Failing to Recall: Examining the Effects of Trace Decay and Interference on Memory for Campaign Information

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Voters are continuously bombarded with information during political campaigns, yet a consistent conclusion from research on voter learning is that individuals remember far less information about political candidates than one might expect. What remains unclear is why memory for campaign information is so poor. The present study examines two explanations for memory failure. Using an experimental design, the present study explores whether campaign information fades from memory (trace decay) or whether extraneous information impedes an individual’s subsequent ability to recall campaign information (interference). The results suggest that examining the ways in which the larger information environment influences recall of campaign information has important implications for the importance we attribute to campaign information in models of voter decision making.

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Voters are continuously bombarded with information during political campaigns. Recent developments in communication technology (e.g., cable news networks, the Internet, and mobile web devices) exacerbate this flood of campaign information. Political researchers have not been remiss in examining the effect such information has on voter decision making. A consistent conclusion from this research is that individuals remember far less information about political candidates than one might expect (e.g., Alvarez & Gronke, 1996; Civettini & Redlawsk, 2009; Conover & Feldman, 1989; Dalager, 1996; Graber, 1988; Herstein, 1981; Holbrook, 1999; Lodge, McGraw, & Stroh, 1989; Lodge, Steenbergen, & Brau, 1995; Nicholson, 2003; Ragsdale & Rusk, 1993; Rahn, 1993; Redlawsk, 2001; Redlawsk, Civettini, & Emmerson, 2010; Sniderman, Brody, & Tetlock, 1991; West, 1994). For example, researchers have asked respondents to the American National Election Study (ANES) to indicate up to five reasons to vote for and five reasons to vote against the major party presidential candidates. On average, respondents recall less than two reasons to vote for or against the Democratic and Republican candidates. These results are not unique. Substantial survey and

1 To calculate this average, I took the mean responses to the following ANES questions from 1952 to 2004: Is there anything in particular about [Republican presidential candidate] that might make you want to vote for him? Is there anything in particular about [Republican presidential candidate] that might make you want to vote against him? Is there anything in particular about [Democratic presidential candidate] that might make you want to vote for him? Is there anything in particular about [Democratic presidential candidate] that might make you want to vote against him? Respondents could provide between 0 and 5 answers to each question. The mean responses for this period were 1.20, 1.30, 1.10, and 1.24, respectively.
experimental research demonstrates that memory for campaign information is a poor representation of information exposure. What remains unclear is why memory for campaign information is so poor.

If we conceive of recalling campaign information as the end result of information processing that begins with exposure to campaign information and ends with retrieval from memory, then a disruption at any point in this process can lead to memory failure. The present study explores two explanations for memory failure.

The first argues that individuals are unable to retrieve information from memory because memory traces have physically decayed over time. Political campaigns are protracted affairs lasting weeks, months, or even years; thus, memory for campaign information may be highly susceptible to decay. The second possibility focuses on the role of the larger information environment surrounding political campaigns. Modern political campaigns do not occur in isolation but are waged within a larger information environment in which voters are continuously inundated with pertinent and extraneous information. Thus, voters in a given political campaign are subject to the ebb and flow of the campaign and the larger information environment. This larger information environment may not be innocuous and may affect memory for campaign information.

Using an experimental design, the present study explores whether campaign information fades from memory or whether extraneous information interferes with an individual’s subsequent ability to recall campaign information. The results suggest that examining the ways in which information processing influences recall of campaign information has important implications for the importance we attribute to campaign information in models of voter decision making.

Cognitive Processing

Recalling information about political candidates is the end result of five stages of cognitive processing: (1) exposure and attention, (2) comprehension, (3) encoding, interpretation, and elaboration, (4) organization and storage in memory, and (5) retrieval (Ottati, Wyer, Dieger, & Houston, 2002). As a result, failing to recall campaign information can stem from a disruption at any point along the way.

The first three stages of cognitive processing happen within seconds of information exposure and take place within working memory. The first stage, exposure and attention, is critical to ensure that information can be retrieved from memory at a later date. However, recent research indicates that voters attend to information that is consistent with their political predispositions (Stroud, 2008); therefore, selective exposure may mimic memory failure. If a campaign message survives selective exposure, it may fall susceptible to comprehension failure. Messages must be understood linguistically and conceptually. However, not all political messages will be equally well-understood by all voters. For example, political knowledge and experience influence the amount and speed of comprehension (Fiske & Kinder, 1981; Lau & Erber, 1985). As a result, a failure to recall campaign information may result from a lack of comprehension.

During encoding, interpretation, and elaboration, new information is thought about in relation to previously encoded information, related conceptual information, and generic knowledge (Brown & Craik, 2000). When a candidate announces his or her intention to run for a particular office, such information may activate encoded information about the candidate (issue positions, background information, etc.), information about other candidates already in the race, and generic knowledge or expectations about politicians. At this stage, a failure to recall information may result from intentional dismissal of the information, misinterpretation of the information, or a disruption in transfer to long-term memory. For example, recent research on motivated reasoning suggests that individuals interpret incoming information in a biased manner to ensure that new information is consistent with prior attitudes (Redlawsk, 2002; Taber & Lodge, 2006). If information cannot be framed in a way consistent with prior attitudes, the inconsistent information may be dismissed.
This creates a knowledge configuration consisting of the new information, encoded information, inferences, and connections between the various pieces of information. This knowledge configuration is then stored in long-term memory within the larger network of information the individual has about the candidate. Once stored in long-term memory, the encoded information may be subject to additional disruptions (e.g., trace decay, interference, etc.) as discussed below.

