Implications of Motivated Reasoning for Voter Information Processing

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Abstract

Researchers attempting to understand how citizens process cognitive and affective information about the political environment have advanced a tripartite theory of motivated reasoning. Motivated reasoning operates through on-line processing, hot cognition, and the "How-do-I-feel?" heuristic to provide an immediate affective evaluation of all new information. The prominence of affect suggests that all social information processing is affectively charged, and thus prone to biases driven by affect towards the social object under consideration. This paper uses a unique dataset built through experimental studies using a dynamic information board to test important premises of motivated reasoning. In particular, affective biases should cause citizens to spend longer attempting to process information which is incongruent with their previous affect, and such biases should also direct search for new information about a candidate, issue, or other social object. Somewhat perversely, motivated reasoners may actually increase their support of a positively evaluated candidate upon learning new negatively evaluated information through a process of bolstering existing affect. Findings are reported which support all of these expectations. Additional analysis shows that these affective biases and bolstering process may easily lead to lower quality decision-making.

Even with the long and storied tradition in voting behavior research significant gaps remain in our understanding of how voters actually process political information. While our ability to predict voting behavior and election outcomes has become reasonably accurate, we are still some distance from a comprehensive model of voter decision-making focused on how political inputs such as campaigns get turned into political outputs such as votes. The inherently hidden nature of human information processing which stems from our inability to directly observe what voters actually do in their minds leaves us many puzzles to continue to work through. As Steenbergen and Lodge succinctly put it "we need to open the black box that transforms campaign stimuli into overt choices on election day" (Steenbergen & Lodge, 1998, p. 3.) Their work, along with that of other colleagues (Lodge & Tabor, 2000; Taber, Glather, & Lodge, forthcoming; Lodge, Taber, & Galonsky, 1999a, 1999b), develops a model of motivated reasoning, in which political information processing is mediated by both cognition and affect and in which voters are in effect at the mercy of biases unconsciously generated by the tight linkage between the two. To date, the research in support of this model has focused on either the psychological processes which occur in sub-second, non-conscious responses to stimuli or on how citizens respond to issue positions congruent and incongruent to their own. If, however, we wish to understand the role of motivated reasoning in political decision-making, then a test of its implications in a political campaign environment is desirable. This paper reports the results of such a test using a unique dataset generated through a political campaign simulation in which subjects fulfilled the standard tasks of any election: learning about candidates, comparing them to one another, and ultimately voting for a preferred choice.

Motivated Reasoning

Motivated reasoning rests on key assumptions about the structure of memory and processing in the mind. While recent research in neuroscience suggests that there are many kinds of "memory" (Marcus, Neuman, and MacKuen, 2000) the current conception of motivated reasoning relies on a simplified model of cognitive and affective memory focused on two parts: long-term memory and working memory (Steenbergen and Lodge, 1998.) Long term memory is the permanent storage mechanism of the mind while working memory is that portion of memory that is currently being attended to by being activated in the mind. Since the mind can only attend to a very limited amount of information at any one time (Miller, 1956) when new information needs to be attended to old information is lost from working memory. It is either transferred to long term memory or not incorporated into the memory structure at all (Simon, 1978.) In other words, human attention processes information in a serial manner.

While the precise organization of the storage of memory continues to be the subject of debate, one of the most widely accepted models is the associative network (Anderson, 1983) in which memory is represented as a network of concepts connected in a series of associations. Spreading activation (Anderson, 1983; Collins and Loftus, 1975) is the mechanism that causes memories to become available to conscious thought. A node may be activated by an outside stimulus, such as reading the name of a person. The activation of that node causes energy to spread across the links between that node and any other nodes associated with it. As the new nodes are activated, they become available to consciousness.[1] Of course, this activation process is subject to the limitations of working memory. If too many nodes are activated the earliest ones will become unavailable as the later ones are activated.

