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Memory for Political Messages: the Role of Inhibition and Prior Attitudes

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MEMORY FOR POLITICAL MESSAGES:
THE ROLE OF INHIBITION AND PRIOR ATTITUDES

by

Shannon Peterson Callahan

A thesis submitted in partial requirement for the degree of

Master of Science in Experimental Psychology

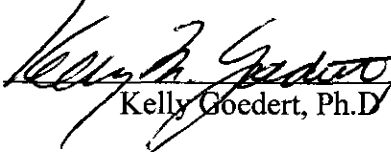
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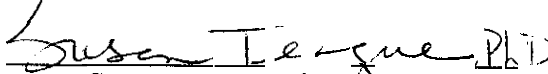
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Dedication

For my wonderful parents, Ellen and Gerard.

Acknowledgments

I would like to thank my advisor, Dr. Janine Buckner, for her unending support, assistance, enthusiasm, and patience throughout this process. I would also like to thank the members of my committee, Dr. Kelly Goedert and Dr. Susan Teague, for their excellent guidance and input. In addition, I would like to thank Dr. Marianne Lloyd and Dr. Susan Nolan for their assistance and advice, Dr. Andrew Simon and Dr. Michael Vigorito for providing me with the computers needed for my study, and my lab assistants Charee Marquez and Zuly Fuentes for their help with data collection. I'd also like to acknowledge Dr. Taber and Dr. Lodge at Stony Brook University for allowing me to use their study materials. Last, I'd like to thank my fellow graduate students for their encouragement, my mother Ellen for her superior proofreading, and my boyfriend Matt for keeping me sane.

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Abstract

Retrieval-induced forgetting (RIF) is a phenomenon wherein repeatedly accessing a portion of information causes decreases in memory for related information that is not practiced (Anderson, Bjork, Bjork, 1994). This study applied the retrieval practice paradigm commonly used in cognitive research to persuasive political statements in order to understand the cognitive implications that selective exposure to political messages may have. This study had a mixed design, with retrieval practice agreement (proattitudinal or counterattitudinal), attitude extremity (neutral, moderate, extreme), gender, and practiced issue (affirmative action or gun control) as between subject variables and item practice status (retrieval practiced, non-practiced/shared stance, non-practiced/shared issue, and non-practiced/different issue) as a within-subjects variable. As it was hypothesized that participants' attitudes might moderate RIF effects, attitude strength and extremity for each issue were assessed as well as potential moderating variables. Participants ($n=124$) were presented all sentences in the study phase, were given 3 trials of retrieval practice for 5 sentences from one stance, and then a recognition task determined participants' accuracy and response time in distinguishing all original sentences from lures (inversions of those original sentences). Analysis (controlling for attitude strength and retrieval practice accuracy) failed to reveal any signs of RIF for hit or false alarm rates or in reaction times, but attitude extremity did affect recognition: while there was no difference between unpracticed items for neutral participants, moderate participants had lower hit rates for unpracticed control items relative to unpracticed items from the same issue as the practiced items. Males showed more false alarms for unpracticed/same stance items relative to all other items while females showed fewer false alarms for these items. While there was no clear evidence of RIF, this research may contribute to future studies on this topic.

Introduction

Forgetting, according to many memory theorists, is a critical process. Although it is often thought of as a negative phenomenon by the public at large, this process enables us to avoid being bogged down by irrelevant or outdated information and helps us access relevant, useful information (e.g., Storm, Bjork, Bjork, & Nestojko, 2006). Hence, despite the irritation that comes with forgetting information that is neither irrelevant nor outdated, forgetting is a highly adaptive process.

Forgetting is not just adaptive according to memory theorists but can also be very adaptive to politicians and those with political interests. For example, politicians may wish their negative attributes (and their opponent's positive attributes) to be forgotten by voters, as well as any scandals or previous positions that have since been changed. The longstanding careers of certain politicians demonstrate that this kind of forgetting may sometimes occur.

Our attitudes about political issues as well as political candidates may be affected by what we forget: if we can only recall the arguments in favor of an issue and none opposing it, we may well have a favorable attitude towards that issue. While research has shown that in certain tasks memory is equally good for the arguments we disagree with as well as the arguments we agree with (Eagly, Kulesa, Brannon, & Hutson-Comeaux, 2000), there is another body of research that suggests retrieving a part of one's knowledge about a topic may cause the information that was *not* retrieved but is *related* to what was retrieved to be inhibited in memory; this phenomenon is known as *retrieval-induced forgetting* (Anderson, Bjork, & Bjork, 1994). In other words, repeatedly retrieving the arguments in favor of an issue might make the arguments that oppose an issue less accessible.

The purpose of this study is to examine whether retrieval-induced forgetting can occur for political attitudinal statements; in other words, whether political messages can be inhibited. In the first section, the major findings from the retrieval-induced forgetting research will be reviewed as well as some relevant findings from research on attitudes. In the second section, the rationale for the study will be elaborated and the study's design will be laid out.

Background

Retrieval-Induced Forgetting

Remembering can sometimes lead to forgetting. This may seem like a paradoxical statement, but research into the phenomenon of retrieval-induced forgetting suggests that this is not the case. Retrieval-induced forgetting (RIF) is the phenomenon wherein retrieving a subset of items detrimentally affects later memory for other items associated with the same cue that were not retrieved (Anderson, Bjork, & Bjork, 1994). While there are certain conditions that need to be met for RIF to occur as well as some moderating variables associated with this effect, in general it is thought to be a robust phenomenon (Bäuml, 2007; Norman, Newman, & Detre, 2007).

Retrieval-Practice Paradigm

Retrieval-induced forgetting is typically tested by using the retrieval practice paradigm. There are three main phases to this paradigm: study, retrieval practice, and a final test. In the study in which Anderson, Bjork, and Bjork (1994) first identified this effect, participants learned category-exemplar word pairs (e.g., *Fruit-Banana*, *Fruit-Orange*, *Occupation-Lawyer*). They then engaged in retrieval practice by completing word stems for half of the exemplars in some of the categories (e.g., *Fruit-Or__*). There were therefore exemplars that were practiced, related exemplars from the same category as the practiced exemplars that were *not* practiced and

unrelated, unpracticed exemplars that served as a control. Following a distracter task, participants' memories for all category-exemplar word pairs were assessed in a final recall test. Not surprisingly, there was a facilitation effect of retrieval practice: the practiced exemplars (e.g., *Fruit-Orange*) were recalled more than exemplars that were not practiced. However, within the exemplars that were not practiced, those from the control set (e.g., *Occupation-Lawyer*) were recalled more than the unpracticed/related set (e.g., *Fruit-Banana*). This weakened recall of *related* unpracticed items relative to *unrelated* unpracticed items was deemed retrieval-induced forgetting.

Theories of Retrieval-Induced Forgetting

From the start, the effects of RIF were attributed to inhibition (Anderson, Bjork, & Bjork, 1994) and by far the most widely accepted theories have been inhibitory. The most common explanation is that non-practiced items compete with practiced items and therefore their memory representations are temporarily made less accessible (Anderson, 2007; 2003). This is attributed to the executive control mechanism of memory that overcomes interference: inhibition. This executive control mechanism is presumed to have evolved to help organisms selectively retrieve relevant information in the face of interfering/distracting information; in other words, inhibition enables us to control our thoughts. There are findings from neuroscience that support this theory: repeated selective retrieval leads to less activation in the areas of prefrontal cortex involved in cognitive control (Kuhl, Dudukovic, Kahn, & Wagner, 2007). This suggests that there is less demand in the regions that detect conflict (anterior cingulate cortex) and resolve conflict (right ventrolateral PFC) following suppression of competing information. This decrease in activation appears to be positively correlated with forgetting of competing memories. Additionally, recent

research indicates that individuals with ADHD do not show normal levels of RIF, as presumably they are less able to inhibit competing thoughts (Storm & White, 2009).

While this theory is seemingly accepted by a majority of researchers (Storm, Bjork, & Bjork, 2007) an alternate inhibitory explanation is offered by Saunders and MacLeod (2006). They argue that instead of suppressing memory representations as Anderson suggests, inhibition may limit the spread of activation of memory traces. Their research suggests that activation can spread throughout and between categories; if this was an unlimited process the memory system would quickly become overwhelmed with data and would not be able to function. It is necessary, therefore, that some mechanism must inhibit the activation of memories. Saunders and MacLeod argue that it is *this* inhibition that takes place in RIF: an inhibition of the associative connections between items. More research is needed to explore the possible inhibition at work in RIF.

Furthermore, not all explanations of RIF are inhibitory. The findings of the original study of RIF (Anderson, Bjork, & Bjork, 1994) could be explained in non-inhibitory terms: the association between the practiced exemplars and their cues may have become so strong due to the retrieval practice that they blocked the retrieval of other exemplars (e.g., Raaijmakers & Shiffrin, 1981). However, such “blocking theories” cannot accurately explain all the properties of retrieval-induced forgetting (see the properties of RIF, below).

A non-inhibitory explanation of RIF has also emerged from “strategy-disruption” work (e.g. Dodd, Castel, & Roberts, 2006; see also Basden et al., 1977). This theory holds that retrieval practice forces participants to recall words in a manner inconsistent with the strategy they employed while learning the word pairs, and this is what disrupts their ability to later recall the words. Thus, it is not that unpracticed/related items are inhibited *per se* so much as participants’ strategies to recall these items are disrupted. To empirically test this function, Dodd,

Castel, and Roberts (2006) manipulated items that were accessed during retrieval practice, such that participants were asked to recall either 1) the last five items they had studied, 2) every other word, or 3) words that were randomly selected from the studied items. Based on previous work, they predicted that in the first two conditions, retrieval practice was unlikely to disrupt retrieval strategies as the overall pattern in which the items were learned was maintained, and in fact, in these conditions *no RIF was found*. In the third condition, where the random selection of words was inconsistent with the pattern in which participants had learned the items, Dodd et al. found effects consistent with RIF. They note that not all the findings in the RIF literature can be explained in terms of strategy disruption (see the explanation of cue independence below), but they instead suggest that either strategy disruption may be an important component of RIF or other noninhibitory theories may account for different RIF effects.

Properties of Retrieval-Induced Forgetting

For over a decade, researchers have examined RIF and several general properties of this phenomenon have been identified. One is that the impairment of unpracticed/related items that follows RIF is “cue independent” (Anderson & Spellman, 1995; Anderson & Bell, 2001). If the items are tested with a novel cue, unpracticed related items are still inhibited relative to baseline. This is known as the “independent probe” technique: if *Fruit-Orange* is practiced and *Fruit-Banana* is not, *Banana* will be inhibited even if is tested by using *Monkey-B* ___ as a retrieval cue. Therefore, it is not the association between the category and exemplar that is inhibited but the memory item itself. In short, this suggests that “blocking theories” cannot adequately account for the RIF phenomenon because they cannot adequately account for all the properties of RIF identified thus far as blocking cannot account for cue independence (Anderson, 2003).

Another property of RIF is “retrieval specificity” (Anderson, Bjork, & Bjork, 2000)- a single trial of retrieval practice is both sufficient and necessary to induce inhibition (Macrae & MacLeod, 1999). When items are strengthened through repeated exposure instead of retrieval, there is still a facilitation effect for practiced items, but the inhibition effect for unpracticed/related items is no longer seen. This is presumably because inhibition only occurs where there is competition that needs to be resolved: when certain exemplars need to be actively recalled there is interference from the other possible exemplars. This interference is not present when studying intact category-exemplar pairs. Furthermore, the act of retrieval does not need to be successfully accomplished: when participants engaged in retrieval-practice trials where it was impossible to complete the task, they still showed inhibition (Storm, Bjork, Bjork, & Nestojko, 2006). Apparently, it seems to be the act of retrieving that causes competing items to be inhibited, not whether the attempt is ultimately successful.

Related to the idea of retrieval specificity is “interference dependence.” RIF only happens when unpracticed/related items interfere with practiced items (Anderson, 2003). If the retrieval practice task does not lead to competition between these items (e.g., *Fruit - Orange*), unpracticed/related items show little inhibition (Anderson et al., 2000). Additionally, stronger items seem to be more vulnerable to the effects of RIF; that is, unpracticed/related exemplars that are most strongly associated with a category show more forgetting than exemplars that are weakly associated with the same category (Anderson, Bjork, & Bjork, 1994). Presumably, strong unpracticed items interfere more with the practiced items and this increase in competition calls for an increased need to inhibit the unpracticed item. Conversely, unpracticed items should interfere less with practiced ones, and their decreased likelihood of competing with the practiced items do not call for as much inhibition. Thus, *Apple* would be more inhibited if *Fruit-Orange*

was practiced because it is strongly associated with the category; *Guava* might be less inhibited for many participants because it is not as strongly associated with the category. Furthermore, multiple practice trials lead to a larger effect because as practiced items are retrieved more often, unpracticed/related items become stronger competitors (Storm, Bjork, & Bjork, 2008; Johnson & Anderson, 2004).

However, while the strength of the unpracticed item affects RIF, the strength of the practiced item does not. As the work on repeated study exposure shows, practiced items can be strengthened without affecting unpracticed/related items (Anderson et al., 2000). These findings all add to the idea that inhibition is the result of interference between unpracticed items and practiced items and this interference is dependent upon the strength of the unpracticed item. Even if one memory is stronger than another, if the memories do not compete with each other (that is, one was not retrieved at the expense of another) there is no need for inhibition to take place.

In another effect that can be attributed to interference dependence, Bäuml and Kuhbander (2006) discovered that inducing negative moods in participants prior to retrieval practice causes RIF effects to disappear; the same effect was not found when positive or neutral moods were induced. Presumably, this is due to the different processing strategies associated with different moods: negative moods are associated with item-specific processing where items are processed according to their distinctive features; therefore unpracticed items do not interfere with practiced items (regardless of conceptual similarity) and inhibition is unnecessary. However, those in positive and neutral moods use more relational processing where items are processed according to their shared features. Essentially, this is the type of processing described above that can lead to RIF by producing interference between items.

Another aspect of interference dependence is the finding that items that participants were instructed to remember were more inhibited following retrieval practice than items from a list that participants were instructed to forget (Storm, Bjork, & Bjork, 2007). Those items that participants intended to remember caused more interference with practiced items and so they were most inhibited of all the words; those items that participants did not intend to remember offered less interference and so they were inhibited less. Thus, intending to remember something does not protect it from forgetting: it actually makes it more vulnerable to inhibition because this intention seems to make it a stronger competitor.

An extension of interference dependence is the finding that encoding specificity does not seem to protect against cross-category inhibition (Anderson & Spellman, 1995). Inhibition of baseline items, which are from different categories, may occur whether the control items are similar to practiced items (unpracticed/similar) or whether they are only similar to unpracticed/related items (unpracticed/dissimilar). This is also known as second-order inhibition. For example, if *Red-Blood* is practiced, the unpracticed/similar item *Food-Strawberry* will be impaired because *Strawberry* interferes with *Blood* as they are both red. If *Red-Tomato* was not practiced, the unpracticed/dissimilar item *Food-Cracker* will be inhibited because *Cracker* and *Tomato* are both foods and *Tomato* interferes with *Blood* (as they are both red). Thus, commonalities to items that are directly inhibited can make an item vulnerable to inhibition; this cross-category inhibition can be as strong in magnitude as within-category impairment shown to unpracticed/related items. In general, interference of any sort by the unpracticed items can lead to inhibition.

One property of RIF that is still relatively unknown is the duration of inhibition following retrieval practice. While it appears to last for at least 20 minutes (Anderson & Spellman, 1995),

it also seems to reinstate over time. In a study by MacLeod and Macrae (2001), when participants were tested 24 hours after retrieval practice, they showed no RIF. Interestingly, if the retrieval practice took place *after* a 24 hour delay, then RIF was still present. This may suggest that retrieval-induced forgetting could be quite long-lasting if retrieval-practice occurs often, and if this is spread out over a long time period, the inhibition may be even more durable (Anderson, 2003). Not enough research has been done as of yet to know whether inhibition is short- or long-lasting (Anderson, 2007; Anderson & Spellman, 1995). However, research does suggest that it does not seem to be permanent: the effects can be not only eliminated but also reversed. Indeed, in one study by Storm, Bjork, and Bjork (2008), items that were inhibited were more strongly recalled after relearning than control items (e.g., those that were never inhibited).