The final stage, retrieval of information, involves culling information from long-term memory. Retrieval can occur when new information is encountered (stored information is retrieved as part of encoding), when individuals are prompted to explicitly recall information (survey), or when a judgment is required (Election Day). However, not all information encoded and stored in memory is retrieved. The inability to retrieve information from memory has been demonstrated in a wide variety of contexts (Spear & Riccio, 1994). As a result, a significant body of research has emerged in psychology focusing on factors that affect the ability of individuals to retrieve information from memory. For example, one extreme cause of retrieval failure is repression or the unconscious blocking of painful or anxiety-provoking information, especially events (Baddeley, 1976; Gruneberg & Morris, 1978).

The present study focuses on two factors argued to be useful in understanding recall failures in everyday life: trace decay and interference. Trace decay and interference are often posed as competing explanations for the inability of individuals to recall encoded information from long-term memory. Trace decay theory posits that memory traces simply deteriorate over time or fade much like “a mark made in a pat of butter will gradually disappear in a warm room” (Baddeley, 1976, 1998). A number of researchers interested in memory for campaign information have raised the possibility that trace decay may be the underlying mechanism leading to poor recall (e.g., Lodge, Steenbergen, & Brau, 1995; Joslyn, 2003). Notwithstanding the appeal of trace decay, researchers have found little biological evidence for such a process (Baddeley, 1976, 1990; Gruneberg & Morris, 1992; Roediger et al., 2001). In part, the lack of evidence for trace decay stems from the difficulty of isolating decay (time) from other factors influencing memory, particularly interfering material.

In contrast, individuals may fail to retrieve information because it has been replaced by other information (Baddeley, 1976, 1990, 1999; Gregg, 1986; Greene, 1992; McGeoch & MacDonald, 1931; Morris & Gruneberg, 1992; Roediger et al., 2001; Spear & Riccio, 1994; Thompson & Madigan, 2005). While decay theory emphasizes the passage of time, interference theory focuses on what happens during that time (Thompson & Madigan, 2005). Recall failure occurs because memory traces have been disrupted by other memory traces and are therefore unavailable for retrieval. A longer delay between exposure and recall allows more interference to occur; thus, time in and of itself is not meaningful (Baddeley, 1976).

Interference generally occurs when new memory traces displace old memory traces.3 For example, McGeoch and MacDonald (1931) asked participants in their study to learn a list of adjectives and then to rest or learn a three-digit number, nonsense syllables, unrelated adjectives, antonyms, or synonyms. Participants in the rest condition recalled more adjectives than those

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2 Other factors have also been posed as likely contributors to retrieval failure. For example, some researchers concentrate on the way that differences in the learning environment and the retrieval environment affect retrieval. Contextual factors found to affect memory include the physical environment, the compatibility between learning and testing materials, and even the physiological state of the individual (Tulving, 1983; Tulving & Thomson, 1973). For example, researchers have found that individuals in a sad mood are more likely to remember sad events than happy events (Teasdale & Fogarty, 1979).

3 Interference can generally take three forms: retroactive, proactive, and output. Proactive interference occurs when old memory traces prevent the learning of new memory traces. For example, learning a list of words can make it difficult to learn a second list with words from the same category (Thompson & Voss, 1972). Output interference occurs when the act of recalling itself impedes one’s ability to completely recall the original information (Roedigger & Schmidt, 1980; Tulving & Arbuckle, 1963). For example, researchers have found that when participants are asked to learn words from categories and then recall those words, words from categories queried last were the least likely to be recalled.
exposed to the interfering material. However, the effect of interference on memory was not constant. As the degree of similarity between the learned material and the interfering material increased, recall became substantially worse. This finding has been replicated with a variety of stimuli. Importantly, when prior information is sufficiently different from new information, interference is less likely (Baddeley, 1990; Greene, 1992; McGeoch & McDonald, 1931; Spear & Riccio, 1994). Wickens, Born, and Allen (1963) found that using dissimilar items on word lists “released” participants from interference.

In sum, recalling information about political candidates is the end result of five stages of cognitive processing, and a disruption at any point along the way can lead to the consistent finding that individuals are unable to recall substantial campaign information. The present study focuses on maintenance of information in memory and considers whether memory for campaign information declines as a function of trace decay or interference.

**Memory for Campaign Information**

Modern political campaigns are protracted affairs magnifying the possibility that campaign information will fade from memory or be subject to extraneous information by Election Day. Voters are exposed to campaign information weeks, months, or even years before an election. Moreover, voters are also subject to substantial noncampaign—and nonpolitical—information over the course of a campaign.

As a result, campaign information is a likely candidate for trace decay and interference. Trace decay theory argues that memory traces physically deteriorate as time passes; therefore, individuals are unable to recall information because it no longer exists in memory. Thus, the first expectation is that memory for campaign information will recede with time (Hypothesis 1). Alternatively, the larger information environment may influence memory for campaign information by interfering with such information. As a result, the second expectation is that memory for campaign information will decline with exposure to interfering material (Hypothesis 2).

Prior research on interference suggests that the nature of the interfering material may influence its effect on memory. Interference is argued to be most likely when interfering material is similar to encoded information. The typical interference paradigm involves a two-list scenario. Participants are asked to learn a word-list and then exposed to a second list. The expectation is that either the first list will make learning the second more difficult (proactive interference) or the second will make memory for the first weaker (retroactive interference). Similarity in this context usually means taxonomical similarity or form similarity. Taxonomical similarity exists when items are similar conceptually or are part of the same conceptual category. Taxonomical classification tends to be hierarchical so that gardenia and rose are very similar, gardenia and oak are similar, gardenia and giraffe are less similar, and gardenia and car are dissimilar. Form similarity typically refers to either the structure of the material (words, digits, antonyms, synonyms, word length, sentence length, etc.) or the presentation form (auditory, visual, olfactory, etc.).