The associative network model speaks to both the general organization of memory in its consideration of nodes and links as well as to the process by which memories are activated. It does not, in and of itself, address the question of how affect is connected to cognition. A number of researchers

have posited various structures, including a bin model (Wyer and Srull, 1986), stories (Schank and Abelson, 1995), and schema theory (for a detailed review see Fiske and Taylor, 1991.) However, the most compelling theoretical model for motivated reasoning is that of hot cognition (Abelson, 1963) which argues that affect is directly and inexorably linked to cognition. Thus, all social concepts are represented in memory not just by their cognitive tags but also with a direct link to their affective value. The affective value, which may be positive or negative, weak or strong, is stored with the cognitive concept and is activated when the concept itself is activated. The likelihood of its activation is related to the strength of its association with the cognitive tag (Fazio, Chen, McDonel, and Sherman, 1982.) The familiar term attitude is defined by Fazio as the "association[] in memory between an attitude object and one's evaluation of the object" (1995, 247.) And while one can readily talk of "attitudes" towards candidates, the direct interest in this paper is the affective portion of the association.

Motivated reasoning as elaborated by Lodge and his colleagues includes three important components working in tandem: on-line processing, hot cognition, and the "How-do-I-feel?" heuristic. On-line processors make an immediate evaluation (like/dislike) of each piece of information they encounter about a social object, maintaining an on-line tally summarizing current affect towards the object, such as a political candidate (Hastie and Park, 1986, Lodge, McGraw, and Stroh, 1989; Redlawsk, 2001.) Thus, the memory node for the concept contains not only the cognitive information about the concept but also this affective tally, and the tally is updated immediately upon the acquisition of new information. The second component, hot cognition describes the linking of affect to cognition. Structurally affect and cognition are inseparable, and when the on-line processing mechanism is operating, affect is automatically activated along with the cognitive node to which it is tied. (Lodge and Taber, 2000.)[2] Finally, Lodge and colleagues argue that the structure of hot cognition and the process of on-line evaluation result in a "How-do-I-feel?" heuristic mechanism for evaluating new information. Simply put, when new information is encountered, the affect associated with relevant existing knowledge interacts with affect towards the new information to form a virtually instantaneous assessment of the new information based not on cognitive evaluation but rather on the interplay between the on-line tally and the affective value of the new information.

One of the most important implications of motivated reasoning -- this linking of affect and cognition -- is that human beings do not generally process social information in a neutral emotional state. Beliefs and feelings play a major role in searching and processing information. This may or may not be a good thing. As Lodge and Taber (2000) point out this reliance on an affective tally can be either a "virtue or a vice" depending on circumstances. They note that the on-line tally can, in cases, more accurately represent a person's position on an issue or candidate than attempts to conjure all of the relevant information from memory and assess the pros and cons on demand. On the other hand, as they argue and this paper will investigate, the linking of affect with cognition opens up the possibility that information search and processing may be biased by existing affect towards the object of interest.

Identifying the Processes of Motivated Reasoning

A pilot study reported by Lodge and Taber (2000) examines the basic hypotheses that the processing of congruent information is faster than incongruent information, and that this difference is due to the unconscious mechanisms of motivated reasoning, not to any conscious effort on the part of subjects. By use of priming techniques and target words (using NES emotion and trait words) they tested subject response times to series of primes flashed on computer screen. The task was to assess whether a target word was positive or negative regardless of the valence of the priming word. Subjects were not asked to respond whether or not the target word was associated with the prime, thus this appears to be a

strong test of affect automatically traveling with a concept. The results generally supported their expectations, with mean response times in the expected directions. Targets not affectively congruent with primes generated longer response times. However the results of this part of their study did not reach conventional levels of statistical significance.

In the second part of the pilot study subjects were exposed to a one page campaign brochure detailing (pictures, short biography, legislative experience, endorsements, and in one condition a lengthy claim about his position supporting gun control, and another condition opposing gun control) a hypothetical candidate. Subjects then went through another set of affective priming trials in which the prime was the candidate's name and the targets were among twelve NES emotion/trait words. The task was a positive or negative assessment of the target word. A verification task followed with subjects primed with the candidate name and required to push a button "true" or "false" after reading a factual statement about the candidate.

Lodge and Taber report a difference in mean response times between verifying a factual attribute and making a candidate-primed affective judgement. Since the mean response time for verifying a factual attribute is two to three times slower than making an affective judgement, the attribute information is "not stored directly with the candidate node but must be summoned up as linked attributes, thereby taking additional time to retrieve" (Lodge & Taber, 2000.) Their assessment is that the candidate node is "hot."