Boundaries on Retrieval-Induced Forgetting

Conceptual interconnections between items sharing a retrieval cue can render items less vulnerable to inhibition; thus, integration seems to be a moderating variable for RIF (Anderson & McCulloch, 1999). If during the study phase participants are instructed to find associations between the exemplars (or spontaneously do so without instruction, as some participants do) they will show less or no inhibition compared to participants who are not instructed to find associations between the items and do not spontaneously do so. This finding suggests that complex knowledge structures such as schemas (Tesser, 1978) that integrate different pieces of information can protect this information from being inhibited by selected retrieval. It also suggests why certain bits of information that are not consistent with schemas can be forgotten: their poor fit with the schema causes them to be less integrated and therefore vulnerable to inhibition. Additionally, integration may be related to the probability of linking practiced and unpracticed items; it may occur most when practiced and unpracticed/related items are very

Retrieval-induced forgetting for sentences

Moreover, sentences have also been subject to inhibition following retrieval practice. Anderson and Bell (2001) examined inhibition for factual knowledge by using propositional statements as stimuli (e.g., *The actor is looking at the tulip*) and found that retrieval practice led to impaired recall of sentences that shared subjects (e.g., *The actor is looking at the violin*), shared objects (e.g., *The teacher is lifting the violin*) and shared relations (*The teacher is looking at the book*). They also found that statements that were related to competing facts were inhibited. This cross-category inhibition was not due to semantic similarity between the objects but was based on their episodic relationship (that is, both *violin* and *tulip* were associated with *actor*). The impairment for shared-subject sentences was attenuated when the sentences were integrated; the researchers attempted to minimize integration but found incidental levels were still present. To explain this pattern, Anderson and Bell posited that facts which fit our beliefs may be integrated well into our schemas and are therefore protected from inhibition; moreover, according to this theory, facts that do not fit our beliefs may be more vulnerable to being forgotten.

Gómez-Ariza, Lechuga, and Pelegrina (2005) further expounded upon this idea in a study employing propositional sentences that were either thematically related (by familiar scripts) or were unrelated to each other. Sentences that were practiced were recalled more and sentences that were thematically related were recalled more, but the interaction between these two variables was not significant: the magnitude of RIF was the same for related and unrelated sentences. This suggests the episodic link between the thematically unrelated sentences is sufficient to produce inhibition and preexisting relationships between the sentences are not

sufficient to change the magnitude of the effect. Additionally, the thematic relations and feature overlap were not sufficient to evoke integration.

Variations on the retrieval practice paradigm

While certain variations of the original retrieval practice paradigm, such as those described above, have altered the study stimuli, other experimental work has manipulated the study phases employed in the research designs. While a competitive retrieval practice phase is sufficient to produce RIF, it does not seem to be necessary. For instance, in a study by Bäuml (2002), participants were asked to generate novel but related items from their semantic memory, and subsequent measures of memory for the original studied items revealed inhibition effects.

Tests beyond cued and free recall have shown inhibition. Findings of early work with recognition measures were initially inconsistent (Koutstaal, Schacter, Johnson, & Galluccio, 1999 as cited in Gómez-Ariza et al, 2005) but there have now been several studies where unpracticed/related items show longer response latencies and less accuracy in recognition than practiced and control items (Radvansky, 1999; Spitzer & Bäuml, 2007; Gómez-Ariza et al., 2005; Hicks & Starns, 2004). The general findings of recognition tasks are that when identifying previously seen items, participants are slower and less accurate (even if asked to think carefully about the source of the item); retrieval practice does not seem to affect their ability to recognize that new items are lures (items not previously seen but similar to old items; Hicks & Starns, 2004; Spitzer & Bäuml, 2007). The finding that this effect is present with recognition measures has been critical: not only does it allow the use of more complicated stimuli but it also adds credence to the inhibition theory of RIF. Thus, when an item is inhibited, it should be inhibited for multiple measures of memory (Hicks & Starns, 2004). In fact, using a recognition task enabled Spitzer and Bäuml (2007) to conclude that retrieval practice seems to reduce the general strength

of unpracticed items, which would affect people's ability to recognize as well as recall these items. Lastly, implicit tests have also been used to detect RIF, though this was found only for conceptual tests (such as category generation and category verification) and not found for tests that are more perceptual (such as word stem completion and perceptual identification; Perfect et al., 2002).

Retrieval-Induced Forgetting and Social Cognition

The findings of retrieval-induced forgetting have been extended somewhat into the field of social cognition. RIF has been found to exist for personality traits (MacLeod & Macrae, 2001) suggesting that retrieving certain aspects of a person's identity inhibits other aspects. However, this effect is somewhat more complex than originally thought: inhibition in personality traits can be moderated by the magnitude of a person's belief in stereotypes (Dunn & Spellman, 2003). Traits that are associated with stereotypes strongly endorsed by participants are forgotten less often, despite alternative traits being subject to retrieval practice. This is presumed to be due to the fact that stereotypes are the type of complex-knowledge structures that enable integration of information and prevent inhibition from taking place (in effect, they are person schemas). Therefore, some attitudes and beliefs do seem to play a role in retrieval-induced forgetting, specifically because they can affect how information is processed.

Research suggests that this inhibition of personality traits can have behavioral consequences. For example, retrieval practice has been shown to lead to biased decision making for job candidates. In a study by Igelesias-Parro and Gómez-Ariza (2006) participants read descriptions of two potential candidates for a job where the two candidates were either strong (in that they both had positive attributes) or weak (in that they both had negative attributes). Later on, they were asked to recall either these qualities (strong or weak) or irrelevant qualities for one

of the candidates. Interestingly, the strong candidates' positive characteristics (e.g., *persuasive*) were inhibited when participants were asked to retrieve personality characteristics that were irrelevant for the job (e.g., *left-handed*), and as a result, participants were more likely to hypothetically hire the other strong candidate. This same effect was not seen for weak candidates: practicing irrelevant personality characteristics did not inhibit that candidate's negative attributes (e.g., *aggressive*) and there was no difference in which candidate was selected for the hypothetical job. This may be due to the negativity bias we have when we perceive other people; negative attributes are distinctive and memorable and therefore may be difficult to inhibit.

Retrieval-induced forgetting has been applied to eyewitness memory as well. When participants were asked to retrieve certain details of a crime scene, recall for other details that were not retrieved was impaired (Shaw, Bjork, & Handal, 1995). Furthermore, while using a similar paradigm in which participants retrieved information about items taken from a crime scene, MacLeod and Saunders (2005) demonstrated that unpracticed/related items are more vulnerable to the introduction of misinformation; in fact, no misinformation effect was found for practiced items. In other words, it is the inhibition of items following retrieval practice that seems to cause participants to recall incorrect information. The correct items were less accessible than the misinformation items and so participants were less able to correctly identify which items were stolen.

Cuc, Koppel, & Hirst (2007) have recently proposed that there is also socially-shared retrieval-induced forgetting (SS-RIF). In their study, participants (listeners) who listened to other participants (speakers) selectively retrieve information showed inhibition for the related information that was not retrieved relative to unrelated information not retrieved. This effect was found for category-exemplar word pairs as well as episodes of stories, but only when listeners

were instructed to monitor the speakers for accuracy. This instruction presumably led the participant to covertly and concurrently retrieve the information along with the speaker. Additionally, when free-flowing conversation replaced retrieval practice (in that the listeners and speakers jointly recounted the story), inhibition was found for those episodes of the story that had not been discussed in the conversation. In this condition, participants did not need to be instructed to monitor one another for accuracy to see SS-RIF. These findings suggest that more forgetting occurs in listeners when speakers mention a portion of information about a topic and are silent about the rest than when the speakers do not discuss the information at all. Thus conversation can affect our memories, and not only for simple stories used in the laboratory: SS-RIF has been found following conversations about one's memories of September 11, 2001 (Coman, 2008) and about traumatic events by combat veterans with post-traumatic stress disorder (Brown, 2008).

Attitudes

The term *attitude* can refer to an evaluation towards any number of objects (Maio & Olson, 2000). For the purposes of this study, the focus will be restricted to what might broadly be considered attitudes for political issues.

Selective Exposure

Selective exposure is a broad term that can have many possible meanings but is often used to refer to the idea that people prefer information that is congruent with their beliefs (Sears & Freedman, 1967). This has more recently become known as the confirmation bias (Jonas et al., 2001). While early research simply suggested people attend more to congruent messages than incongruent messages (Brock & Balloun, 1967), the evidence for selective exposure to

information has been inconsistent (e.g., Sears & Freedman, 1967; Kunda, 1990; Pomerantz, Chaiken, & Tordesillas, 1995).

The effect does not seem to be as clear-cut as seeking out congruent information and avoiding incongruent information. For example, strong, congruent messages and weak, incongruent messages are preferred to strong, incongruent messages and weak, congruent messages (Kleinhesselink & Edwards, 1975). Lowin (1967) theorized that this is because there are two strategies that individuals employ to maintain a belief system: incongruent/nonsupportive information can be avoided or it can be sought out and challenged. Whether a person avoids or approaches the nonsupportive information is based upon how likely it seems that the information can be refuted: weak arguments are easy to refute and are approached, but strong arguments are more difficult to refute and tend to be avoided. Weak supportive information is also avoided because it does not help to maintain a belief system (rather, it weakens it). The approach/avoid distinction is similar to the two types of defense against attitude threat posited by Chaiken et al. (1999): people either engage in *passive defense*, where incongruent information is avoided or screened out, or *active defense*, where incongruent information is challenged. The type of defense people use depends upon factors such as their processing capacity as well as how committed they are to their attitudes.

Several additional moderating variables beyond “perceived refutability” have been identified for selective exposure. When people expect to need to defend their attitude in a debate, they seek out the incongruent information; interestingly, this effect is not seen when they expect to defend their attitude in an essay (Canon, 1965). This is possible due to an expectation that in a debate, an active defense of one’s attitude will be needed. Additionally, when people are in positive moods, they do not show a strong preference for congruent information, but when they

are in negative moods they prefer information that is supportive of their beliefs (Jonas, Graupmann, & Frey, 2006). The amount of information available can influence whether people prefer congruent or incongruent information: if the choice is between just 2 pieces of information, people select the incongruent information but if more pieces of information are offered, people select the congruent information because it requires less effort (Fischer et al., 2008). In most cases, the information that is selectively sought out is supportive/congruent but when people are high in defensive confidence (they believe they can defend their beliefs from attack), they selectively expose themselves to incongruent information (Brannon et al., 2007).

These differences in preferences for information may stem from differences in motivation. All reasoning is motivated, but there are different goals that can influence how information is sought out and processed (Kunda, 1990). *Accuracy goals* lead to reasoning that is more accurate and less biased (e.g., Fiske & Taylor, 1991); both congruent and incongruent information is sought out. These goals may be activated if the issue is something participants are highly involved in (e.g., Petty & Caccioppio, 1999). There are also *directional goals* (also known as *partisan goals*, Kruglanski & Webster, 1996) in which a person is motivated to arrive at a particular conclusion. When these goals are activated, people engage in biased memory searches to find information that supports the hypothesis they want to support. In other words, people seek congruent information. Indeed, people show faster reaction times for memories and beliefs that can support their desired conclusion, which suggests these memories are more accessible (and more highly schematized) when directional goals are activated (Sanitioso et al., 1990 as cited in Kunda, 1990).

Motivation also affects what kind of defense strategy a person uses (Chaiken et al., 1999): presumably, it is more threatening to people to be challenged on those issues that are important

to them and evoke committed attitudes (which are often more controversial issues); they therefore are more motivated to defend these attitudes actively instead of passively. In support of this hypothesis is evidence that suggests people process counterattitudinal (incongruent) information for longer periods of time than proattitudinal (congruent) information (Edwards & Smith, 1996; Ditto, 1998). They are also more critical of incongruent information than congruent messages; this effect is known as *motivated skepticism* (Ditto & Lopez, 1992; Taber & Lodge, 2006). As Chaiken et al. (1989) have posited, these messages are scrutinized more carefully and for longer periods of time so that they might be refuted.

This effect, too, is not without moderating variables: attitudinal ambivalence affects processing time (Clark, Wegener, & Fabrigar, 2008). Participants with ambivalent attitudes are motivated to seek information that will reduce their ambivalence and avoid information that will increase it. As proattitudinal (congruent) information generally reduces ambivalence and counterattitudinal (incongruent) generally increases it, participants with ambivalent attitudes do *not* show greater processing time for counterattitudinal information; instead, they show greater processing time for the proattitudinal information. In other words, they do not scrutinize the information that is likely to increase their ambivalence.

Theoretically, it seems as if these directional biases in information processing should lead to attitude polarization: congruent information is sought out and assimilated and incongruent information is avoided or counterargued. This seems as if it should cause attitudes to be more extreme. However, the findings for this theory have been inconsistent. A seminal research study by Lord, Ross, and Lepper (1979) showed attitude polarization following selective exposure; however, attempts to replicate and refine this study have failed (e.g., Pomerantz, Chaiken, & Tordesillas, 1995).

Taber and Lodge (2006) argued that at least some of the inconsistent findings are due to the fact that the political arguments that had been used in prior studies were “affectively tepid (p.764).” Instead, they used actual arguments taken from political interest groups, which were decidedly more affectively charged. With their more contentious arguments, they found both a confirmation bias (selective exposure for congruent information) and a disconfirmation bias (motivated skepticism). Among participants who showed these two biases, there was indeed more attitude polarization. The effect was stronger among participants with stronger attitudes as they presumably had more motivation to defend their attitudes (Abelson & Prentice, 1989, as cited in Taber & Lodge, 2006); those who were more politically sophisticated also showed more polarization. The effect was not seen among participants with the weakest and least-informed attitudes. They did not show biases in reasoning, presumably because they did not have sufficient motivation or knowledge to do so.

Memory for Attitudinal Messages

As established, selective exposure is not as universal an effect as was once thought: people do not necessarily seek out congruent information at the expense of incongruent information. Similarly, while it was once thought that people had selective *memory* for congruent information, this effect too does not seem to be as strong. The *congeniality effect* is the principle that people are better at recalling information that supports their attitudes than the information that does not support it (Eagly et al., 1999). While there are persuasive theoretical reasons to believe that proattitudinal information should be recalled more effectively, empirical findings have been inconclusive and moderating variables like plausibility of information have been identified (Johnes & Aneshansel, 1956, as cited in Eagly et al., 1999). One meta-analysis for the congeniality effect revealed that not only was it a small effect ($d = .23$), but one that weakened

over time: use of stricter methodology has resulted in even smaller effect sizes (Eagly et al., 1999) suggesting that methodological artifact (e.g., non-blind coding) may contribute to the effect. The effect appears to be stronger for issues high in value relevance (those issues that are related to beliefs that are important to us) but weaker when issues are high in outcome relevance (those issues that have important consequences in our lives) and controversiality; there was no effect of overall familiarity with the issue. It may be that different issues may evoke different motivations in reasoning: high value relevance might lead to a directional goal which in turns elicits a passive defense (the person would rather screen out incongruent information because their attitude is important to them), whereas outcome relevance seems to lead to accuracy goals in reasoning as the potential impact of the issue in people's lives encourages them to think carefully about this issue (e.g., Petty & Cacioppo, 1999; Petty & Wegener, 1998). As many of these factors may lead to different processing, it was suggested that the issues used in these experiments be carefully considered with regards to their value and outcome relevance and controversiality (Eagly et al., 1999). Additionally, in the studies where there were significant differences in memory between proattitudinal and counterattitudinal information, there were inconsistencies in what information was favored: only 60% showed the congeniality effect. The other 40% showed improved memory for incongruent information.

That memory should sometimes be better for counterattitudinal memories should not be surprising considering the findings regarding active defense: counterattitudinal messages are often scrutinized for longer periods than proattitudinal messages so that they might be refuted (Edwards & Smith, 1996). In an experiment to test the congeniality effect, Eagly, Kulesa, Brannon, Shaw, and Hutson-Comeaux (2000) asked participants to list what they were thinking as they listened to the messages. Pro-attitudinal messages evoked global thoughts (e.g., "I agree")

but counterattitudinal thoughts evoked more oppositional and issue-relevant thoughts (e.g., “But only 40% of the public approves of abortion”). This systematic processing of counterattitudinal messages led participants to remember counterattitudinal and proattitudinal messages equally well; proattitudinal messages do not need the amount of processing to be remembered because they fit well with existing attitudes/schemas (Eagly et al., 2001).