For example, McGeoch and McDonald (1931) asked participants to learn a list of words and then exposed participants to a rest period, a three-digit number, nonsense syllables, unrelated words, antonyms for the word list, or synonyms for the word list. Synonyms were identified a priori by the researchers as the “most” similar while the three-digit number was considered to be the least similar. The researchers found that as the degree of similarity between the encoded material and the interfering material increased, recall became substantially worse.

In moving beyond word lists, defining similarity becomes more complicated; however, there are a few studies that use “complex meaningful materials.” Such studies focus on topical similarity. For example, Gunter, Berry, and Clifford (1981) explored whether interference occurs in TV news broadcasts and whether participants can be “released” from interference with dissimilar items. In
their study, the two categories of items used were sports and politics. The authors found that information from the broadcast was more likely to be retained when similar news items were separated from each other in the broadcast than when similar news items were sequential.

When thinking about the larger information environment surrounding political campaigns, voters are exposed to both political (e.g., foreign policy crises, other political contests, etc.) and nonpolitical information (e.g., sports events, celebrity gossip, etc.) over the course of a campaign. Political information should be the most likely to interfere with memory for campaign information. As a result, memory for encoded campaign information should be lower when interfering material is politically relevant (i.e., words) than when it is irrelevant (i.e., three-digit number; Hypothesis 3).

Are there further expectations we might posit for different types of political material? Prior research in political science suggests that political information is substantially different from the two-list paradigm commonly used in interference experiments. Specifically, information about political candidates (personal information, issue information, scandals, etc.) is likely organized in associative networks, which influences encoding, storage, and retrieval of information from memory (Anderson, 1983; Hastie, 1980; Huang & Price, 2001; Judd & Krosnick, 1989; Lau & Redlawsk, 2006; McGraw, Pinney, & Neumann, 1991; Ottati et al., 2002; Pryor & Ostrom, 1981; Srull, 1981; Srull & Wyer, 1989).

In an associative network framework, information about a political candidate is represented by nodes with links connecting the various nodes (Sedikides, Devine, & Fuhrman, 1991; Sedikides & Ostrom, 1988). When new information about a political candidate is encountered, connections between the new information and encoded information are established. Connections between nodes facilitate the retrieval of information through spreading activation. As Collins and Loftus (1975) argue, activating one node activates linked nodes. Nodes are better recalled when they are strongly connected to other nodes and such connections are strengthened each time the node is activated. This “spreading activation” reinforces information in the network thereby facilitating retrieval at a later date.

If we think about campaign information as organized in an associative network, then exposing participants to additional information about a candidate may actually activate and strengthen nodes representing encoded information about the candidate. Such activation reinforces this encoded information thereby facilitating retrieval. In contrast, political information unrelated to the present campaign is unlikely to reinforce encoded information as it activates a distinct store of information. This expectation is also consistent with prior research that finds learning information about a political candidate may become more difficult with concurrent campaigns (Nicholson, 2005; Wolak, 2009). As a result, interfering material related to the campaign at hand should facilitate memory for encoded campaign information whereas political information unrelated to the present campaign should impede memory for encoded campaign information (Hypothesis 4).

Importantly, campaign-related information may vary in the effect it has on memory. Negative information may facilitate memory to a greater extent than positive information. Substantial research indicates that negative information has a more powerful effect on attention, recall, and evaluation than nonnegative information (Baumeister, Bratslavsky, & Finkenauer, 2001; Bless, Hamilton, & Mackie, 1992; Miller, 2010; Ohira, Winton, & Oyama, 1997; Pratto & John, 1991; Redlawsk, Civettini, & Emmerson, 2010; Robinson-Riegler & Winton, 1996). Individuals focus more attention on negative information, process negative information more extensively, and weigh it more heavily in decision making than nonnegative information (Baumeister et al., 2001). The attentional advantages accruing to negative information also lead to more extensive processing and enhanced memory for the negative information (Baumeister et al., 2001; Bless et al., 1992; Ohira et al., 1997; Robinson-Riegler & Winton, 1996). By focusing more attention on the candidate, negative information may reinforce encoded information about the candidate to a greater extent than positive information. As a result, exposure to negative information about a political candidate may facilitate memory for encoded information more so than positive material (Hypothesis 5).
Method

An experimental design was used to explore the effect of interference and decay on memory for campaign information. An experimental design is particularly useful when examining issues of memory as such a design ensures control over information exposure so that any differences in memory are not due to differences in initial exposure. Table 1 outlines the design of the experiment.

Participants

Participants (n = 185) were recruited from undergraduate political science courses at a Midwestern university in the United States to participate in a candidate evaluation experiment. Participants received extra credit for their participation in the experiment. In this experiment, 55% of the participants were female, and the average age of the participants was 23. The racial/ethnic distribution of participants was 60% White, 23% Black, 7% Asian, 4% Hispanic/Latino, 2% Native American, and 3% other. The treatment conditions did not significantly vary in terms of gender ($\chi^2(5) = 5.12, p = 0.40$), race/ethnicity, ($\chi^2(30) = 28.06, p = 0.57$), age ($\chi^2(100) = 94.59, p = 0.63$), or social class ($\chi^2(15) = 11.48, p = 0.72$).