Lodge, Taber, & Galonsky (1999a) report an experiment to examine the mechanisms behind motivated reasoning and how citizens evaluate issue-relevant information, using arguments about affirmative action. Subjects were exposed to these arguments in several different treatments. The results suggest that two effects are at work, and attitude strength effect and an attitude polarization effect. In particular, political sophisticates were found to hold slightly more extreme attitudes, were less ambivalent than non-sophisticates, and were more biased in judging the strength of both compatible and incompatible arguments. Further, they find evidence that those who held strong views and were more sophisticated showed attitude polarization effects so that those viewing arguments incompatible with their own position became even more strongly supportive of their prior position. In another report, Lodge, Taber, & Galonsky (1999b) replicate these results and extend them to show that bias also occurs in information search when subjects know ahead of time the valence of the information available to them. Subjects were given the opportunity to examine information on two issues: affirmative action and gun control. This information was presented as coming from particular groups whose positions on these issues were well known. Subjects showed a clear bias towards searching first for information confirming their own pre-existing positions on these issues.

Other studies suggest that an important consideration is the nature of the processing goals under which information search proceeds. Information processing may be motivated by accuracy goals, in which the individual desires to reach the correct conclusion and may search for information to ensure such a result. Alternatively, the decision-maker may have directional goals which motivate towards reaching a specific pre-selected conclusion, thus focusing information search on information which reinforces existing affect (Kunda, 1990.) Kunda suggests that those motivated by a directional goal will work to rationalize and justify the pre-selected conclusion, working towards an "illusion of objectivity." Thus directional goals bias the process of search and the construction of beliefs. Lodge, Taber, and Galonsky (1999a) confirm this reinforcing bias under certain conditions. Accuracy goals, the motivation to do a good job, might be expected to lessen the extent of this bias, but Kunda argues that this is not always the case. She cites a number of studies, including Kahneman and Tversky (1972), Lord, Lepper, and Preston (1984) and Tversky and Kahneman (1973) which show that even when an incentive was used to induce accuracy, bias remains. In another report, Kunda (1987) provides some evidence for

memory bias in an experiment about self-evaluations of academic performance. Her study shows those who want to see themselves as academically successful will recall memories that support this conclusion despite existent knowledge that leads to a conclusion of academic failure and despite motivations to be accurate in memory recall.

The initial studies by Lodge and his colleagues provide a promising glimpse into how affect and cognition combine at a very basic level to affect the ways in which people search for and process information. To understand motivated reasoning and the role played by hot cognition we must attempt to get inside the information processing "black box" of cognition and affect. This cannot be done through traditional political science methods such as survey research, no matter how sophisticated, hence the reliance on laboratory studies. However, these studies need to be extended into an environment in which people make political decisions and during which the decision making process can be closely monitored. While it is interesting and important to know that subject reactions to target words are predicated on the affect associated with priming words, it would be even more interesting to political science to know that these biases shown in the prior research also occur when people are involved in political activity. The study I report here attempts to move the research in this direction, by presenting an experimental paradigm in which subjects participate actively in a simulated presidential election campaign, searching for information about candidates, and deciding which one deserves their vote. Using this paradigm I will test basic propositions of hot cognition, in particular the effect of information congruency on the processing of new information about candidates, the effect of affective biases on information search, and the role that these biases may play in the recall of memories about the campaign and candidates.

Method

Dynamic Process Tracing[3]

The experimental design used in this study is based on process tracing techniques. Process tracing designs start with the assumption that decision-making is best studied by collecting data while the decision is actually being made (Ford, Schmitt, Schectman, Hults, and Doherty, 1989; Jacoby, Jacard, Kuss, Troutman, and Mazursky, 1987.) The major research technique for process tracing studies of decision-making is the information board, which presents subjects with an *m x n* matrix of information. Subjects choose among several alternatives (columns of the matrix) which differ on one or more attribute (rows.) Redlawsk and Lau have revised the traditional static information board, modifying it into a dynamic, ever-changing simulation mimicking the flow of information during a political campaign (Lau and Redlawsk 1992; Redlawsk and Lau 1995; Lau and Redlawsk 1997; Redlawsk, 2001, Lau and Redlawsk, In Press.) Where the static board allows subjects to have access to all available information at all times the dynamic board emulates the ebb and flow of a political campaign over time. The essential feature of the static information board -- the ability to trace the decision-making process as it happens -- is retained while information about candidates comes and goes. In order to mimic the sometimes confusing and often-unmanageable campaign environment the dynamic information board has the potential to overwhelm subjects with information. Further, a real election campaign contains a "here today, gone tomorrow" quality to its information flow and so does the dynamic information board. Finally, where the standard information board makes all types of information equally accessible, from positions on arcane issues to party identification, the dynamic approach models the relative ease or difficulty of finding certain kinds of information at different times during a campaign.