The null congeniality effect found by Eagly et al. was found despite what might have been several potential moderating variables: whether the test was recognition or recall, whether participants were tested immediately or after 2 weeks, whether participants were presented with statements that were aligned with one or both sides of the issue, whether participants were activists or undergraduate psychology students, whether participants had a lot or little prior knowledge of the issue, and whether participants’ attitudes were relatively weak or strong, counterattitudinal and proattitudinal information was recalled equally well. However, Eagly et al. theorized that less controversial issues sometimes used in previous studies might not evoke active defense (that is, participants may be less motivated to counterargue) when compared to the hotly contested issues such as abortion, the death penalty, and homosexuals in the military used in their study and as such the issues would not lead to differentiated thoughts. Without these oppositional, critical thoughts, the congeniality effect may be present.

Attitude Strength

In general, strong attitudes are those attitudes that are stable over time and influence behavior and action (Krosnick & Petty, 1995). There are many different aspects to attitude strength, such as the attitude itself (e.g., extremity), its structure (accessibility, quantity of information, and organization of the schema), how it is formed (amount of careful evaluation),

and subjective beliefs about the attitude (e.g., certainty, importance, and personal relevance; Krosnick & Petty, 1995).

Two areas that have received special attention in research are importance and accessibility. Importance refers to a person's subjective concern about the issue and seems to be related to self-interest, social identification, and value relevance (Bonniger, Krosnick, & Berent, 1995). Accessibility refers to how easily the attitude comes to mind and is thought to be a structural feature of the attitude object's representation and the person's attitude towards that object; those links that are stronger are more accessible (Fazio, 1995). Furthermore, accessibility and importance seem to be causally related: attitudes that are important are more accessible, but merely making an attitude more accessible does not change its importance (Bizer & Krosnick, 2001).

Attitude strength has been shown to play a moderating role in several areas of research. Strong attitudes (specifically, important attitudes) are more resistant to persuasion; this seems to be a function of how motivated a person is to resist attitude change and has both affective and cognitive components (Zumerink & Devine, 1996). Attitude strength can moderate the amount of selective exposure: stronger attitudes are associated with higher levels of exposure to proattitudinal information (Brannon et al., 2007; Holbrook et al., 2005; Sweeney & Gruber, 1984).

Attitude strength also seems to play a moderating role in how attitudinal statements are remembered. Eagly et al. (2000) found that attitude strength did have an effect on memory, but it affected incongruent and congruent information equally. Those with stronger attitudes remember more of the messages, regardless of whether these messages were proattitudinal or counterattitudinal. Further research suggests this difference in memory may be related to how

relevant the attitude is. Participants for whom an attitude was highly relevant showed greater accuracy in recall and recognition for information relevant to that attitude (Holbrook et al., 2005). However, this effect ($d = .26$) was only found when the tasks were timed and participants were permitted to spend as long as they liked thinking about the statements. It was completely eliminated when the recall and recognition tasks had a designated pace that participants had to follow, which suggests the greater accuracy is due to selective elaboration. That is, participants were selective in devoting their cognitive resources: when given the time, they thought more about the attitudes that are relevant to them. Thus, attitude strength also seems to affect how information is processed.

Attitude strength is also thought to be related to knowledge structures or schemas. Attitudes towards issues that are not important to an individual seem to follow an agreement-based organization: this is a bimodal schema where information is organized as either agreeing or disagreeing with our own attitude (McGraw & Pinney, 1990). Furthermore, there are few to no associations or interconnections between these pieces of information (facts, beliefs, etc); they are presumed to be linked only to the attitude object and not to one another (Berent & Krosnick, 1995). However, those political attitudes that *are* important to us are organized differently: there are a variety of dimensions (e.g., philosophical arguments involved, veridical facts, rights involved, typical supporters, typical opponents, etc.) and more interconnections between the individual pieces of information (Berent & Krosnick, 1995). This difference in structure is presumably due to the fact that people think about the attitudes and issues that are important to them; the deeper processing leads to more elaborate structures. Research suggests that it is these knowledge structures that enable information relevant to important attitudes to be more

memorable: the structure of the schemas facilitates accessing memories with speed and accuracy (Krosnick, 1989).

Political sophistication

Related to the concept of attitude strength is the notion of political sophistication, or expertise about politics. People who are politically sophisticated are presumed to possess more elaborate and efficient political schemas, as they can recall information and make inferences about that information more so than those who are not politically sophisticated (Fiske & Kinder, 1981). Furthermore, people who are politically sophisticated seem to respond differently to news media than those who are not politically sophisticated. They are less likely to have their opinion changed by the media (de Vreese & Boomgaarden, 2006; Iyenger et al., 1984) but are more likely to learn/acquire information from the news (Rhee & Cappella, 1997). These differences do not seem to be just due to their being exposed to more news but due to underlying differences in processing. Again, this may be due to their superior political schemas: they are better adept at assimilating and organizing this information and are more interested in doing so (Luskin, 1990).

Theories of Political Cognition

Two information-processing models are relevant to political thought: memory-based processing and on-line/impression-driven processing. In on-line processing, people integrate relevant information into an overall attitude; when an evaluation is called for, they retrieve the already-formed attitude. In memory-based processing, however, people do not integrate information as they receive it but instead simply store it. When an evaluation is needed, they retrieve that information from memory, process it, and then form an evaluation (Hastie & Park, 1986).

Research suggests memory-based processing is dependent on the information that can be recalled (and is therefore more associated with both context and valence of information recalled) and that on-line attitudes are more accessible than memory-based attitudes because they are already formed (Tormala & Petty, 2001). What type of processing a person uses may often depend upon the goals the person has: if they intend to form an impression, they will use on-line processing but if they have no specific goal (or a goal that might otherwise inhibit impression formation, such as memorization) they use memory-based processing (Hastie & Park, 1986).

While Zaller and Feldman (1992) theorized that the average person does not have on-line processing for political issues because they would be overwhelmed by the amount and complexity of information, McGraw, Lodge, and Stoh (1989) found evidence of this type of processing in candidate evaluation. In their study, they found it was not the specific information that was accessible that determined a person's evaluation of a political candidate but instead evaluations were predicted by participants' impressions about the candidate. In a follow-up study, McGraw, Lodge, and Stoh (1990) found evidence that political sophisticates seem to use on-line processing more while nonsophisticates are more likely to use the memory-based method. This difference may explain why those who are not politically sophisticated often show recency effects in their evaluation (the information encountered later affected their impression more than earlier information): their evaluations require accessing their memory for relevant information and the most recent information is often the most accessible. Later research also indicates that people were less likely to use on-line processing when there is subjective uncertainty and ambivalence associated with the candidate (McGraw et al., 2003).

Research suggests that not all pieces of information contribute to the impression equally: issues that are important to a person have more of an impact (McGraw et al., 1990). Additionally,

those impression-based attitudes seem to be held with more certainty, are correlated more with other evaluations, and are more predictive of behavior; these effects cannot be attributed only to the differences in accessibility associated with on-line processing (Bizer et al., 2006). Thus, on-line processing seems to lead to the formation of stronger attitudes than memory-based processing.

There is a form of “hot cognition” hypothesized to be an extension of the on-line political processing model. It seems that sociopolitical concepts that have been previously evaluated are automatically charged with affect; in other words, our stored impressions are linked automatically to emotions (Lodge & Tabor, 2000). This emotional valence is activated within milliseconds when participants are presented with political stimuli (leaders, groups, issues, and ideas). In effect, this valence serves as a motivational factor and affects subsequent cognitions and evaluations of the stimuli (Morris et al., 2003).

Measuring Political Attitudes

Public opinion

researchers, political scientists, and psychologists are generally in agreement regarding the fact that people’s attitudes are inconsistent. The common finding is that identical questions asked six months apart will only evoke the same response in 45-55% of responders (Zaller & Feldman, 1992). This sort of inconsistency (or unreliability) led Converse (1964) to declare not only ‘an end to ideology’ in the sense that attitudes were no longer organized according to conservative or liberal schemas, but an end to ‘true attitudes’ as well, if by ‘true attitudes’ one means a stable, significant attitude. He argued that most people lack meaningful, consistent attitudes about policy and political issues and essentially engage in a mental coin flip when answering questions. While this theory has dominated political science and political psychology for several decades

(see Jost, 2006 for a discussion), there were some who felt these denouncements of ideology and attitudes were extreme. Achen (1975) argued that people do have 'true attitudes' but the nature of surveys makes it difficult to measure them; people's attitudes are nuanced and rarely map onto the response format exactly and their responses may furthermore be affected by social desirability.

More recently, it was theorized that people's attitudes are probably somewhere between what was described by Achen (1975) and Converse (1964). Zaller and Feldman (1992) argue that while it is incorrect to say people do not have meaningful attitudes, they most probably have too much ambivalence and inconsistency to have what could be described as 'true attitudes.' Instead, people have a large number of 'considerations' about an issue (a reason for favoring one side of the issue) that may be only partially consistent. When asked their opinion, they engage in hasty and incomplete memory searches in which the most salient considerations are called to mind; thus, response measures do not really measure 'true attitudes' but what considerations were most accessible. For people who think about issues often, they have multiple considerations accessible and their response will be an average of those considerations (Anderson, 1974) but others who do not think about the issue often may only have the consideration that is at the 'top of their head' (Taylor & Fiske, 1978), or spontaneously, available and that this will be the consideration that is used for decision making.

This model can account for response effects such as how different questions that precede an item can evoke different responses (Tourangeau & Rasinski, 1988) and how priming by TV newscasts leads to differential political attitudes (Iyengars et al., 1991; Morris, 2007). Context and priming cause different considerations or arguments to be made more accessible. The model can also explain the effect noted by Bishop, Oldendick, and Tuchfarber (1984): survey questions

do not simply measure attitudes but are used by people to determine what their attitudes ‘are.’ That is, many people’s attitudes are not formed until they are forced to think about them (as also predicted by the memory-based processing models of attitudes). However, Zaller and Feldman do note that this model is not claiming that individuals’ responses are not authentic. Their responses are based on real considerations and therefore on real feelings. Simply because people may have variation in their attitudes does not make their attitudes less genuine; they are simply less consistent and are often context specific.

While Zaller and Feldman are political scientists, their model not only incorporates psychological research but is similar to other cognitive and social psychological theories. There is a parallel to the theory of attitudes as ‘temporary constructs’ (Wilson & Hodges, 1991) that are constructed from a large and inconsistent ‘data base’ of ideas. Tourangeau and Rasinski (1988) theorized that attitude measures do not evoke ‘true attitudes’ but instead begin a process wherein people use the item to identify the issue, search their mind for relevant thoughts, integrate these thoughts into a coherent attitude, and then map that attitude onto the response options. Furthermore, the idea of multiple considerations fits with the notion of numerous attitudes made possible by various schemas (Tesser, 1978).

The Present Study

These two bodies of research regarding retrieval-induced forgetting and political attitudes are brought together in the present study, which investigates retrieval-induced forgetting for political attitudinal statements.

Rationale

Extending Research for Retrieval-Induced Forgetting

One motivation for this research is to add to the knowledge base regarding the types of stimuli that show retrieval-induced forgetting effects. This effect has already been greatly

expanded from the initial category-exemplar pairs used in Anderson, Bjork, and Bjork (1994), and it is of theoretical interest to see if the same effects that have already been found for relatively simple prepositional sentences (Anderson & Bell, 2001; Gómez-Ariza, et al., 2005) are found for more complex and abstract sentences as well as ideas.

Understanding Effects of Selective Exposure

Selective exposure to political information certainly occurs in our daily lives. Politicians and their staff may be selectively controlling what information people are presented, or people may select the information themselves. Technology has allowed for the proliferation of news sources, which has resulted in what some researchers refer to as a “fragmented mass media environment” (West, 2001 as cited in Morris, 2007). As a result, many people no longer receive their news from homogenized (and sometimes more balanced) television news but instead can seek out news sources more consistent with their political perspective. People are less likely to hear counterattitudinal messages from these fragmented media sources: an analysis of the information presented on the Fox News Channel indicated that their coverage of the Iraq invasion was more supportive than the other news networks and contained more Republican partisan messages (Aday, Livingston, & Herbert, 2005). Similar effects have been found for the New York Times and CBS Evening News: these sources have been shown to have more liberal messages (Groseclose & Milyo, 2005).

What effects might this selective exposure have on people’s attitudes? Indeed, even when controlling for other factors like political party, in 2004 a person whose only source of news is Fox was more likely to think the war was going well at the time, more likely to think positively about President Bush and negatively about Senator Kerry, and less likely to think the United States was divided (Morris, 2007). These same effects were not found among other TV news

audiences. Morris concluded that those who watched Fox News exclusively had a slightly different view of reality than other audiences. It is unlikely that this effect is restricted to Fox News. As there is research that suggests a left-ward bias among many mainstream media sources (Groseclose & Milyo, 2005), those whose sole source of news is the New York Times may also have different attitudes and perceptions. Indeed, regardless of the direction of the bias, relying on one biased news source increases exposure to one-sided messages.

Could these effects possibly be partially explained by inhibition? If so, what might the implications of inhibition for political thoughts be? Although attitudes are generally inconsistent in predicting behavior (correlations have ranged from $-.20$ to $.73$; Glasman & Albarracin, 2006), attitudes that are accessible are more likely to guide behavior (Fazio, 1989; Glasman & Albarracin, 2006). Presumably, this is because memories are available to guide both decisions about behaviors and how relevant information is processed (Fazio, 1989). By inhibiting certain thoughts, other thoughts may be made more accessible and therefore may have more of an impact on behaviors from responses to survey questions (Zaller & Feldman, 1992) to voting behavior.

Television news has been shown to increase accessibility of certain information and affect evaluations of the president (though not among political sophisticates; Iyender et al., 1984). Outside the laboratory, among Independents, usage of Fox News was more associated with voting for President Bush and usage of CNN as a news source was associated with voting for Senator Kerry (Morris, 2007). While it is important to remember that this effect is a correlation, it is still possible that it may be partially attributable to the inhibition effect demonstrated by Igelesia-Parro and Gomez-Artiz (2006): retrieving the irrelevant attributes of a candidate made that candidate's positive attributes less accessible and participants were more likely to choose the

candidate's competitor. Perhaps by focusing on Senator Kerry's irrelevant attributes (e.g., his penchant for windsurfing) instead of his positive attributes (his military service, his Senate experience), those positive attributes were inhibited for some voters. In their eyes, Senator Kerry went from a decorated veteran to a 'girlie man' (Rich, 2004).

Another intriguing element of the 2004 election is that advertisements from a group known as the Swift Boat Veterans for Truth caused many people to question Senator Kerry's reputation as a "war hero" (Devlin, 2005). Inhibition may help explain this phenomenon as well: memories that are inhibited by retrieval-induced forgetting are more susceptible to the misinformation effect (MacLeod & Saunders, 2005). If for either candidate irrelevant or negative attributes were retrieved by partisan news sources at the expense of positive attributes, the candidate's positive attributes might have been inhibited; perhaps people who relied primarily upon such news sources had memories that were more vulnerable to the introduction of misleading information by others.

Lastly, inhibition may also help explain how collective forgetting of political events can sometimes occur (Cuc, Koppel, & Hirst, 2007). A main justification given by the Bush Administration for the invasion of Iraq was that Saddam Hussein had weapons of mass destruction and was an imminent threat. This justification turned out to be untrue. If alternate justifications (such as the importance of bringing democracy to the Middle East) are retrieved now by individuals and the news media, the role of weapons of mass destruction in the build-up to war may become less important. It is possible that repeated selective retrieval of certain justifications for the current war could cause the justification regarding weapons of mass destruction to be all but forgotten by some people. Again, motivation is an important factor here:

people who supported the war may be motivated to forget (perhaps to reduce their cognitive dissonance) while those who were opposed to the war may be highly motivated to remember.