Design and Procedures

Participants provided informed consent and completed an initial questionnaire regarding demographic characteristics, political attitudes (partisanship, ideology, political interest, media use, and their positions on 10 political issues including those used in the study), and political knowledge. Having completed the prestimulus questionnaire, participants then read a series of newspaper articles detailing a fictitious House campaign in Fresno, CA. Specifically, the issue positions (abortion, homeland security, immigration, environment, and gay rights) of a hypothetical Republican candidate were embedded in a series of newspaper accounts of the campaign (the appendix includes one of the articles). In addition to the candidate’s issue positions, participants learned background information about the candidate where relevant to the story (e.g., he is married, he is a lawyer, he is currently in the California Assembly, etc.). For example, in describing the candidate’s position on

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4 While using college students may limit the conclusions we draw from experimental designs given their age and limited political experiences, hypotheses regarding memory should be testable with a population of young adults.
immigration (he was against providing social services to immigrants and was for allowing the police to stop suspected immigrants without an infraction), the study described the candidate as a lawyer who witnessed the problem of illegal immigration firsthand and then later became chairman of the state immigration task force. All experimental conditions received identical campaign information.

After reading the campaign information, participants were assigned to a control condition, a delay condition, or one of several interference conditions. The control condition proceeded directly to the recall stage. Participants in the delay condition were asked to “please wait while the next part of the study loads.” The delay lasted two minutes. The length of the delay was based on the average time it took three research assistants to read the interference articles. Participants assigned to the remaining conditions read a newspaper article designed to create interference. The newspaper articles varied according to whether the material was nonpolitical, political though unrelated to the campaign, related to the campaign and negative, or related to the campaign and positive.

Participants assigned to the nonpolitical condition read one of two articles: an article detailing efforts by a Wiccan group to ensure that veterans be allowed to have the Wiccan symbol engraved on their headstones or an article describing the state of the California economy. Two nonpolitical articles very different from each other were used to ensure that any conclusions based on this condition were not tied to the specific topic of the nonpolitical article. There were no significant differences in memory between participants exposed to the Wiccan article and those exposed to the California economy article. As a result, these participants were combined for the analyses.

The unrelated political condition read a post-election article discussing six undecided House races. This article did not discuss the campaign featured in the experiment, but it did address a politically relevant topic. Moreover, the House races discussed in the campaign did not occur in the general vicinity of the experimental location. Finally, the article was chosen to fit the general theme of the 2008 congressional elections.

Participants in the positive condition read one of two newspaper articles describing the candidate in positive terms. One article indicated that the candidate was leading in the polls and likely to win the election and the second article offered a detailed endorsement of the candidate by the newspaper used throughout the experiment. Participants reading about the endorsement did not significantly differ in their memory for campaign information from participants exposed to the polling data. As a result, these participants were combined for the analyses.

Participants assigned to the final condition, the negative condition, read one of two newspaper articles describing the candidate in negative terms. These articles were the exact opposite of those used in the positive condition. Specifically, one article indicated that the opponent was leading in the polls and likely to win the election while the other article outlined the newspaper’s endorsement of the opponent. Memory for the campaign information did not significantly differ between

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5 The original design of the study included the control condition and the five interference conditions. Following a reviewer’s suggestion, I added 40 additional participants that were randomly assigned to either the delay condition or one of the remaining five groups (control, nonpolitical, unrelated, negative, or positive). The assignment ensured that 20 participants were assigned to the delay group and 20 to the five groups. As a result, participants were recruited to participate in the study during different semesters. The original group of participants did not significantly differ from the second group in terms of gender (χ²(1) = 0.67, p = 0.41), race (χ²(5) = 5.03, p = 0.41), age (χ²(20) = 19.76, p = 0.47), or social class (χ²(3) = 1.40, p = 0.71). Additionally, the participants in both groups were recruited from the same political science course taught at the same university by the same instructors and completed the study in the same research laboratory. I have rerun the analyses presented below with time as a covariate, and this did not significantly alter the substantive conclusions.

6 One could argue that the negative information used in this experiment was not “very” negative. The goal was to maintain consistency in the magnitude of the positive and negative information; thus, extremely negative information like scandalous information was not used. I would not argue that the negative information used in the experiment is equivalent in its effect on memory to scandalous information, inconsistent information, etc. In fact, I suspect that “more” negative information would have a substantial effect on memory unlike the negative information used in the present study. However, participants responded to the negative information in the study as one might expect participants to respond to negative information. Participants exposed to the negative polling and endorsement information evaluated the candidate more negatively (M = 1.90, SD = 0.61) than participants exposed to the positive information (M = 2.77, SD = 1.33, F₁,80 = 14.46, p < 0.001).
participants reading about the polling data and participants learning of the endorsement; thus, the participants were combined for the analyses.

Participants assigned to all conditions then answered questions tapping memory for the campaign information. Finally, participants were asked to evaluate the candidate on a 5-point scale (very negative to very positive).

Memory for Campaign Information

Various measures of memory for campaign information were used in the analyses. In the final stage of the experiment, participants were asked to recall the candidate’s issue positions and anything else they might remember from the campaign. From responses to these free-recall questions, four measures of recall were created: Issue Recall, Gist Recall, Specific Recall, and Total Recall. The first recall measure, Issue Recall, captures whether or not the participant recalled the five issues discussed in the campaign (M = 3.44, SD = 1.50). Gist Recall assesses whether participants correctly recalled the candidate’s position (e.g., pro-life) on the five issues (M = 2.98, SD = 1.72). Specific Recall focuses on whether the participants recalled specific details from the campaign (M = 2.96, SD = 3.18). Did the participant recall that the candidate supports legislation prohibiting federal funds for clinics providing abortions (specific)? Finally, Total Recall is a summary measure representing the total number of issues, gists, and specific details the participant provided (M = 9.38, SD = 5.59).

Results

One-way analyses of variance (ANOVA) were performed to examine the extent to which memory for campaign information varied as a function of assignment to the experimental conditions. The null hypothesis was that participants in all conditions would recall a similar amount of information. Contrary to the null hypothesis, assignment had a significant effect on memory for campaign information. Specifically, recall of the issues discussed in the campaign (F(5,182) = 2.77, p < 0.05, η² = 0.07), recall of the candidate’s issue positions (F(5,182) = 3.12, p < 0.01, η² = 0.08), recall of the specific details of the campaign (F(5,182) = 3.55, p < 0.01, η² = 0.09), and overall recall of the campaign information (F(5,182) = 3.59, p < 0.01, η² = 0.09) varied by assignment to the experimental conditions.

Decay. Consistent with trace decay theory, the first hypothesis was that participants proceeding directly to the recall stage (control condition) would recall more information from the campaign than participants asked to wait two minutes (delay condition). Figure 1 illustrates the mean score for participants in the control condition (black), participants in the delay condition (white), and participants in the interference conditions (gray) for each measure of recall. Participants in the control condition recalled slightly more campaign information than participants in the delay condition. These differences were confirmed with one-way ANOVAs. Participants in the control condition recalled more issue information (M = 4.11, SD = 0.86, F(1,36) = 3.12, p < 0.10, η² = 0.08) than participants in the delay condition (M = 3.33, SD = 1.68). Further, the control condition recalled more of the candidate’s issue positions (M = 3.63, SD = 1.26, F(1,36) = 2.13, p < 0.15, η² = 0.06) than participants in the delay condition (M = 2.83, SD = 2.01). Recall of the specific details of the campaign did not significantly differ between the control condition and the delay condition (F(1,36) = 0.08, p = 0.78). Turning to the composite measure, participants assigned to the control condition did not recall more

7 To examine effect sizes, I use eta-squared. Eta-squared represents the proportion of the variance that can be attributed to a particular effect. Eta-squared values of 0.01, 0.06, and 0.14 reflect small, medium, and large effect sizes (Green, Salkind, & Akey, 2000).
information overall than participants in the delay condition \((F_{1,36} = 0.44, p = 0.51)\). In sum, a delay between exposure and recall slightly reduced memory for campaign information.

**Interference.** While trace decay theorists emphasize the passage of time, interference theorists argue that what happens during that time period affects memory (Hypothesis 2). Comparing the interference conditions to the control condition illustrates that memory for campaign information was higher among participants in the control group than among participants exposed to interfering material. Participants assigned to the control group \((M = 11.37, SD = 4.03)\) recalled more information overall than participants assigned to the interference conditions \((M = 9.03, SD = 5.52, F_{1,164} = 3.18, p < 0.10, \eta^2 = 0.02)\). Similarly, recall of the issues discussed in the campaign \((M = 4.11, SD = 0.86, F_{1,164} = 4.29, p < 0.05, \eta^2 = 0.03)\) and recall of the issue positions of the candidate \((M = 3.63, SD = 1.27, F_{1,164} = 3.11, p < 0.10, \eta^2 = 0.02)\) were higher among participants in the control condition than among participants exposed to interfering material \((M = 3.36, SD = 1.53\) and \(M = 2.91, SD = 1.72\), respectively). Recall of the specific details of the campaign did not significantly vary between participants in the interference and control conditions \((F_{1,164} = 1.37, p = 0.24)\). In general, memory for campaign information was lower among participants in the interference conditions than among participants in the control condition.

Comparing the interference conditions to the control condition does not allow us to determine whether interfering material reduces memory for campaign information beyond the effect of time. Comparing the interference conditions to the delay condition using one-way ANOVAs illustrates that memory for campaign information did not significantly differ between participants in the delay group and participants exposed to the interfering material. These results hold for recall of the issues discussed in the campaign \((F_{1,163} = 0.01, p = 0.94)\), recall of the candidate’s issue positions \((F_{1,163} = 0.03, p = 0.86)\), and overall recall \((F_{1,163} = 0.58, p = 0.45)\). Though not statistically significant in conventional terms, recall of the specific details from the campaign did vary such that participants in the delay condition \((M = 3.94, SD = 3.96)\) recalled more specific details than participants in the interference conditions \((M = 2.75, SD = 3.12, F_{1,163} = 2.19, p < 0.15, \eta^2 = 0.01)\). These results suggest that interference in general may not be any more influential on memory than time since exposure though interference may negate one’s ability to recall specific details as opposed to more general information like issues and issue positions.

However, prior research concludes that interference is most successful when interfering material is similar to encoded information; thus, comparing all interference conditions to the delay condition may mask successful interference. Moreover, the expectations outlined earlier propose that certain
types of interfering material may have little effect on memory, other types may actually reinforce memory, and still other types of information may impede memory. As a result, the remaining analyses focus on the effect of different types of interfering material on memory for campaign information. Figure 2 illustrates the mean score among participants in the delay and interference conditions for each measure of recall.