This is an important caveat. As was mentioned above, while importance causes attitudes to be more accessible, simply causing attitudes to be accessible will not make them more important to the person (Bizer & Krosnick, 2001). Furthermore, as the research into on-line processing by political sophisticates demonstrates, not all people's attitudes and evaluations depend upon which information is accessible (McGraw, Lodge, & Stoh, 1990). If selective exposure does alter the accessibility of information through inhibition, this may not necessarily have an effect on the person's attitude. A person's motivation is also important. It is possible that the resistance to change associated with important attitudes (Eagly et al., 2000; Krosnick & Petty, 1995) will also be a resistance to inhibition: although there are events in Senator Kennedy's career that could possibly interfere or compete with the Chappaquiddick car crash scandal, some people may not forget this incident because they are motivated *not* to forget (Leibovich, 2009). Additionally it must be mentioned that focusing on irrelevant attributes did not cause everyone to forget Senator Kerry's positive attributes and the Veterans for Truth ads did not cause everyone to doubt his service record. Those who had strong support for Senator Kerry (or for the Democratic Party) were not as affected by these ads as those who supported President Bush or were undecided (Devlin, 2005). It may be that those who are not politically sophisticated are more vulnerable to these effects. It may also be that selective exposure can only lead to polarization of existing political attitudes, not complete attitude change.

Research Questions

The intention in this study was to examine whether retrieval-induced forgetting (RIF) would be observed for attitudinal statements about political issues. There were reasons to both predict this effect as well as reasons to expect not to see it.

On the one hand, the same pattern of results for political attitudinal statements as seen in previous findings could have been observed (e.g., Anderson & Bell, 2001; Gómez-Ariza et al., 2005). That is, one could have expected that practicing a subset of information would lead unpracticed but related items to be forgotten. As was stated earlier, if this form of inhibition is an adaptive process and a side-effect of how we update our memories (Storm, Bjork, Bjork, & Nestojko; Anderson, 2001), then the same pattern of inhibition should be present for attitudinal statements. Furthermore, as it has already been found for a variety of other types of knowledge structures, it may not be unreasonable to expect that attitudinal statements should be no different from any other type of stimuli already studied using the RIF paradigm.

On the other hand, attitudinal statements about issues like abortion or the death penalty are very different from typical stimuli used in the past (e.g., “fruit: orange” or “The banker is the yard”). Furthermore, as has already been reviewed, political scientists have argued that sociopolitical concepts are automatically affectively charged (Lodge & Taber, 2000) and memory researchers have shown that negative moods can moderate RIF (Bäuml & Kuhbander, 2007). In addition, social cognitive research in retrieval-induced forgetting suggests that attitude structures such as stereotypes can moderate the effect of inhibition (Dunn & Spellman, 2003). It is therefore possible that people’s attitudes towards the issues in this study may affect the amount of integration observed.

Additionally, while there is evidence for attitudinal research that suggests proattitudinal and counterattitudinal messages are remembered equally well in certain tasks (Eagly et al., 2000) there is also evidence that these messages are not always processed the same way (Edwards & Smith, 1996; Eagly et al., 2000). Instead, they are processed differently depending upon the person's motivation (Kunda, 1990), political sophistication (Fiske & Kinder, 1981), attitude extremity (Clark et al., 2008), and other variables. Consequently, it was possible that these factors would have a moderating effect on retrieval-induced forgetting. Furthermore, there is some possibility that political orientation and general interest in politics also might have served as potential moderating variables, as some researchers theorize that conservative and liberal ideologies are basic cognitive and motivational predispositions (Jost, 2006) and amount of self-reported interest in politics may affect participants' motivation to engage in active defense (Tabor & Lodge, 2006).

Additionally, the degree to which participants spontaneously integrated related information without explicit instruction to do so may have served as a moderating variable (Anderson & McCulloch, 1999). Research also suggests that males and females differ in their default processing styles. If they are not instructed to use a particular strategy, females tend to use a more effortful and elaborative approach while males use a heuristic approach that focuses on cues (Meyers & Maheswaran, 1991). Due to these differences in processing strategy, gender may also moderate RIF.

Therefore, the first hypothesis was that retrieval-induced forgetting and facilitation effects would be observed for attitudinal statements about political issues. The second hypothesis was that retrieval-induced forgetting/facilitation would be affected by participants' level of agreement with the items they practiced retrieving. The third hypothesis was that retrieval-

induced forgetting/facilitation may be affected by variables such as participants' attitude strength or extremity, gender, political orientation, self-reported political interest, or political sophistication.

Method

Participants

Participants were 133 undergraduate students recruited from the departmental human subjects research pool. Four participants were excluded from analysis for failing to follow directions. An additional 5 were excluded for falling more than 2 standard deviations below the mean on the retrieval practice task, as this indicated that they correctly completed less than 24.8% of the sentences. The final sample therefore consisted of 124 participants (73 female, 2 not reported).

An a priori power analysis ($\alpha = .05$, $\beta = .15$) indicated that for an effect size F of .33 with 2 groups and 4 repetitions, a total n of 54 was required (G*Power 3, 2007). A second power analysis with the same parameters as the first but that additionally accounted for a covariate called for a total n of 91 (G*Power 2, 1998). A post hoc power analysis ($\alpha = .05$) indicated that for an effect size F of .25 with 9 groups and 4 repetitions, a total n of 124 yields a power of .99.

Design

This experiment was a 2 x 2 x 2 x 3 x 4 mixed design and controlled for attitude strength and retrieval practice accuracy. The between-subjects variables were retrieval practice item agreement (counterattitudinal or proattitudinal), issue (affirmative action or gun control), gender, and attitude extremity (neutral, moderate, or extreme). Item agreement, gender, and attitude extremity were variables that were hypothesized to affect retrieval-induced forgetting/facilitation, and issue was included to control for unintended differences in topics. The within-subjects variable was retrieval practice item status: practiced, unpracticed/same stance, unpracticed/opposite stance, and unpracticed/ different issue (which served as control items). To clarify this distinction between items, if the participant practiced retrieving statements in favor of

gun control, these statements would comprise the practiced item set; other pro-gun control statements that were not practiced would be unpracticed/same stance items; the anti-gun control statements would be unpracticed/opposite stance, and both pro- and anti- affirmative action statements would be unpracticed/different issue (again, the control items).

The final test in this study was a recognition task. As such, the dependent variables were accuracy and latencies of responses (RT) for each participant and each retrieval practice condition (Gómez-Ariza et al., 2005). For accuracy, both participants' hit rates and false alarm rates were considered, where hit rates were calculated as the participants' frequency in correctly identifying a previously seen item as *old* divided by the total number of old items, and false alarm rates were calculated as the frequency that participants incorrectly identified a new item as *old* divided by the total number of *new* items. Latency (RT) was determined by the average time for a participant to make a response in each practice condition (Gómez-Ariza et al., 2005).

Political Issues

A pilot survey was undertaken to identify two political issues to use for stimuli. The survey asked students for self-reported political interest and knowledge and their political affiliation and orientation. They were also asked to rate their interest, knowledge, perceived self-relevance, and perceived controversiality of nine potential topics (welfare, gun control, defense spending, gay rights, healthcare, affirmative action, and foreign policy towards North Korea). These issues were taken from relevant news at the time and were chosen for the survey by the investigator. The goal was to identify two topics that were rated similarly moderate in terms of personal knowledge, value relevance, and controversiality, as prior research suggests that these can be moderating factors in memory for attitudinal statements (e.g. Eagly et al., 1999, Eagly et al., 2001, Holbrook et al., 2005).

The pilot survey was administered to two summer-session sections of introductory psychology ($n = 29$). Students indicated their political orientation on an 11-point scale (Kroh, 2007), with 1 indicating “strongly liberal,” 6 indicating “neutral,” and 11 indicating “strongly conservative.” The most frequent reported orientation was neutral ($n = 9$) and the sample skewed somewhat towards the left with a mean orientation of 5.19 or “somewhat liberal.” Concerning political affiliation, 65.5% identified themselves as Democrats, 20.7% as Republicans, 6.8% as Other, and 6.9% as having no affiliation. Students also indicated their self-reported interest and knowledge in politics on a 7-point Likert scale. The most frequent response for both was that subjects “somewhat agreed” that they were both interested ($M = 4.10$, $SD = 1.97$) and knowledgeable ($M = 4.48$, $SD = 1.75$) in politics.

With regard to the individual issues, participants rated on an 8-point scale how interested in the topics they were, how relevant they felt the topics were in their lives, how knowledgeable they considered themselves to be for the topics, and how controversial they considered the topics to be. For this scale, 0 indicated “no interest/relevance/knowledge/ controversy,” 4 indicated “moderate” and 7 indicated “high” interest/relevance/etc. The mean scores for each issue can be seen in Table 1. Overall, the nine issues evoked approximately moderate ratings from participants for all four variables.

Based on the findings from the pilot survey and the availability of reliable scales and piloted material (Taber & Lodge, 2006), affirmative action and gun control were selected. These issues were rated similarly along the four dimensions by the pilot sample and t-tests confirmed that there were no significant differences between these ratings (all $p > .05$). Foreign policy towards North Korea was selected for use as a filler issue.

Table 1

<i>Mean Issue Ratings</i>				
	Interest	Knowledge	Relevance	Controversiality
Welfare	4.41 (2.11)	3.86 (1.67)	3.76 (2.49)	4.86 (1.94)
Gun Control	4.79 (1.87)	3.79 (1.73)	3.41 (2.34)	5.00 (2.02)
Defense Spending	5.2 (1.7)	3.79 (1.77)	4.93 (1.99)	5.46 (1.93)
Gay Rights	3.97 (2.28)	4.18 (2.20)	2.9 (2.01)	6.39 (1.17)
North Korea	3.69 (2.35)	2.89 (1.79)	3.1 (2.24)	4.39 (2.13)
Healthcare	6.24 (1.57)	4.79 (1.73)	6.48 (1.43)	5.71 (1.51)
Affirmative Action	5.07 (1.9)	4.21 (1.73)	4.38 (2.41)	5.35 (1.57)

Note: Numbers in parentheses indicate standard deviations.

Measures

Attitude Scales

For the present study, the Gun Control and Affirmative Action Batteries (Tabor & Lodge, 2006) were used to measure both attitude strength (measured on a 100 point sliding scale) and attitude position/extremity (six 9-point Likert items; see Appendix A for all scales). The variables were assessed separately because strength and extremity are thought to be two separate dimensions in attitudes (Petty & Krosnick, 1995), and in previous studies correlations between strength and extremity have never exceeded .20. In prior use, both scales for both issues were shown to be reliable, with standardized item α exceeding .72. However, in the present study strength was reliable for both scales (gun control $\alpha = .88$, affirmative action $\alpha = .84$), but position was not as reliable (gun control $\alpha = .57$, affirmative action $\alpha = .66$). The correlation between position and strength remained low for both issues (gun control $r = -.20$, affirmative action $r = .20$);).

With the position/extremity scales, lower scores indicated more favorable opinions towards the issues. Scores could range from 6 to 54, with 30 being a neutral score. Overall, mean position was positive for both gun control ($M = 22.38, SD = 6.79$) and affirmative action ($M = 27.45, SD = 7.94$). In addition to identifying participants' positions on the issues, the absolute value of their position on the experimental issue was used to group participants by their attitude extremity, as this indicated how far from neutral their positions were. Scores from 0-7 were classified as neutral ($n = 61$), scores from 8-15 were classified as moderate ($n = 53$), and scores from 16-24 were classified as extreme ($n = 10$). Scores on the strength scale were converted to ratios, with lower scores indicating weaker attitudes. Overall, mean strength was moderate for both gun control ($M = .55, SD = .22$) and affirmative action ($M = .50, SD = .21$). These attitudes are consistent with the results from the pilot study- these were issues that were described by most participants as neutral or moderate.

Other scales

As differences in political sophistication might potentially be a moderating variable (Fiske, Kinder, & Larter, 1983), a five-item index of political sophistication (Delli Carpini & Keeter, 1993) was included. These five questions were taken from an item analysis of the National Election Survey, with higher scores indicating greater political sophistication. In previous work this Index was shown to be reliable ($\alpha = .71$) and to perform well relative to the longer NES surveys ($r = .91$). However, in the present study it was not as reliable ($\alpha = .61$). The mean sophistication score was 2.78 ($SD = 1.42$), which suggests that the overall sample was neither extremely politically sophisticated nor extremely naïve.

Another potential moderating variable was the degree to which participants spontaneously integrated information, which was measured by using the spontaneous integration

questionnaire developed by Anderson & McCulloch (1999). For this scale, lower scores indicate lower integration, and the mean score was 3.12 ($SD = .84$), indicating that most participants reported integrating related items “some of the time.” This scale was reliable ($\alpha = .83$).

Lastly, self-reported interest in politics and political orientation were measured through the use of a Likert-scale item that is frequently used to assess political attitudes and is considered to be both reliable and valid (e.g. Ommundsen & Larsen, 1997). For political orientation the 11-point political orientation scale has been demonstrated as having the highest validity and reliability of left-right scales (Kroh, 2007); lower scores indicate more liberal political orientation. The mean political orientation was 6.16 ($SD = 2.41$), indicating most participants identified themselves as neutral. By collapsing orientation scores into categories, participants were grouped as conservative ($n = 52$), liberal ($n = 39$), and neutral ($n = 31$). For political interest, lower scores indicate higher agreement with the statement presented; the mean score across participants was 3.66 ($SD = 1.75$), thus indicating in response to the statement “I would consider myself highly interested in politics,” most participants fell between “somewhat agree” and “neither agree nor disagree.”

Stimuli

The arguments that Taber and Lodge (2006) used were from the pamphlets and websites of issue-relevant interest groups such as the National Rifle Association, the NAACP, and the Republican and Democratic parties. The arguments were constructed to have similar complexity in the form of sentence length, average number of syllables, words per sentence, sentences per argument, and so forth to avoid potential processing biases (Cobb & Kuklinski, 1997; Petty & Cacioppo, 1981). However, since the arguments in the Taber and Lodge study consisted of short paragraphs, it was necessary to modify the material to fit the RIF paradigm which utilizes

sentences rather than short paragraphs. To do this, the paragraphs were broken or condensed into 10 sentences for each category and the original phrasing was maintained as much as possible (see Appendix B for all stimuli). While constructing the sentences length, number of words ($M = 13.9$, $SD = .68$), and average number of syllables ($M = 22.5$, $SD = 1.9$) were controlled for.

The stimuli for retrieval practice were modeled after Gómez-Ariza et al.(2005): participants were asked to perform a sentence completion task in which they were asked to insert missing words (cued by word fragments) in sentences that were either seen previously or had never been viewed before. The fragments provided the first two letters of the word as cues. The word fragments were approximately every third and ninth words of the sentence, with some variation so that it was the key terms in the sentences that needed to be completed. There were no three letter words that needed to be completed and no duplicate word fragments were used in different sentences. For each issue stance, 5 different combinations of 5 retrieval practice sentences were constructed. The combinations of sentences were randomly selected, with the restrictions that no sentence be used more than once in each version, no sentence be used more than 3 times altogether, and no sentence appear in the same position in multiple versions.

In previous research, when constructing lures for recognition tasks, the subject from one sentence would be paired with the predicate from another sentence within the same category (e.g., Gómez-Ariza et al., 2005). Unfortunately, the same practice could not be used with the present stimuli since the subjects and topics were not interchangeable. Lures were instead constructed by inverting the structure of each sentence (e.g. the original sentence “Black students may feel stigmatized if others feel they were only admitted because of color” was altered to read “If others feel they were only admitted because of color black students may feel stigmatized”). In some instances, this process required small alterations in conjunctions and verb tense.

Procedure

The procedure for this study is summarized in Figure 1. The study was conducted using desktop computers with E-Prime software. Participants were randomly assigned to issue and retrieval practice versions, and semi-random assignment was used to assign participants to conditions. Participants were first tested for their attitudes towards the two issues. While this is not ideal as it might have potentially activated participants' political self concept (Markus & Kunda, 1986), assessing attitudes after potentially altering the accessibility of certain political thoughts may result in a less accurate attitude measure than would come from assessing them before the manipulation (Zaller & Feldman, 1992), especially if selective exposure leads to attitude polarization (Tabor & Lodge, 2006). The attitude scale was immediately scored so that participants could be matched to the appropriate stance according to their condition (e.g., if the participant was assigned to the disagree condition and her responses indicated she was pro-affirmative action, she received a version with anti-affirmative action retrieval practice sentences).