A few preliminary conclusions can be drawn from a visual assessment of recall across the various groups. Participants reading one of the two nonpolitical articles (Wiccan or California economy) recalled more information than individuals assigned to the political conditions and the delay condition. Moreover, participants reading additional information about the candidate recalled more campaign information than participants reading an unrelated political article. Exposure to the political article unrelated to the present campaign (the article covering the 2008 undecided House races) appears to have had the largest negative effect on memory. Participants reading the unrelated political information recalled less information from the campaign than participants assigned to the delay condition or participants reading nonpolitical or campaign-related material. Among participants assigned to read additional information about the candidate, those reading negative information about the candidate did not consistently differ in their recall from those participants assigned to read positive information about the candidate.

These preliminary conclusions deserve further scrutiny. According to hypothesis three, memory for campaign information should be lower when interfering material is politically relevant (i.e., words) than when it is irrelevant (i.e., three-digit number). To examine this possibility, one-way ANOVAs comparing the delay, nonpolitical, and political conditions (unrelated, positive, and negative) were conducted for each measure of recall. The results indicate that overall recall of campaign information \( F_{2,163} = 6.14, p < 0.01, \eta^2 = 0.07 \) varied by assignment to the three conditions. Post hoc contrasts indicated that participants exposed to politically relevant interfering material \( (M = 7.95, SD = 5.06) \) recalled less information overall than the nonpolitical condition \( (M = 11.30, SD = 5.83, t(144) = 3.56, p < 0.001) \) and the delay condition \( (M = 10.11, SD = 7.12, t(115) = 1.56, p < 0.15) \). The comparison between the delay condition and the nonpolitical condition was not significant \( (t(63) = 0.69, p = 0.49) \). The overall test statistic for recall of the issues discussed in the campaign was suggestive \( F_{2,163} = 1.93, p < 0.15, \eta^2 = 0.02 \). Participants assigned to the delay condition \( (M = 3.33, SD = 1.68) \) were not significantly different from the political conditions \( (M = 3.19, SD = 1.58, t(115) = 0.35, p = 0.73) \) or the nonpolitical group \( (M = 3.72, SD = 1.36, t(63) = 0.97, p = 0.34) \) in terms of their recall of the issues discussed in the campaign. In contrast, participants in

![Figure 2. Memory for campaign information with political interference. This figure displays the mean score for the delay condition and the interference conditions for each measure of recall.](image-url)
the nonpolitical condition recalled more issue information than participants in the political conditions ($t(144) = 1.99, p < 0.05$). Additionally, the three groups also differed in their recall of the candidate’s issue positions ($F_{2,163} = 3.65, p < 0.05, \eta^2 = 0.04$). The comparison between the delay condition ($M = 2.83, SD = 2.01$) and the political conditions was not significant ($M = 2.64, SD = 1.73, t(115) = 0.41, p = 0.68$), whereas the delay condition and the nonpolitical condition ($M = 3.47, SD = 1.57, t(63) = 1.35, p = 0.19$) slightly differed and the comparison between the political and nonpolitical conditions was clearly significant ($t(144) = 2.75, p < 0.01$). Finally, recall of the specific details of the campaign ($F_{2,163} = 7.75, p < 0.001, \eta^2 = 0.09$) also varied by assignment to the three conditions. Participants in the delay condition ($M = 3.94, SD = 3.96$) and the nonpolitical condition ($M = 4.11, SD = 3.90$) did not differ in their recall of the details ($t(63) = 0.15, p = 0.88$); however, both the delay condition ($t(115) = 2.63, p < 0.01$) and the nonpolitical condition ($t(144) = 3.77, p < 0.001$) recalled more detailed information than participants in the political conditions ($M = 2.11, SD = 2.44$). To summarize, participants in the nonpolitical and political conditions were very different from each other in terms of recall. Those participants exposed to a nonpolitical interference recalled more campaign information than participants exposed to a political interference. Importantly, participants in the delay condition did not generally differ in their recall of campaign information from the political and nonpolitical groups. However, participants in the delay condition did recall more details from the campaign than the political conditions.

Additionally, interfering material related to the campaign at hand was expected to facilitate memory for campaign information whereas political information unrelated to the present campaign was expected to impede memory for encoded campaign information (Hypothesis 4). In the context of political campaigns, researchers have argued that individuals maintain associative networks to store information about political candidates. As a result, exposure to additional campaign material may not interfere with encoded information but may be stored alongside it in memory and serve to reinforce encoded information through spreading activation. In contrast, politically relevant material unrelated to the campaign at hand may interfere with encoded campaign material as it activates a separate memory store.