During the study phase, participants were instructed to try to memorize the sentences as they would be asked about them later (Gómez-Ariza et al, 2005). They were then presented with the 40 test and 6 filler stimuli. Each sentence was presented for 8 seconds (Anderson and Bell, 2001) in both visual and auditory form (read by a text-to-speech voice synthesizer), as it was thought that this dual presentation would ensure that participants attended to the material. The sentences were block randomized: there were ten blocks consisting of one randomly selected sentence from each test category with the constraint that no sentence shared the next sentence's category (Spitzer & Bauml, 2007). The first and last three sentences presented were always fillers. Following the completion of the study phase, participants were given a series of

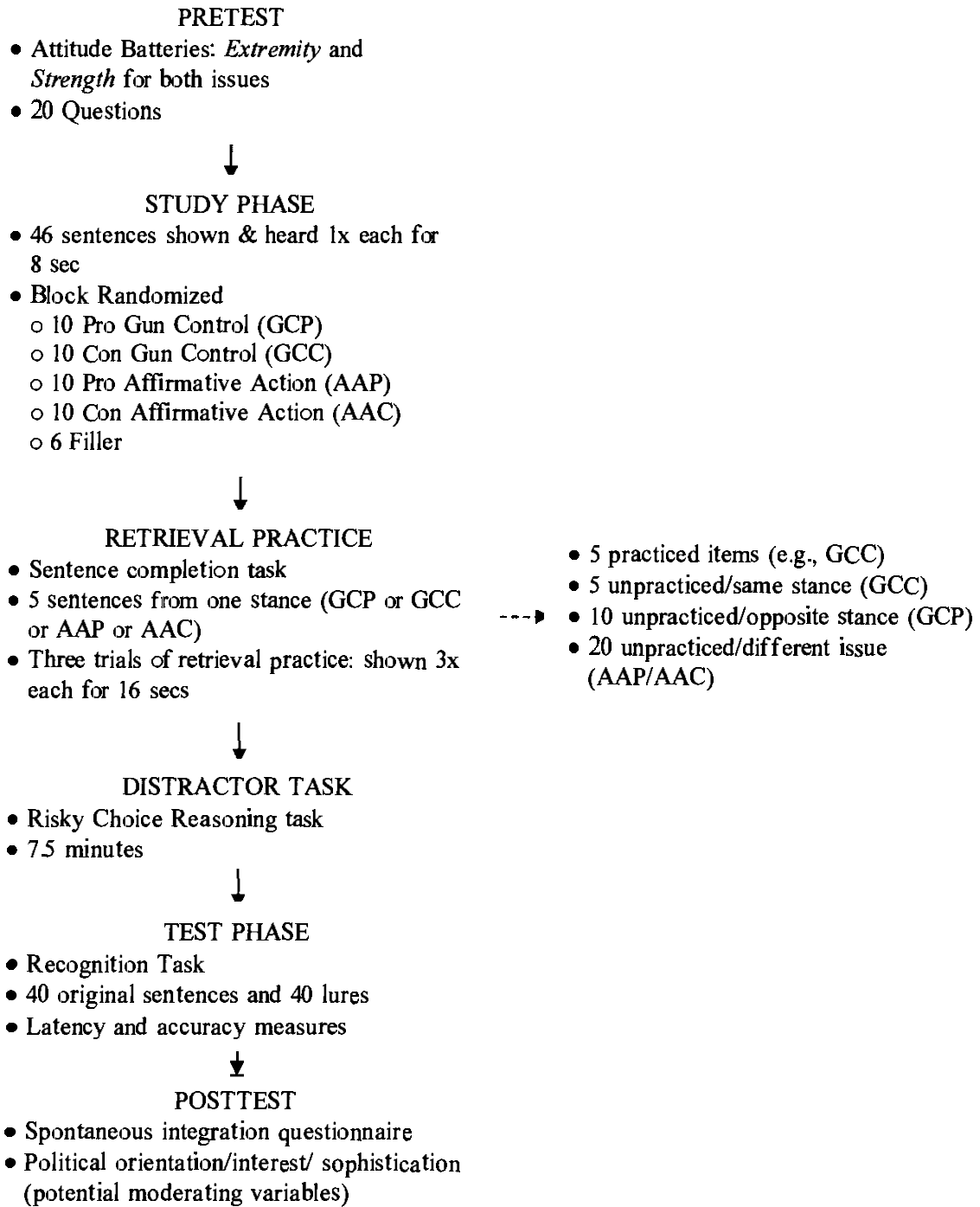
arithmetic problems and instructed to solve as many as possible in 60 seconds (Spitzer & Bäuml, 2007) to serve as a recency control.

During the retrieval practice phase, participants were asked to complete a sentence completion task. Participants were informed that they would be tested more than once for each sentence and that no sentence was impossible to complete. They were instructed to try hard to complete the sentence before it disappeared from the screen and three filler sentence fragments were presented as practice. The sentence fragments were 5 sentences previously encountered during the study phase and each fragment appeared for 16 seconds (Anderson & Bell, 2001) during which time participants were instructed to fill in the missing words using the keyboard. There were three trials in which the five sentence fragments were presented, with the order of sentences remaining consistent.

For the distracter task, participants spent 7.5 minutes doing a risky-decision reasoning task (Spitzer & Bäuml, 2007) taken from Tversky and Kahneman (1981). During the recognition task, participants were asked to complete a memory task where they would be shown sentences that had been previously presented to them as well as new sentences. Participants were instructed to hit a button on the keyboard marked “yes” if they thought the sentence was old, a button marked “no” if they thought the sentence was new, and to try and be as fast and accurate as possible. During the post-test phase, participants were asked to complete the measures for the potential moderating variables (spontaneous integration, political interest, political orientation, and political sophistication). Upon completing the post-test phase, they were debriefed and thanked for their participation.

Figure 1.

Procedure



Results

Criterion for significance for all analyses was set at $\alpha = .05$ unless otherwise indicated, and the Bonferroni correction was used for all post hoc tests.

Retrieval Practice

Overall mean retrieval practice accuracy was .63 ($SD = .17$). Independent samples t-tests were used to determine if there were differences in retrieval practice accuracy due to issue, gender, or condition. There were no significant differences between the two issues (affirmative action: $M = .62$, $SD = .16$; gun control: $M = .65$, $SD = .18$, $t[122] = -.93$, $p > .1$), between genders (female $M = .64$, $SD = .17$; male $M = .62$, $SD = .18$; $t[120] = .52$, $p > .1$), or between conditions (proattitudinal $M = .62$, $SD = .17$; counterattitudinal $M = .65$, $SD = .174$; $t[121.654] = .413$, $p > .1$). One-way ANOVAs were used to determine if there were differences in retrieval practice accuracy due to topic stance or stance version. There were no significant differences between the four stances (con-affirmative action/AAC $M = .66$, $SD = .15$; pro-affirmative action/AAP $M = .58$, $SD = .15$; con-gun control/GCC $M = .67$, $SD = .18$, pro-gun control/GCP $M = .62$, $SD = .19$; $F[3,120] = 1.936$, $p > .1$) and within each stance, there were no differences between its five versions ($F_s < 2.212$, $ps > .092$).

Although there were no differences in versions, there were differences in accuracy between the sentences in each stance (AAC: $F[9, 470] = 63.13$, $\eta_p^2 = .38$; AAC: $F[9, 494] = 17.48$, $\eta_p^2 = .14$; GCC: $F[9,530] = 32.35$, $\eta_p^2 = .22$; GCP: $F[9,499] = 15.14$, $\eta_p^2 = .12$). Post hoc tests revealed that within each stance, there were multiple sentences that were significantly different from the others (for mean accuracy of each sentence as well as results of the post hoc tests, see Appendix Table 1 in Appendix C).

Retrieval-Induced Forgetting and Facilitation

Hypothesis 1 predicted that retrieval-induced forgetting and facilitation effects would be observed. If *facilitation* were present, practiced items would have greater recognition and faster reaction times than unpracticed items. If retrieval-induced *forgetting* were present, unpracticed/opposite issue (control) items would have greater recognition and faster reaction times than unpracticed/ same stance items and unpracticed/opposite stance items. Again, as the unpracticed/same stance and unpracticed/opposite stance items would presumably compete with the practiced items, they would be subject to inhibition and therefore have lower recognition and slower reaction times relative to the control items.

Hypothesis 2 predicted that retrieval-induced forgetting and facilitation effects would be affected by participants' level of agreement with practiced items. Hypothesis 3 predicted that retrieval-induced forgetting and facilitation effects may be affected by variables such as gender and attitude extremity. If these hypotheses are correct, there would be differences in recognition rates and/or reaction times between these groups.

With these predictions in mind, 2 (condition: Proattitudinal, Counterattitudinal) x 2 (issue: Affirmative Action, Gun Control) x 2 (gender) x 3 (attitude extremity: Neutral, Moderate, Extreme) x 4 (item status: Practiced, Unpracticed/Same Stance, Unpracticed/Opposite Stance, Unpracticed/Different Issue) repeated measures ANCOVAs were performed to determine if retrieval-induced facilitation and retrieval-induced forgetting were present. To control for variability in attitude strength and retrieval practice accuracy, both variables were treated as covariates. This analysis was used for recognition rates and reaction times for hits, false alarms, and a combination of hits and false alarms as lures were essentially semantically identical to the original sentences (van Dijk & Kintsch, 1983 as cited in Zwaan, 1994; see Discussion for further

explanation). In all analyses, the Greenhouse-Geisser correction was used to correct for violation of the sphericity assumption.

Hit Rates

There was no significant main effect of item status ($F[2.53,123]=1.89, p>.1$), which did not support Hypothesis 1: practiced items did not have significantly higher recognition rates than all unpracticed items (no overall retrieval-induced facilitation) and unpracticed/same stance and unpracticed/opposite stance did not have significantly lower recognition rates than control items (no overall retrieval-induced forgetting).

There was a significant Item Status x Attitude Extremity interaction ($F[5.05, 123] = 2.63, \eta_p^2=.05$), which supported Hypothesis 3: there were differences between neutral, moderate, and extreme participants. Specifically, recognition for control items differed by extremity group ($F[2,121]=.581, \eta_p^2=$), as neutral participants showed higher hit rates for control items than moderate participants ($t(110)=2.38, d=.45$, see Table 2 for all means and standard deviations).

Furthermore, this difference in recognition for control items led to a different overall pattern of results for neutral and moderate participants. Neutral participants did not seem to distinguish between the three types of unpracticed items, but moderate participants distinguished between control items and items related to the practiced items. Paired t-tests within these groups (adjusted $\alpha=.0125$ for all tests) revealed that both showed evidence of a facilitation effect in that practiced items had significantly or trends towards greater recognition rates than unpracticed items (neutral: practiced vs. control- $t[60]=3.78, d=.98$; practiced vs. unpracticed/ same stance- $t[60]=3.19, d=.82$; practiced vs. unpracticed/opposite stance- $t[60]=2.38, p=.02, d=.61$; moderate: vs. control- $t[52]=6.20, d=1.72$; vs. unpracticed/same stance- $t[52]=2.30, p=.03, d=.64$, vs. unpracticed/opposite stance- $t[52]=4.25, d=1.18$; tests not conducted for extreme group due to the

low sample size [n=9]). However, while there were no differences between the unpracticed items among neutral participants, among moderate participants the control items had a trend towards fewer hit rates relative to unpracticed/same stance items ($t[52]=2.31, p=.025, d=.64$).

Table 2

Mean Hit Rates of Item Types by Attitude Extremity.

Attitude Extremity	Practiced	Retrieval-Practice Item Status		
		Topic 1 Unpracticed/ Same Stance	Unpracticed/ Opp. Stance	Topic 2 Unpracticed/ Opp. Issue
Neutral	.76 (.22)	.65 (.23)	.67 (.19)	.66 (.12)
Moderate	.76 (.18)	.67 (.25)	.64 (.18)	.59 (.16)
Extreme	.85 (.18)	.54 (.33)	.67 (.17)	.58 (.11)
Overall	.77 (.20)	.65 (.23)	.66 (.18)	.62 (.14)

Note: Numbers in parentheses represent standard deviations.

False Alarm Rates

As was expected by previous research, there was no main effect of item status: false alarm rates did not differ between practiced or unpracticed items ($F[2.57, 123]=1.37, p>.1$). However, there was a Item Status x Gender interaction that was not predicted ($F[2.571, 123]=3.988, p=.012, \eta_p^2=.039$). Specifically, males and females differed in their false alarms for unpracticed/same stance items. An independent samples t-test indicated that not only did males have significantly higher false alarm rates for these items relative to females ($t[120] = 3.022, d=.6$, see Table 3 for means and standard deviations), but paired samples t-tests (adjusted α level = .0125 for all tests) indicated that males had significantly or trends towards greater false alarm rates for these items relative to unpracticed/opposite stance items ($t[48] = 2.44, d=.45$) and control items ($t[48]= 2.12, p=.039, d=.31$). Females not only had fewer false alarms for unpracticed/same stance items relative to males, but also significantly or trends towards fewer

false alarms for these items relative to all other items (vs. unpracticed/opposite stance items- $t[72]=3.22, d=.38$; vs. control items- $t[72]=2.27, p=.03, d=.30$; vs. practiced items- $t[72]=2.11, p=.04, d=.27$). Stated more clearly, men showed the most false alarms and woman showed the least false alarms for unpracticed/same stance items.

Table 3

Mean False Alarm Rates of Item Types by Gender.

Gender	Retrieval-Practice Item Status			
	Practiced	Topic 1 Unpracticed/ Same Stance	Unpracticed/ Opp. Stance	Topic 2 Unpracticed/ Opp. Issue
Female	.44 (.29)	.37 (.30)	.46 (.21)	.44 (.16)
Male	.44 (.29)	.52 (.30)	.41 (.21)	.45 (.17)

Note: Numbers in parentheses represent standard deviations.

There was also a significant Topic x Condition x Attitude Extremity interaction ($F[1,123] = 6.985, p=.010, \eta_p^2=.066$), which was also not predicted. Follow-up analyses revealed a significant Condition x Attitude Extremity effect, but only for those who practiced statements about gun control ($F[2,123] = 3.642, p=.033, \eta_p^2=.117$). Among neutral participants, those who agreed with the gun control statements they practiced had greater false alarm rates than those who disagreed with practiced statements ($t[29] = 3.288, d= 1.22$, see Table 4 for means and standard deviations). There was no such effect among moderate participants who practiced statements about gun control ($t[27]=.47, p>.1$ and no differences among participants who practiced statements about affirmative action ($F[2,123] = .412, p >.1$).

Table 4

Mean False Alarm Rate of Issues by Attitude Extremity and Condition.

	Condition	Affirmative Action		Gun Control	
		Proattitudinal	Counterattitudinal	Proattitudinal	Counterattitudinal
Attitude	Neutral	.458 (.16)	.442 (.16)	.531 (.16)	.358 (.15)
Extremity	Moderate	.484 (.16)	.375 (.16)	.417 (.16)	.445 (.16)
	Extreme	.533 (.15)	.510 (.16)	.370 (.16)	.339 (.16)

Note: Numbers in parentheses represent standard deviations.

Combined Hit and False Alarm Rates

When false alarms were treated as hits, there was not a significant main effect of item status ($F[2.55, 123]=2.3, p>.7$), which again did not support Hypothesis 1: practiced items did not have greater combined hit rates than unpracticed items (no overall facilitation) and control items did not have greater combined hit rates than unpracticed/same stance and unpracticed/opposite stance items (no overall retrieval-induced forgetting).

However, there was an Item Status x Condition interaction ($F[2.546, 123]= 3.101, p=.035, \eta_p^2=.030$), which partially supported Hypothesis 2: participants' agreement with the practiced statements affected their recognition. Those in the proattitudinal condition showed more combined hits for unpracticed/same stance items than those who disagreed with the statements ($t[122]= 2.93, d=.53$; see Table 5 for all means and standard deviations). This difference in unpracticed/same stance items led to a different pattern of results. Specifically, participants showed improved recognition for practiced items (retrieval-induced facilitation) as well as items that they agreed with (congeniality effect).