To examine this possibility, I compared the mean recall of participants exposed to the delay, the unrelated political condition, and additional information (both positive and negative) about the candidate. One-way ANOVAs comparing the three conditions were conducted for each measure of recall. The results indicate that recall of the issues discussed in the campaign ($F_{2,11} = 2.32, p < 0.10, \eta^2 = 0.04$), recall of the candidate’s issue positions ($F_{2,11} = 2.15, p < 0.15, \eta^2 = 0.04$), recall of the specific details ($F_{2,11} = 3.46, p < 0.05, \eta^2 = 0.06$), and overall recall ($F_{2,11} = 2.23, p < 0.15, \eta^2 = 0.04$) varied by assignment to the three conditions. Participants in the unrelated political condition ($M = 6.13, SD = 6.16$) recalled less information overall than participants in the delay condition ($M = 10.11, SD = 7.11, t(31) = 1.70, p < 0.10$) and the campaign-related conditions ($M = 8.27, SD = 4.80, t(97) = 1.52, p < 0.15$). Additionally, the unrelated political group provided fewer issue recalls ($M = 2.40, SD = 1.72$) than the delay ($M = 3.33, SD = 1.68, t(31) = 1.57, p < 0.15$) or campaign-relevant conditions ($M = 3.33, SD = 1.52, t(97) = 2.15, p < 0.05$). Similarly, participants in the delay condition ($M = 2.83, SD = 2.01, t(31) = 1.50, p < 0.15$) and the campaign conditions ($M = 2.80, SD = 1.66, t(97) = 2.09, p < 0.05$) recalled a greater proportion of the candidate’s issue positions than participants in the unrelated group ($M = 1.80, SD = 1.93$). The campaign-related groups did not significantly differ from participants in the delay condition in terms of overall recall ($t(100) = 1.34, p = 0.18$), recall of the issues ($t(100) = 0.00, p = 1.00$), and recall of the candidate’s issue positions ($t(100) = 0.08, p = 0.94$). Focusing on recall of the specific details from the campaign, participants in the delay condition ($M = 3.94, SD = 3.96$) recalled more details than participants in the campaign-related conditions ($M = 2.14, SD = 2.31, t(100) = 2.60, p < 0.01$) or the unrelated condition ($M = 1.93, SD = 3.17, t(31) = 1.59, p < 0.15$). Moreover, the comparison between participants reading the additional campaign information and participants exposed to
interfering material that was unrelated to the campaign was not significant for recall of the specific details \((t(97) = 0.30, p = 0.76)\). In sum, participants exposed to additional information about the candidate, both positive and negative, recalled more information than those participants exposed to information about an unrelated, though politically relevant, topic. Additionally, participants reading the unrelated article performed worse in terms of recall than participants asked to sit and wait for the next stage of the study.

Finally, exposure to negative information about a candidate was expected to facilitate memory for encoded information to a greater extent than positive material. Negative information tends to attract more attention and to be processed more substantially than nonnegative information. Therefore, exposure to the negative interference may enhance memory for the encoded campaign information more than positive information. One-way ANOVAs comparing the delay, positive, and negative conditions were conducted for each measure of recall. The results indicate that overall recall of campaign information \((F_{2,101} = 0.98, p = 0.38)\), recall of the issues discussed in the campaign \((F_{2,101} = 0.02, p = 0.98)\), and recall of the candidate’s issue positions \((F_{2,101} = 0.02, p = 0.98)\) did not vary by assignment to the three conditions. Recall of the specific details of the campaign did vary across the three conditions \((F_{2,101} = 3.94, p < 0.05, \eta^2 = 0.07)\); comparisons indicate that participants in the delay condition recalled more details from the campaign \((M = 3.94, SD = 3.96)\) than participants in the positive condition \((M = 1.83, SD = 2.12, t(57) = 2.67, p < 0.01)\) and the negative condition \((M = 2.44, SD = 2.47, t(59) = 1.80, p < 0.10)\).

To summarize the results of this study, Table 2 displays the extent to which each hypothesis was supported. In general, memory for campaign information declined with exposure to the delay condition (Hypothesis 1) and the interference conditions (Hypothesis 2) as compared to the control condition. Comparing all interference conditions to the delay condition generated an insignificant difference, yet comparing the specific interference conditions to the delay condition yielded interesting findings. Participants assigned to the political conditions recalled less information than participants in the nonpolitical group (Hypothesis 3), and participants in the campaign-relevant conditions recalled more information than the unrelated condition (Hypothesis 4). Hypothesis 5 was not supported in this study as participants in the negative condition did not significantly differ in their recall of campaign information from participants in the positive condition.

### Discussion

Prior research on voter learning indicates that memory for campaign information is rather weak. This finding appears perplexing as candidates, parties, and groups spend an incredible amount of money and effort conveying campaign messages to voters; however, this finding becomes less puzzling when we conceive of memory failure as the end result of cognitive processing. When individuals process incoming information, they proceed through various stages including exposure and attention, comprehension, encoding, storage, and retrieval. A disruption at any stage in the process can produce recall failure. For example, voters may attend to some information and ignore

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Status</th>
</tr>
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<tbody>
<tr>
<td>H1: Memory will be greater in the control condition than the delay condition</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: Memory will be greater in the control and delay conditions than the interference conditions</td>
<td>Partially Supported</td>
</tr>
<tr>
<td>H3: Memory will be greater in the nonpolitical condition than the political conditions</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: Memory will be greater in the campaign conditions than the unrelated political condition</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: Memory will be greater in the negative condition than the positive condition</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>

### Table 2. Summary of Support for Hypotheses
other information, voters may fail to comprehend information, or voters may intentionally discard information. The present study considers two additional possibilities in asking whether memory for campaign information is influenced by time or interfering material. Modern political campaigns are protracted affairs subject to the ebb and flow of the larger information environment. As a result, information presented to voters over the course of a campaign may be highly susceptible to decay and interference.

Using an experimental design exposing participants to information about a fictitious political campaign, I explored whether memory for campaign information varied by time or exposure to interfering material. The design of the study made it possible to compare the effect that interference had on memory for campaign information independent of the effect of time. As compared to the control group, participants in the delay condition and the interference conditions recalled less information from the campaign. However, comparing all interference treatments to the delay condition yielded an insignificant difference. Nonetheless, exploring the differences between the delay condition and the various interference conditions produced some interesting results. Participants assigned to the political conditions recalled significantly less information than participants in the nonpolitical group or the delay group. Importantly, the nonpolitical information used in the study (Wiccans and the economy) may very well have political implications. As a result, these differences may be accentuated with the use of information lacking any political implications (e.g., celebrity news). Among those participants assigned to one of the political conditions, those exposed to campaign-related material recalled significantly more encoded campaign information than those exposed to an unrelated political article. Moreover, participants in the delay condition recalled more information from the campaign than participants asked to read the political article unrelated to the present campaign. For the participants in this study, exposure to the unrelated political article impeded memory for campaign information more so than the delay or the other interference articles. In line with Nicholson’s (2005) findings, voter learning may suffer from the existence of concurrent campaigns.