Paired t-tests (adjusted $\alpha =.0125$ for all tests) revealed that those in the proattitudinal condition had significantly or trends towards greater combined hit rates for items they agreed with, namely practiced and unpracticed/same stance items, relative to unpracticed items they

disagreed with, namely unpracticed/opposite stance and control items (practiced vs. control- $t[61]=3.60, d=.55$; practiced vs. unpracticed/opposite stance items- $t[61]= 3.60, d= .46$; unpracticed/same stance vs. control- $t[61]=2.19, p=.03, d=.34$; unpracticed/same stances vs. unpracticed/opposite stance- $t[61] =2.10, p=.04, d=.28$). Furthermore, there was no significant difference between the items that they agreed with ($t[61]=1.00, p>.1$), although retrieval-induced forgetting would predict that the unpracticed/same stance items would be lower relative to the practiced items.

Those in the counterattitudinal condition also showed a facilitation effect, as they had significantly or trends towards greater combined hit rates for practiced items relative to control and unpracticed/same stance items, despite disagreeing with the practiced items (practiced vs. control- $t[61]=2.19, p=.03, d=.33$; practiced vs. unpracticed/same stance- $t[61]=3.55, d=.48$). In addition, they showed higher combined hit rates for items they agreed with, namely unpracticed/opposite stance, relative to unpracticed items they disagreed with, namely unpracticed/same stance ($t[61]=2.57, p=.013, d=.39$).

Table 5

Mean Combined Hit and False Alarm Rates of Item Types by Condition.

Condition	Retrieval-Practice Item Status			
	Practiced	Topic 1 Unpracticed/ Same Stance	Unpracticed/ Opp. Stance	Topic 2 Unpracticed/ Opp. Issue
Proattitudinal	.63 (.21)	.60 (.23)	.54 (.16)	.54 (.11)
Counterattitudinal	.58 (.18)	.48 (.23)	.55 (.15)	.53 (.11)

Note: Numbers in parentheses represent standard deviations.

Reaction Times

With regards to Hypothesis 1, it was predicted that practiced items would have faster reaction times relative to unpracticed items, and that unpracticed/same stance and

unpracticed/opposite stance items would have longer reaction times relative to control items. Additionally, with regards to Hypothesis 2 it was expected from previous research that counterattitudinal messages would have longer reaction times relative to proattitudinal messages. Neither of these hypotheses was confirmed: there were no main effects of either item status or condition on reaction times.

However, for both hits and combined hits, there was a significant Condition x Gender x Attitude Extremity interaction, which was not predicted (hits: $F[1,123]=5.28$, $\eta_p^2=.05$; combined hits: $F[1,121]=4.51$, $\eta_p^2=.04$). Specifically, among moderate participants there was a main effect of gender for those in the proattitudinal condition (hits: $F[1,25]=7.45$, $\eta_p^2=.25$; combined hits: $F[1,25]=6.00$, $\eta_p^2=.214$) but not for those in the counterattitudinal condition (hits: $F[1,24]=1.81$, $p>.1$; combined hits: $F[1,24]=1.16$, $p>.1$). Moderate females in the proattitudinal condition had significantly faster reaction times for hits and combined hits than moderate males in the same condition (hits: female $M=3077.38$, $SD=1089.21$; male $M=4191.57$, $SD=1136.45$; combined hits: female $M=3181.78$, $SD=1227.89$; male $M=4397.78$, $SD=1227.89$). For false alarms, there was a significant 5-way interaction: Item Status x Topic x Condition x Gender x Attitude Extremity. However, follow-up analyses considering all possible simple main effects did not reveal any significant differences.

Moderating Variables

Hypothesis 3 predicted that retrieval-induced forgetting and facilitation may be affected by many variables: participants' attitude strength, attitude extremity, gender, political orientation, self-reported political interest, and political sophistication. To test this prediction, multiple regression analyses predicting hit, false alarm, and combined hit and false alarm rates were employed, as this seemed an appropriate way to account for the high number of variables. In

Model 1, the covariates (strength and retrieval practice accuracy) were added so that their contribution might be controlled for. In Model 2, the primary variables were added (condition, gender, and extremity) and in Model 3, the potential moderating variables were added (sophistication, integration, interest, and orientation). The standardized coefficients for all significantly contributing models are in Table 6.

In addition, a Pearson’s correlation was performed for interest, integration, sophistication, strength, and retrieval practice accuracy. Sophistication was significantly negatively correlated with interest ($r = -.36, p < .00$) and positively correlated with accuracy ($r = .19, p = .04$): greater political sophistication was associated with higher general interest in politics and higher retrieval-practice accuracy. No other correlations were significant.

Table 6

Significantly contributing models and standardized coefficients by response and item type

Model	Variable	Response Type											
		Hits				False Alarms				Combined Hits/False Alarms			
		Prac.	Unprac. / Same Stance	Unprac. /Opp. Stance	Control	Prac.	Unprac. /Same Stance	Unprac. /Opp. Stance	Control	Prac.	Unprac. /Same Stance	Unprac. /Opp. Stance	Control
	RP Accuracy			.10		-.25**							
	Strength			.23*		-.03							.26*
2	RP Accuracy				.37*								-.20*
	Strength				.09								.16
	Condition				-.03								-.27**
	Gender				.15								.20*
	Extremity				-.23*								-.08
	Topic				-.04								-.00
3	RP Accuracy												-.14
	Strength												.21*
	Condition												-.01
	Gender												-.18†
	Extremity												.06
	Topic												-.17†
	Interest												.03
	Integration												.18*
	Sophistication												-.08
	Conservatism												-.28**
	Liberalism												-.20

Note: ** = $p < .005$, * = $p < .05$, † = $p < .06$

Hit Rates

For practiced and unpracticed/same stance items, none of the models were significant ($F_s < 2.26, p_s > .1$). For unpracticed/opposite stance items Model 1 contributed most to the variance ($r^2 = .06, F[2,119] = 3.74$) and strength was the only significant predictor, with stronger attitudes predicting higher hit rates. For control items, Model 2 contributed most to the variance ($r^2 = .20, F[4,113] = 2.43, p = .05$): accuracy and attitude extremity were both significant predictors, with higher accuracy and less extreme attitudes predicting higher hit rates.

False Alarm Rates

For practiced items, Model 1 contributed most to the variance ($r^2 = .07, F[2,119] = 4.11$), and the only significant predictor was accuracy, with lower retrieval practice accuracy predicting more false alarms. For unpracticed/same stance items, Model 2 contributed most to the variance ($r^2 = .31, F[6,119] = 8.45$). Accuracy, condition, and gender were significant predictors and strength had a trend towards significance, with lower accuracy, proattitudinal statements, males, and stronger attitudes predicting more false alarms. For unpracticed/ opposite stance items, Model 3 contributed most to the variance ($r^2 = .22, F[11,119] = 2.81$). Strength, orientation, and integration were significant predictors and there were trends for gender and topic, with weaker attitudes, conservative orientation, low spontaneous integration, females, and affirmative action as a topic predicting fewer false alarms. For control items, none of the models were significant ($F < 1.282, p > .2$)

Combined Hit and False Alarm Rates

For practiced and control items, none of the models were significant ($F_s < 1.7, p_s > .1$). For unpracticed/same stance items, Model 2 contributed most to the variance ($r^2 = .18, F[6,119] = 4.16$). Accuracy, condition, and gender were significant predictors, with lower accuracy, males,

and proattitudinal statements predicting more combined hits. For unpracticed/opposite stance items, only Model 1 contributed to the variance ($r^2 = .07$, $F[2,119] = 4.36$) and accuracy was the only predictor, with lower accuracy predicting more combined hits.

Overall there was considerable variability between the different items as to which variables predicted recognition. Furthermore, the present models left much of the variance unaccounted for.

Alternate Analyses

In light of previous research, it was possible that participants' memory for statements was unaffected by retrieval practice and instead was more affected by the issues and their attitudes. Therefore, an alternate series of analyses that collapsed items into issue stances (pro or con) and political themes (liberal or conservative) was considered to test for an overall congeniality effect. If a congeniality effect is present, participants will have greater recognition for items they agree with than those they disagree with.

A 2 (attitude position: Pro or Con) x 2 (gender) x 3 (attitude extremity: Neutral, Moderate, Extreme) x 2 (issue stance: Pro or Con) repeated measures ANCOVA (controlling for attitude strength) was conducted for each issue. For both affirmative action and gun control, there was no evidence that participants had better memory for statements that were proattitudinal. Also, a 2 (political orientation: Liberal or Conservative) x 2 (gender) x 2 (political theme: Liberal or Conservative) repeated measures ANOVA revealed no benefit in memory for statements that were consistent with participants' political beliefs.

Discussion

Overview of Findings

Retrieval-Induced Forgetting and Facilitation: Overall

Hypothesis 1 predicted that retrieval-induced forgetting and facilitation effects would be observed for attitudinal statements about political issues. This hypothesis was only partially supported: there was no clear evidence of retrieval-induced forgetting following selective retrieval of political messages in either participants' response rates or reaction times. However, retrieval practice was not without any effect: across the analyses there was evidence of a clear facilitation effect as practiced items consistently had the highest recognition rates, as was predicted.

Theories for Absence of Retrieval-Induced Forgetting

There are several possible explanations as to why RIF was not observed. One possible explanation is that the sentences were integrated, which made the unpracticed items less vulnerable to inhibition (Anderson & McCulloch, 1999). This integration may have resulted from either from the semantic similarity between the sentences or from participants' schemas/attitudes (Anderson, 2003). Even though many of the participants' had more neutral attitudes and were not political sophisticated, it is quite possible that they had knowledge structures that would have promoted integration of these items, especially as the issues and arguments used may have been familiar to most participants.

The null effect may also be accounted for by the interference dependence principle of retrieval-induced forgetting, which is that only unpracticed items that interfere with practiced items are inhibited (Anderson, 2003). If the unpracticed/same stance and unpracticed/opposite stance items did not interfere with the practiced items (as may be the case if they were not

encoded well), this would lessen the need for inhibition. In other words, if the unpracticed items were weak, they might not have competed with practiced items. Similarly, research suggests that participants' mood can affect the level of interference in processing (with negative moods leading to less interference). If some nature of the task (either studying counterattitudinal statements or the repetitive nature of the study phase) induced a negative mood, RIF might not have been observed.

The principle of interference dependence can account for yet an alternate explanation: there was no RIF because of the nature of the control sentences. Although control items were from a different issue, they were still similar to the practiced items in that they were complex statements about political issues. It is possible that these items could have competed with practiced items and were therefore equally vulnerable to inhibition as unpracticed/same stance and unpracticed/opposite stance items. If these items were inhibited, it would be very difficult to identify, because there are no items to compare them to. Furthermore, what was considered a competing statement may have been affected by participants' attitude: neutral participants might have considered any statement that was not practiced to be competing, regardless of whether the items were from the same stance, same issue, or different issue as the practiced statements. For moderate participants, it may be that only statements from a different issue were perceived as competing with the practiced statements, as their more elaborate schemas for the practiced issue would enable them to integrate and recall statements from both stances of the issue. If this is so, control items may have been inhibited. The pattern of results for moderate participants does show that hit rates are lowest for control items, but whether this actually reflects inhibition cannot be said.

A final explanation stems from the nature of the test phase: recognition tasks have been considerably less consistent in finding retrieval-induced forgetting (Gómez-Ariza et al, 2005) and when RIF has been present, it is often a smaller effect (Anderson, 2003). It is therefore quite possible that RIF was not found in the present study because of how the memory was assessed.

In short, there are many possible theories as to why RIF was not observed in the present study. Unfortunately, the present study does not indicate which (if any) of these theories is the most accurate.

Retrieval-Induced Forgetting and Facilitation: Agreement

Hypotheses 2 predicted that retrieval-induced forgetting/facilitation would be affected by participants' level of agreement with the items they practiced retrieving, which was also only partially supported. The null effect for RIF held constant regardless of participants' agreement with the messages they practiced, but proattitudinal and counterattitudinal participants did show different patterns of results for combined hit rates.

Effect of Agreement on Combined Hit Rates

In the present study, there was a relatively high overall false alarm rate ($M = .44$, $SD = .22$). This is most likely due to the nature of the lures: unlike previous recognition RIF studies, the lures were not entirely new sentences but were created by alterations in the syntax of the original sentence. This method resulted in lures that were essentially identical to the original sentences. According to van Dijk and Kintsch (1983, as cited in Zwaan, 1994), there are three levels at which text is represented in our memories. The first level is the surface code, or the verbatim sentence. The next level is textbase, which contains the sentence's propositions or ideas, but not in their original order. The last level is the situation model, which represents a combination of the textbase with prior knowledge. What representation the participants use

appears to depend upon time, as the surface code seems to be used immediately after reading while the textbase is used after a delay (e.g. Reder, 1982). Furthermore, the perspective of the reader is important: surface codes are stronger when a reader believes she is reading literature while situation models are stronger when she believes she is reading a newspaper (Zwaan, 1994).

According to this research, in the present study due to the delay and the nature of the stimuli (which are more similar to news items than literature), participants probably relied upon the textbase of each sentence during the recognition test. This could very likely account for their high false alarm rates: they no longer had access to the surface codes that would help them distinguish lures from the original sentences. Additionally, as the lures consisted of the same textbase as the original sentences it is therefore possible to consider a false alarm a hit, as to the participant the lure *was* the sentence that had been previously presented to them.

When hits and false alarms were combined in this manner, the pattern of results was somewhat altered and resembled a combination facilitation and congeniality effect. Those in the proattitudinal condition had higher recognition rates for items they practiced and items they agreed with (unpracticed/same stance) relative to other items, while those in the counterattitudinal condition had higher recognition rates for the items they practiced relative to other items and lower recognition rates for the items they disagreed with (unpracticed/same stance) relative to the items they agreed with (unpracticed/opposite stance). An alternative series of analyses was conducted to rule out an overall congeniality effect. However, when item types were collapsed according to their issue (affirmative action/gun control) or overall theme (liberal/conservative), there was no evidence that participants had greater recall for items they agreed with relative to items they disagreed with. Therefore, the congeniality effect was limited to unpracticed items. While Eagly et al (2000) argued that the congeniality effect is *not* robust,

they theorized that if participants use a passive as opposed to active defense it might be observed. Perhaps in this study, during the study phase participants were not motivated to counterargue the messages they disagreed with or simply did not have time to do so. Retrieval practiced increased recognition for sentences regardless of agreement, but for unpracticed sentences, proattitudinal sentences may have been assimilated more easily into existing knowledge structures.

It is worth noting that the pattern of results for those in the counterattitudinal condition somewhat resembles typical RIF: combined hit rates for unpracticed/same stance items were lower relative to unpracticed/opposite stance items (though they were not lower relative to control items). Whether this is indeed RIF is difficult to say: the lower combined hit rate for unpracticed/same stance items is due primarily to lower false alarm rates among counterattitudinal participants, but whether or not that lower false alarm rate is due to inhibition cannot be stated with certainty. If it is indeed RIF, this would be a surprising finding as it was posited that counterattitudinal participants might show less selective retrieval of practiced items as they might counterargue the retrieval practice items they disagreed with (Eagly et al., 2000).

Retrieval-Induced Forgetting and Facilitation: Other Variables

Hypothesis 3 predicted that retrieval-induced forgetting/facilitation might be affected by attitude extremity, gender, political orientation, self-reported political interest, or political sophistication, and was again only partially supported. While RIF was not found when gender and differences in extremity of attitudes towards the retrieval practice issue were considered, they were not completely irrelevant and affected participants' memory in different ways.

Effect of Prior Attitudes on Hit Rates

Neutral participants showed a straightforward facilitation effect for hit rates, while moderate participants had higher hit rates not just for practiced items but for items from the same

issue as the practiced items (unpracticed/same stance and unpracticed/opposite stance) relative to the control items. The difference between neutral and moderate participants seemed to specifically involve the unpracticed/different issue items, as moderate participants did not have lower hit rates for any other items relative to neutral participants. With neutral participants, control statements had equivalent hit rates to the other non-practiced items but for moderate participants, control statements had significantly lower hit rates relative to other items: this suggests that moderate participants distinguished between the unpracticed items but neutral participants did not.

This effect may be due to differences in schemas: moderate participants may have different schemas for the practiced issue as compared to more neutral participants and these schemas may have been activated by retrieval practice. Neutral participants may have had a more general *political issues* schema that included statements from both topics (which may account for equivalent recognition of all unpracticed items) while moderate participants may have had a more specific *affirmative action* or *gun control* schema that would not include statements from the unpracticed issue (which may account for the lower recognition of the unpracticed items).

Effect of Gender on False Alarm Rates

Females not only showed fewer false alarms for unpracticed/same stance items relative to males, but males showed more false alarms for these items relative to other items while females showed fewer false alarms for these items relative to other items. This difference was unexpected, as previous RIF recognition research showed no significant difference in false alarms for items regarding retrieval practice status (e.g., Hicks & Starns, 2004; Spitzer & Bauml, 2007). It is important to note this was not due to a main effect of either gender: males did not simply have more false alarms overall but their increased false alarms were specific to unpracticed/same

stance items; similarly, females did not have fewer false alarms overall but their decreased false alarms were also specific to unpracticed/same stance items.

This effect cannot be attributed to differences in retrieval practice accuracy, as there were no differences in accuracy by either gender. It is possible that this effect is due to differences in inhibition as the result of retrieval-induced forgetting. If lures are inhibited along with the original sentences they resemble (as Anderson, 2003 suggested may be the case), false alarm rates for unpracticed/same stance items would be lower; conversely, if lures are not inhibited but the original sentences are (as previous RIF recognition research indicates, Spitzer & Bauml, 2007), this could lead to higher false alarm rates. Perhaps males did not inhibit lures for some reason while females did inhibit the lures. However, this explanation seems unlikely as there was no evidence that the original unpracticed/same stance items were inhibited, it is doubtful that the lures would have their accessibility altered. Furthermore, there is no theoretical reason to expect these different inhibitory patterns.

An alternate explanation may be that females processed the unpracticed/same stance items more deeply at encoding, which then made it easier to identify lures, while males processed these items less deeply, making them more vulnerable to false alarms. Previous research does suggest that females use more elaborative processing than males (Meyers & Maheswaran, 1991). However, if this was indeed the case, females would also have lower false alarm rates for practiced items, as these sentences would have been processed more deeply at encoding as well. Furthermore, it might be expected that males would have higher false alarms for all unpracticed items, not simply unpracticed/same stance items, though the lower false alarm rate for practiced items could be due to increased familiarity with these items.

The difference in unpracticed/same stance items between genders is currently without an acceptable explanation, as neither possibility proposed here can adequately account for the effect. Furthermore, why retrieval practice did not result in fewer false alarms for practiced items for all participants is also presently unexplainable; these items were the ones that participants were arguably the most familiar with, which should have made it easier to recognize lures.

Effect of Other Variables: Regression Analysis

Political sophistication and overall interest in politics were never significant predictors of either hits, false alarms, or combined hits. Furthermore, spontaneous integration and political orientation were only significant in predicting false alarms for unpracticed/same stance items—high integration and liberal political orientation predicted higher false alarm rates. Still, these variables were not at all robust predictors, as they only predicted one type of response for one type of item. Gender and agreement were also not universal predictors: gender significantly predicted unpracticed/opposite stance and unpracticed/same stance false alarms and combined hits (males had higher rates), while condition only predicted unpracticed/same stance false alarms and combined hits (proattitudinal had higher rates).

Surprisingly, participants' attitudes were not as strong predictors as the attitude literature might suggest: attitude strength predicted hits and false alarms only for unpracticed/same stance items (stronger attitudes had higher rates for both), while attitude extremity predicted hits only for control items (more neutral attitudes had higher rates). Instead, the most consistent predictor was retrieval practice accuracy, which predicted control and practiced item hits, false alarms for unpracticed/opposite stance, unpracticed/same stance, and practiced items, and unpracticed/same stance combined hits (as accuracy rose, so did hits and as accuracy was lower, false alarms and combined hits were higher). This finding is not as surprising if retrieval practice accuracy is

considered to reflect not just the degree participants encoded the sentences but also their overall motivation and interest in participating in the study.

Overall, the regression analyses indicate that the proposed moderating variables did not have a robust effect on recognition of persuasive political statements. Again, this is somewhat unexpected: the literature regarding political sophistication and attitude strength in particular would have predicted that these variables would lead to improved memory. Additionally, while higher political sophistication was associated with higher retrieval practice scores, it was not correlated with self-reported spontaneous integration as might be expected from those with more elaborate schemas. However, it may be that there was not enough variability in the sample: only 33% of the overall sample could be considered political sophisticated (4 or more questions correct) while only 43% had attitudes stronger than .5 and only 13% had attitudes stronger than .75. Perhaps in a more diverse sample with more political sophisticates and more participants with strong and extreme attitudes a different pattern of results might be observed. It is also simply possible that the sample was too small: as the largest model contained 9 predictors, perhaps 124 participants were not enough

Reaction Times: Overall

An interesting finding was that there were no differences in latency due to retrieval practice status or condition, as previous research has shown both unpracticed/related items (e.g. Hicks & Stern, 2004) and counterattitudinal messages (e.g. Ditto, 1998) are processed more slowly. This may be due to the considerable variability in reaction times: participants were not excluded if their reaction times were either very fast or very slow and extreme scores may have affected the results. It also may be that because of the complex nature of the stimuli and difficulty of the recognition task participants spent roughly equivalent time on all items.

Limitations and Future Research

There were several shortcomings in the present study, in both its design and execution. While these problems are regrettable, they do lay the groundwork for future research. First, it was mentioned above that the chosen control items may not have been appropriate; while they were from a different issue they may have still been perceived as competing sentences by participants. If this was the case, then any potential retrieval-induced forgetting would be undetectable as there would be nothing to compare to the inhibited items. It is possible that politically neutral sentences may be a better choice for a control.

Second, there were several issues with the materials used in this study. The sentences were complex and a single presentation of 8 seconds may not have been enough for participants to encode the sentences, even with the simultaneous visual and auditory presentation. Furthermore, the encoding stage may have been perceived as tedious by participants (40 consecutive sentences), which may have affected their interest and motivation in the later experimental tasks. Additionally, the retrieval practice stimuli were not equivalent in their ease of completion, though these differences in sentences did not lead to any significant differences in version. The differences in retrieval practice stimuli were not anticipated to be a problem, as research suggests retrieval does not need to be successful in order to lead to inhibition: what is important is the act of retrieving and not its outcome (Storm, Bjork, Bjork, & Nestojko, 2006). Nonetheless, there was relatively low overall retrieval practice accuracy as many participants completed the sentences with incorrect words or could only complete one of the words. While this was corrected by using retrieval practice accuracy as a covariate, in future studies more carefully constructed retrieval practice items would be an improvement.

Especially problematic were the materials used in the recognition task. As mentioned above, the lures differed in syntax (surface code) but not in meaning (textbase); therefore at the level of representation most likely used by participants, lures were indistinguishable from the original sentences. This is most likely why differences in false alarm rates were observed, which were not seen in earlier RIF studies that used entirely different items as lures. While designing the study, this difference in lure creation was also not anticipated to be a problem. Previous research found no difference in false alarms and it was thought that lures were needed simply as “filler” items needed to conduct a recognition task. As there was not enough material from the arguments used by Taber & Lodge (2006) to construct 20 sentences for each stance, the decision was made to create lures by altering the sentence structure of the original sentences. However, this choice of lures may have inadvertently made the recognition task more difficult and more analytical. Considering that retrieval-induced forgetting is a weaker effect with recognition tasks than recall, this alteration in lure creation may help explain why RIF was not seen. In future studies, it would be highly advisable to use completely different sentences from the same stance as lures. It may be better still to use a recall task instead of recognition: although recognition tasks may be more useful in dealing with complex stimuli (Hicks & Starns, 2004), the RIF effect is smaller with recognition tasks (e.g. Anderson, 2003).

That there was a significant Topic x Condition x Extremity interaction indicates that gun control and affirmative action were not completely equivalent issues. When attitude strength and retrieval practice accuracy were controlled for, neutral participants in the proattitudinal condition had more false alarms than those in the counterattitudinal condition, but only for the issue of gun control. On the other hand, this was the only significant difference between the two issues and therefore may not be a major limitation.

The scales used in this study did not have the high reliability reported by previous researchers. While the attitude strength scales were acceptable, both the attitude position and political sophistication scales had α levels below .7. This may reflect differences in samples: the attitude position scales were created and normed on political science students and may not transfer well to introductory psychology students. It also may reflect that participants might not have carefully read the position scales. Many participants endorsed statements that could generally be seen as mutually exclusive; this may have reflected their ambivalence and uncertainty regarding the issue, or their haste in completing the questionnaire.

It was previously mentioned that the sample was not very diverse; while this sample was relatively unique for having many self-identified conservative students there was unfortunately not much diversity with respect to political sophistication or attitude strength, position, and extremity. Most students were in favor of the two issues and most did not have strong or extreme attitudes. The fact that only 10 participants could be considered as having extreme attitudes made it difficult to analyze this group: it is surprising that extreme participants would more closely resemble neutral participants concerning their pattern for hit rates than moderate participants, but this may simply reflect high variability in a small sample

Overall, the sentences used in this study may have been too complex to observe retrieval-induced forgetting. While Anderson (2003) argued that this effect should generalize to all instances where a subset of information is retrieved at the expense of other information, it may have been too soon to jump from simple semantic sentences to complex attitudinal statements. RIF is a small effect and is generally only observed in carefully controlled experiments; this study may not have had the proper amount of control necessary. Perhaps the retrieval practice

paradigm needs to be more slowly extended to include sentences such as the statements used here.

Finally, there was arguably low external validity in this study. The motivation behind the study was to examine whether retrieval-induced forgetting can account for the results of selective exposure to political messages seen in day-to-day life. With that in mind, a single presentation of persuasive political sentences followed by three trials of retrieval practice may not be equivalent to the selective exposure seen outside the laboratory. Future research should consider the effects of more extensive selective exposure.

Furthermore, the task of asking participants to recognize sentences' syntax does not necessarily tap into what is important: the danger in selective exposure may be that it makes the meaning of unpracticed items less accessible. In other words, it may be irrelevant that participants cannot distinguish "Of Western nations the US has the most lenient gun laws and the highest murder rate" from "The most lenient gun laws and the highest murder rate of Western nations are in the US"; more important would be if the main idea of the statement ("US vs. Western nations: most lenient gun laws, highest murder rate") was inhibited. While looking at hit rates alone was intended to answer that question, perhaps a more valid measure of inhibition may have been to ask participants to generate as many of the original sentences as possible.

Summary

While this study did not clearly demonstrate that retrieval-induced forgetting effects are observed with persuasive political statements as stimuli, the possibility that such effects may exist was not ruled out. There were several effects that are potentially accounted for by inhibition: the low baseline rates among moderate participants and low rates for all non-retrieval practiced items among neutral participants, the differences in false alarms for unpracticed/same stance by

gender, and the differences in combined hits for unpracticed/same stance by condition. However, there are alternative explanations beyond inhibition that can account for these effects. Future research is needed to clarify exactly what mechanism is at work here.

This study supported previous findings that participants' prior attitudes can affect their memory for attitudinal statements: for unpracticed items, participants showed higher combined hit rates for items that they agreed with relative to items that they disagreed with. Attitude extremity was also a significant factor: among unpracticed items, moderate participants distinguished between items from the same topic as the practiced items and control items while neutral participants did not make such a distinction. This study did not show a robust effect of spontaneous integration or attitude strength on recognition, and no effect of political sophistication or overall interest in politics. It also showed clear effects of gender: males and females differed in their patterns of false alarms, with males showing the most and females showing the least false alarms for unpracticed/same stance items.

Overall, these findings may contribute to future retrieval-induced forgetting research concerning political statements. Attitude extremity as well as position ought to be considered: there were not only differences based upon whether the retrieval practice items were proattitudinal or counterattitudinal, but those with defined opinions seemed to have a different pattern of results than those without defined opinions. Furthermore, gender is not often treated as a variable in RIF studies but perhaps it should be as it seems that there are differences in how males and females treat unpracticed/related items.

In conclusion, while this study did not conclusively determine whether selective exposure to political statements can lead to retrieval-induced forgetting, the work done here may valuably inform future research into this topic.

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Appendix A: Scales

1) Attitude Battery (Tabor & Lodge, 2006)

Extremity/Position (9 pt. Likert type agree-disagree response options)

- Equal opportunity for African-Americans is very important but it's not really the government's job to guarantee it.
- Generations of slavery and discrimination have created conditions that make it difficult for blacks to work their way out of the lower class.
- It's really a matter of some people not trying hard enough; if blacks would only try harder they could be just as well off as whites.
- Over the past few years blacks have gotten less than they deserve.
Affirmative action helps to level the playing field, giving blacks an equal chance.
- Blacks do not help themselves by pushing in where they're not wanted.
- Curbing gun violence is very important, but limiting the right to bear arms is not really an effective way to do this.
- Everyone's rights and freedoms are important, but sometimes, as with gun control, it is necessary to limit freedom for the greater public good.
- Guns, like cars, should only be used by responsible citizens. Gun control laws just ensure that responsible people are using guns in a responsible manner.
- Over the past few years our right to bear arms has been eroding. This encroachment on our rights must be stopped.
- There should be no limits on the number of guns someone can own.
- It is not the government's job to pick and choose the types of weapons it finds acceptable for citizens to own.

Attitude Strength (continuous sliding response scale, 0-100)

- How much do you personally care about the issue of affirmative action?
- Compared to how you feel about other public issues, how strong are your feelings regarding the issue of affirmative action?
- Some people report that they are very certain of their feelings on the issue of affirmative action. Others say they are not certain at all. How certain are you of your feelings on the issue of affirmative action?
- People have told us they have thought a lot about some issues and haven't thought at all about some other issues. How would you rate the amount of thinking you have done about the issue of affirmative action?
- How much do you personally care about the issue of gun control?
- Compared to how you feel about other public issues, how strong are your feelings regarding the issue of gun control?
- Some people report that they are very certain of their feelings on the issue of gun control. Others say they are not certain at all. How certain are you of your feelings on the issue of gun control?
- People have told us they have thought a lot about some issues and haven't thought at all about some other issues. How would you rate the amount of thinking you have done about the issue of gun control?

2) Spontaneous Integration Questionnaire (Anderson & McCulloch, 1999)

(5 point Likert response type items; 1 = None of the Time, 3 = Some of the Time, 5 = All of the Time)

During the first phase, when you saw a sentence, how often, if ever, did you intentionally think back to previously seen sentences? For example, did you ever intentionally rehearse sentences from the same topic together? Answer as accurately as possible; there are no right or wrong answers:

- How often did you think back to previous sentences for the messages *in favor* of affirmative action?
- How often did you think back to previous sentences for the messages *opposed* to affirmative action?

- How often did you think back to previous sentences for the messages *in favor* of gun control?
- How often did you think back to previous sentences for the messages *opposed* to gun control?

3) Political Sophistication Index (Delli Carpini & Keeter, 1993)

Here are few questions about the government in Washington. Please enter your answer using they keyboard. Many people don't know the answers to these questions, so if there are some you don't know please type "don't know" and go on to the next question.

- Do you happen to know what job or political office is held by Dick Cheney? What is it?
- Whose responsibility is it to determine if a law is constitutional or not. .. is it the president, the Congress, or the Supreme Court?
- How much of a majority is required for the U.S. Senate and House to override a presidential veto?
- Do you happen to know which party had the most members in the House of Representatives in Washington before the election [this month/last month/last November]?
- Would you say that one of the parties is more conservative than the other at the national level? Which party is more conservative?

4) Political Interest

Please indicate how much you agree or disagree with the following statement:

- I consider myself to be highly interested in politics.