While the experimental results presented here are certainly not conclusive on the ability of time and interfering material to impede retrieval of campaign information, they are suggestive. Trace decay and interference are often described as competing explanations for memory deficiencies, yet participants exposed to either the delay or interfering material recalled less information than the control condition. As a result, one might conclude that interference does not affect memory for campaign information independent of the effect of time on memory. I would caution against such a conclusion. Not only did the interference conditions have differential effects on memory, but these results also highlight the difficulty noted by Baddeley (1990) and others of isolating decay (time) from interference. A longer delay between exposure and recall provides more opportunities for interference. The assumption underlying decay theory is that the brain will remain at “rest” during a delay or rest period. However, researchers are unable to ensure that participants remain “thoughtless” during this period; instead, participants are free to contemplate the experimental materials as well as nonexperimental topics. As a result, a delay period is more accurately conceptualized as an unstructured period subject to “internal” interference. Participants may not be subject to external interference, but they may be subject to physiological or psychological forces not controlled by the researcher. For example, participants interested in politics may continue contemplating the campaign material during the delay period whereas those uninterested in politics may focus on other topics. Future research exploring the role of voter characteristics in guiding one’s susceptibility to decay or interference may be able to disentangle the effect of time, internal interference, and external interference.

Additionally, the present study concentrates on retroactive interference, but one can imagine studies, with very real practical implications, that examine both proactive and retroactive interference. Candidates sometimes shift their positions on issues (i.e., flip-flop or U-turn). For example, John Kerry, for example, was accused of flip-flopping at various points during the 2004 presidential
campaign. The most infamous flip-flop concerned his stance on the War in Iraq and his claim that he first voted for funding the war and then voted against it. Such apparent inconsistency may very well affect a voter’s ability to remember the new position of the candidate. More recently, Mitt Romney has been accused of flip-flopping on abortion. Prior to 2004, most abortion rights advocates considered Romney to be an ally in the abortion fight; however, in 2005, he announced a “change of heart.” What effect does such inconsistency have on memory for the candidate’s issue positions? Does the candidate’s new position replace memory for the encoded position (retroactive interference), or does the encoded position make it difficult for voters to remember the new position (proactive interference)? The findings in the present study pave the way for these and other questions to be addressed in future research.

Moreover, the experiment lasted approximately one hour, yet memory for campaign information was lower with exposure to the delay and the interference. More complex experimental designs (e.g., designs utilizing Lau and Redlawsk’s dynamic process-tracing methodology or longitudinal experiments) may accentuate the effect of both time and interfering material. Further, an experimental design varying the length of the delay period would enable more extensive conclusions regarding the relationship between time and memory for encoded information.

The results of this study underscore the necessity of examining the relationship between memory for campaign information and the extraneous environment. Our current models of voter decision making focus almost exclusively on incoming information related to the current political campaign and how the processing of candidate-relevant information influences voter decision making. The present study suggests that understanding the relationship between campaign information and voter decision making requires more attention to the larger environment (both in terms of time since exposure and extraneous information) than has been previously paid. Additionally, understanding the effect that the larger information environment has on memory for campaign information enables us to answer practical questions of interest to political candidates and their campaign managers. In particular, if decay is most critical, then repetition of campaign messages should be sufficient to prevent memory traces from fading or decaying. In contrast, if memory is most susceptible to interference, then candidates will need to be more diligent in ensuring they have the “last word” before Election Day. These and other questions are answerable with a more extensive focus on memory and its susceptibility to the larger information environment.

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REFERENCES


Appendix

Sample of Campaign Newspaper Article

The Fresno Bee

Bates Says “No” to Domestic Partnership Benefits
Byline: Michaela Brewster
Congressional candidate Brain Bates today reiterated his opposition to formal recognition of domestic partners by the federal and state government and to the extension of spousal benefits to the domestic partners of federal and state government employees.

“Providing benefits to domestic partners is unnecessary and costly,” Bates argued in front of the Fresno Chamber of Commerce, “Neither the government nor private businesses can afford this kind of handout without ultimately eliminating jobs, increasing deficits, raising taxes, and reducing growth.”

In a follow-up press release, the Bates campaign used stronger language, “Giving domestic partners the same rights as married couples will diminish the institution of marriage because it conflicts with the moral values of most citizens of California and most Americans. Big cities like San Francisco and Los Angeles want to export their brand of morality across the country, but we do not have to follow their lead. This congressional district is known for its independent-minded people and we can make these decisions for ourselves. In this case, the right decision is clear. As a member of Congress, Brian Bates will not let the gay lobby, financed by people in San Francisco and Hollywood, force the rest of the country to adopt domestic partnership statutes that are not in the interest of the people of this country.”

Support for such measures is split in Congress; but, as Representative, Bates would have greater opportunities to block any effort to enact such legislation.

Besides the provision of domestic partnership benefits for government employees, Bates has said he would oppose a proposed ordinance requiring companies with government contracts of $25,000 or more to provide equal benefits to both spouses and domestic partners of their employees. Such a policy has been passed by cities across the country including Seattle, San Francisco, and Phoenix, but has yet to receive support in Congress.

Three officials of the Fresno Chamber of Commerce have warned that this ordinance might discourage some employers, particularly small ones, either from bidding on government contracts or from continuing to offer benefits to their employees’ spouses.

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