5) Political Orientation

Please indicate the number that best describes your response to the question:

- How would you describe your political orientation?
[1- Strongly Liberal 3- Moderately Liberal 5- Somewhat Liberal 6- Neutral 7 – Somewhat Conservative 9- Moderately Conservative 11- Strongly Conservative]

Appendix B: Stimuli

Original sentences(#.), retrieval-practice sentences(#.1), and lures (#.2)

Pro-Affirmative Action (AAP):

1. White males benefited from a biased system so preferences for minorities are only fair.
 - 1.1. White males be _____ from a biased system so preferences for mi _____ are only fair.
 - 1.2. Preferences for minorities are only fair since white males benefited from a biased system.
2. While much progress has been made women can still greatly benefit from affirmative action.
 - 2.1. While much pr _____ has been made women can still gr _____ benefit from affirmative action.
 - 2.2. Women can still greatly benefit from affirmative action though much progress has been made.
3. People are still excluded from some higher status professions by stereotype and custom.
 - 3.1. People are still ex _____ from some higher status pr _____ by stereotype and custom.
 - 3.2. Stereotype and custom are still excluding people from some higher status professions.
4. The Supreme Court has ruled that affirmative action is consistent with the Constitution.
 - 4.1. The Supreme Co _____ has ruled that affirmative action is co _____ with the Constitution.
 - 4.2. Affirmative action is consistent with the Constitution as the Supreme Court has ruled.
5. Affirmative action programs are a needed first step towards racial equality in America.
 - 5.1. Affirmative action is a ne _____ first step towards ra _____ equality in America.
 - 5.2. A needed first step towards racial equality in America are affirmative action programs.
6. Many African American male workers are still behind white males in pay and position.
 - 6.1. Many African American ma _____ workers are still behind wh _____ males in pay and position.
 - 6.2. In pay and position many African American male workers are still behind white males.
7. Only tough affirmative action programs can help level the playing field for minorities.
 - 7.1. Only tough affirmative action pr _____ can help level the pl _____ field for minorities.
 - 7.2. The playing field for minorities can be leveled only by tough affirmative action programs.
8. Lingering racist attitudes in America can be changed by affirmative action programs
 - 8.1. Lingering racist at _____ in America can be changed by af _____ action programs.
 - 8.2. Affirmative action programs can change lingering racist attitudes in America.
9. Affirmative action is not "reverse discrimination" but a vital step to end bias.
 - 9.1. Affirmative action is not re _____ discrimination but a vi _____ step to end bias.
 - 9.2. A vital step to end bias is affirmative action and it is not "reverse discrimination."
10. Affirmative action has helped five times more blacks enter the fields of law and medicine.
 - 10.1. Affirmative action has he _____ five times more blacks en _____ the fields of law and medicine.
 - 10.2. Five times more blacks entered the fields of law and medicine with the help of affirmative action.

Con Affirmative Action (AAC)

1. Racial quotas often hurt groups who had no role in the country's history of discrimination.
 - 1.1. Racial quotas often h _____ groups who had no r _____ in the country's history of discrimination.
 - 1.2. Groups who had no role in the country's history of discrimination are often hurt by racial quotas.
2. Favoring blacks over other groups is reverse discrimination and a form of racism.
 - 2.1. Favoring blacks over of _____ groups is reverse di _____ and a form of racism.
 - 2.2. A form of racism is favoring blacks over other groups and it is reverse discrimination.
3. It's unfair for upper-class blacks to be given preferences over lower-class whites.
 - 3.1. It's unfair for up _____-class blacks to be gi _____ preferences over lower-class whites.
 - 3.2. Giving preferences over lower-class whites for upper-class blacks is unfair.
4. The Constitution absolutely bans racial bias and that includes affirmative action too.
 - 4.1. The Constitution ab _____ bans racial bias and that in _____ affirmative action too.
 - 4.2. Affirmative action is included in the Constitution's absolute ban of racial bias.
5. Today people of all races and classes can get ahead if they're willing to work hard.

- 5.1. Today people of all ra__ and classes can get ah__ if they're willing to work hard.
- 5.2. If they're willing to work hard, today people of all races and classes can get ahead.
6. The majority of Americans are opposed to affirmative action so the laws should be repealed.
 - 6.1. The majority of Am__ are opposed to affirmative ac__ so the laws should be repealed.
 - 6.2. The laws should be repealed as the majority of Americans are opposed to affirmative action.
7. Affirmative action is no longer needed and now hurts minorities more than it helps them.
 - 7.1. Affirmative action is no lo__ needed and now hu__ minorities more than it helps them.
 - 7.2. Affirmative action now hurts minorities more than it helps them and is no longer needed.
8. People are more likely to be successful if they prove their abilities in equal competition.
 - 8.1. People are mo__ likely to be successful if they pr__ their abilities in equal competition.
 - 8.2. If they prove their abilities in equal competition people are more likely to be successful.
9. Black students may feel stigmatized if others feel they were only admitted because of color.
 - 9.1. Black students may feel sti__ if others feel they were only ad__ because of color.
 - 9.2. If others feel they were only admitted because of color black students may feel stigmatized.
10. Any kind of racial preference is an injustice as only people's character should be judged.
 - 10.1. Any kind of racial pr__ is an injustice as only pe__ character should be judged.
 - 10.2. Only people's character should be judged so any kind of racial preference is an injustice.

Pro Gun Control (GCP)

1. You're more likely to be killed by your own gun than by an intruder's weapon.
 - 1.1. You're more li__ to be killed by your own gun than by an in__ weapon.
 - 1.2. Your own gun is more likely to be used to kill you than an intruder's weapon.
2. Guns are only necessary for protection because there are so many guns out there.
 - 2.1. Guns are only ne__ for protection because there are so ma__ guns out there.
 - 2.2. Only because there are so many guns out there are guns necessary for protection.
3. Of Western nations the US has the most lenient gun laws and the highest murder rate.
 - 3.1. Of Western na__ the US has the most le__ gun laws and the highest murder rate.
 - 3.2. The most lenient gun laws and the highest murder rate of Western nations are in the US.
4. Recent school tragedies highlight that children's and teens' access to guns needs to be reduced.
 - 4.1. Recent school tra__ highlight that children's and teens' ac__ to guns needs to be reduced.
 - 4.2. Children's and teens' access to guns needs to be reduced as recent school tragedies highlight.
5. The vast majority of felons report they bought their guns through legal channels.
 - 5.1. The vast majority of fe__ report they bo__ their guns through legal channels.
 - 5.2. Legal channels are where the vast majority of felons report they bought their guns through.
6. Tougher gun legislation is needed to keep guns out of the hands of criminals
 - 6.1. Tougher gun le__ is needed to keep guns out of the ha__ of criminals
 - 6.2. To keep guns out of the hands of criminals tougher gun legislation is needed.
7. Gun owners do not always behave as responsibly as they claim to do
 - 7.1. Gun owners do not al__ behave as re__ as they claim to do
 - 7.2. Despite their claims gun owners do not always behave responsibly.
8. The courts think the gun industry should be reined in and Congress should follow suit.
 - 8.1. The courts th__ the gun industry should be re__ in and Congress should follow suit.
 - 8.2. Congress should follow suit as the courts think the gun industry should be reined in.
9. Most gunshot deaths are deemed unjustified by the police and not ruled as self defense.
 - 9.1. Most gunshot de__ are deemed unjustified by the po__ and not ruled as self defense.
 - 9.2. The police do not rule as self-defense most gunshot deaths and instead are deemed unjustified.
10. Bringing down the number of guns in circulation would bring down the murder rate.
 - 10.1. Bringing down the nu__ of guns in circulation would br__ down the murder rate.
 - 10.2. The murder rate would be brought down by bringing down the number of guns in circulation.

Con Gun Control (GCC)

1. Carrying a gun is the best protection a person can have from violent crime.
 - 1.1. Carrying a gun is the best protection a person can have from violent crime.
 - 1.2. The best protection a person can have from violent crime is carrying a gun.
2. Our murder rate is so high partially because most victims do not defend themselves.
 - 2.1. Our murder rate is so high partially because most victims do not defend themselves.
 - 2.2. Because most victims do not defend themselves is partially why our murder rate is so high.
3. The media distorts gun issues and only talks about tragedies involving guns.
 - 3.1. The media distorts gun issues and only talks about tragedies involving guns.
 - 3.2. Only talking about tragedies involving guns is how the media distorts gun issues.
4. Legal handguns are used in self defense over two million times each year.
 - 4.1. Legal handguns are used in self defense over two million times each year.
 - 4.2. Over two million times each year legal handguns are used in self defense.
5. If lawful gun possession was outlawed crime would spiral out of control.
 - 5.1. If lawful gun possession was outlawed crime would spiral out of control.
 - 5.2. Crime would spiral out of control if lawful gun possession was outlawed.
6. Gun control measures are unconstitutional and against a basic right of citizenship.
 - 6.1. Gun control measures are unconstitutional and against a basic right of citizenship.
 - 6.2. A basic right of citizenship is violated by gun control measures, which are unconstitutional.
7. Laws that require guns to be locked up in homes defeat the purpose of gun ownership.
 - 7.1. Laws that require guns to be locked up in homes defeat the purpose of gun ownership.
 - 7.2. The purpose of gun ownership is defeated by laws that require guns to be locked up in homes.
8. Gun control legislation can only regulate guns that are sold through legal outlets.
 - 8.1. Gun control legislation can only regulate guns that are sold through legal outlets.
 - 8.2. Only guns that are sold through legal outlets can be regulated by gun control legislation.
9. A majority of the American people have serious misgivings about gun control.
 - 9.1. A majority of the American people have serious misgivings about gun control.
 - 9.2. Serious misgivings about gun control are had by a majority of the American people.
10. Most privately owned guns are owned by sportsmen and pose no risk to society.
 - 10.1. Most privately owned guns are owned by sportsmen and pose no risk to society.
 - 10.2. No risk to society is posed by sportsmen, who own most privately owned guns.

Filler

1. A missile defense shield is crucial for protecting our nation from North Korea.
 - 1.1. A missile defense shield is crucial for protecting our nation from North Korea.
 - 1.2. To protect our nation from North Korea, a missile defense shield is crucial.
2. Instead of a pricey missile defense shield we should seek peaceful resolution with North Korea.
 - 2.1. Instead of a pricey missile defense shield we should seek peaceful resolution with North Korea.
 - 2.2. We should seek peaceful resolution with North Korea instead of a pricey missile defense shield.
3. Any means are justified to stop North Korea from accumulating nuclear weapons.
 - 3.1. To stop North Korea from accumulating nuclear weapons, any means are justified.
 - 3.2. Any means are justified to stop North Korea from accumulating nuclear weapons.
4. We should negotiate with North Korea instead of antagonizing the government.
 - 4.1. We should negotiate with North Korea instead of antagonizing the government.
 - 4.2. Instead of antagonizing the government we should negotiate with North Korea.
5. The awful quality of life in North Korea calls for humanitarian assistance.
 - 5.1. The awful quality of life in North Korea calls for humanitarian assistance.
 - 5.2. Humanitarian assistance is called for by the awful quality of life in North Korea.
6. Any aid to North Korea would only go to the government instead of the people.
 - 6.1. Any aid to North Korea would only go to the government instead of the people.
 - 6.2. Instead of the people, any aid to North Korea would only go to the government.

Appendix C: Additional Table

Appendix Table 1

Mean Accuracy of Retrieval Practice Sentences

Topic	Sentence	Accuracy	Sig. Different
Pro Affirm. Action	Racial quotas often hu ___ groups who had no ro ___ in the country's history of discrimination.	.71 (.44)	2,3,4,5,6,10
	2 Favoring blacks over ot ___ groups is reverse di ___ and a form of racism.	.93 (.19)	1,4,8,9,10
	3 It's unfair for up ___-class blacks to be gi ___ preferences over lower-class whites.	.96(.16)	1,4,8,9,10
	4 The Constitution ab ___ bans racial bias and that in ___ affirmative action too.	.13 (.26)	1,2,3,5,6,7,8,9
	5 Today people of all ra ___ and classes can get ah ___ if they're willing to work hard.	.97 (.12)	1,4,8,9,10
	6 The majority of Am ___ are opposed to affirmative ac ___ so the laws should be repealed.	.98 (.08)	1,4,8,9,10
	7 Affirmative action is no lo ___ needed and now hu ___ minorities more than it helps them.	.78 (.32)	4,9,10
	8 People are mo ___ likely to be successful if they pr ___ their abilities in equal competition.	.63 (.32)	2,3,4,5,6,10
	9 Black students may feel sti ___ if others feel they were only ad ___ because of color.	.47 (.43)	1,2,3,4,5,6,7
	10 Any kind of racial pr ___ is an injustice as only pe ___ character should be judged	.31 (.32)	1,2,3,5,6,7,8
Con Affirm. Action	White males be ___ from a biased system so preferences for mi ___ are only fair.	.51 (.45)	3,6
	2 While much pr ___ has been made women can still gr ___ benefit from affirmative action.	.73 (.32)	3,6,9
	3 People are still ex ___ from some higher status pr ___ by stereotype and custom.	.18(.24)	1,2,4,5,6,7,8,9,10
	4 The Supreme Co ___ has ruled that affirmative action is co ___ with the Constitution.	.61 (.22)	3,6
	5 Affirmative action is a ne ___ first step towards ra ___ equality in America.	.46 (.21)	2,3,6
	6 Many African American ma ___ workers are still behind wh ___ males in pay and position	.86 (.34)	1,3,4,5,7,8,9
	7 Only tough affirmative action pr ___ can help level the pl ___ field for minorities.	.52 (.37)	3,6
	8 Lingering racist at ___ in America can be changed by af ___ action programs.	.58 (.33)	3,6
	9 Affirmative action is not re ___ discrimination but a vi ___ step to end bias.	.45 (.36)	2,3,6,10
	10 Affirmative action has he ___ five times more blacks en ___ the fields of law and medicine	.71 (.36)	3,9
Pro Gun Control	Carrying a gun is the be ___ protection a per ___ can have from violent crime.	.98 (.10)	3, 5,6,7,8,9
	2 Our murder ra ___ is so high partially because most vi ___ do not defend themselves.	.83(.31)	3,5,6,7,9
	3 The media dis ___ gun issues and only talks ab ___ tragedies involving guns.	.42 (.24)	1,2,4,8,10
	4 Legal handguns are us ___ in self defense over two mi ___ times each year.	.88 (.24)	3,5,6,7,9
	5 If iawful gun po ___ was outiawed crime would sp ___ out of control.	.27 (.36)	1,2,4,7,8,10
	6 Gun control me ___ are unconstitutional and against a ba ___ right of citizenship.	.44 (.40)	1,2,4,8,10
	7 Laws that re ___ guns to be locked up in ho ___ defeat the purpose of gun ownership.	.57 (.39)	1,2,4,5
	8 Gun co ___ legislation can only reguiate guns that are so ___ through legal outlets.	.72 (.36)	1,3,5,6,9
	9 A maj ___ of the American people have serious mi ___ about gun control.	.40 (.20)	1,2,4,8,10
	10 Most privately ow ___ guns are owned by sp ___ and pose no risk to society.	.74 (.25)	1,5,6,9
Con Gun Control	You're more li ___ to be killed by your own gun than by an in ___ weapon.	.65 (.23)	8
	2 Guns are only ne ___ for protection because there are so ma ___ guns out there	.66 (.32)	8,10
	3 Of Western na ___ the US has the most le ___ gun laws and the highest murder rate.	.71(.30)	8,10

4	Recent school tra_____ highlight that children's and teens' ac_____ to guns needs to be reduced.	.52 (.37)	6,10
5	The vast majority of fe_____ report they bo_____ their guns through legal channels.	.55 (.38)	10
6	Tougher gun le_____ is needed to keep guns out of the ha_____ of criminals	.75 (.34)	4, 8
7	Gun owners do not al_____ behave as re_____ as they claim to do	.52 (.37)	10
8	The courts th_____ the gun industry should be re_____ in and Congress should follow suit.	.32 (.26)	1,2,3,6,9,10
9	Most gunshot de_____ are deemed unjustified by the po_____ and not ruled as self defense.	.60 (.42)	9,10
10	Bringing down the nu_____ of guns in circulation would br_____ down the murder rate.	.98 (.10)	2,3,4,5,7,8,9