Using this dynamic process tracing methodology a unique dataset has been collected incorporating observations of the information processing techniques employed by subjects as they negotiate an election campaign. Data have been collected on what subjects learn about each candidate, how long they spend processing each discrete piece of candidate information, their likes and dislikes about each candidate and issue, and more, all collected unobtrusively as subjects engage in political information processing. At the end of the campaign subjects report their memories about the candidates, their global affect towards the candidates and the affective value of each memory they can recall. As a means of testing propositions derived from motivated reasoning the dynamic information board provides the best available insight into what voters are actually doing during a campaign.

Subjects

This study reports on a total of 102 subjects who were recruited from central New Jersey in the fall of 1994.[4] Of the initial 102 subjects, 3 could not complete the study due to either fatigue or inability to operate the computer. Thus, 99 subjects are available for analysis. No specific attempt was made to be representative of voters in New Jersey. Two thirds of subjects were female, and the average age was 49 years, with the youngest 18 and the oldest 82 years of age. Overall, 22% of subjects were 65 or over. Twenty-five percent of subjects had household incomes over $75,000 per year, while 13% were under $25,000. The racial mix included only 7% non-white, somewhat lower than the surrounding area. Finally, partisanship was distributed (assigning "leaners" to their party) as 57% Democrat, 7% pure independent, and 36% Republican.

Procedure

Subjects participated in a mock presidential primary election featuring six candidates, divided between the two parties. Subjects were told that the computer would present the kind of political information which would normally be available in any real primary election and that the candidates, while all invented, were designed to represent a realistic ideological spectrum for their respective political parties. Subjects were required to register as either Democrat or Republican prior to the election, and then could only vote for the candidates from within the chosen party. Thus while subjects could actually learn about all six candidates they had strong incentive to focus only on the candidates from their own party. By creating mock candidates crucial control was retained over the differences between subjects in prior knowledge of actual politicians. No subject knew anything about any of the candidates before the mock campaign began. The specific procedures followed by subjects are detailed in Figure 1.

Insert Figure 1 about here

Three manipulations were embedded in the primary election. The processing manipulation was designed to place subjects into either an on-line or memory-based processing mode with half of subjects randomly assigned to each condition. Since on-line processing appears to be the default method by which people evaluate social information (Hastie and Park 1986; Lodge, McGraw and Stroh 1989; Lodge 1995) and given that all subjects knew they had to vote for one candidate at the end of the primary, the incentive to form an evaluation and thus process on-line was strong. Accordingly, no specific instruction was given to create the on-line condition, since existing research strongly suggested

this would be the default. Subjects in the memory-based condition were instructed that they would be required to list everything they could remember from the campaign once the election was over, in effect, being warned that memory mattered. Memory-based subjects were also instructed that they would have to justify their vote choice to the experimenter; Lodge (1995) suggests that the justification process can be effective in blocking on-line evaluation. This should have had the effect of creating an accuracy motivation for this group of subjects. These instructions were embedded in the general instructions subjects read at the beginning of the primary election simulation. Subjects in the on-line condition were given the same set of general instructions without the specific paragraph describing the listing and justification requirements.

The second manipulation was the task demand manipulation varying the number of candidates a subject faced during the primary election. One half of subjects were faced with four candidates in their party's primary (and two in the other party), while the remaining subjects faced only two candidates in their party (and four in the other party). This manipulation was included to manipulate the difficulty of the choice, presuming that a four-candidate primary would be more difficult than a two-candidate one, particularly since the two-candidate condition featured ideologically distinct candidates. For purposes of this analysis, no theoretically important expectations exist about this manipulation.

The third manipulation, the poll interruption, was originally designed to test whether the time taken to make a decision would vary according to when the decision was made. However, in the current analyses it provides a way of assessing candidate affect prior to the end of the campaign. One-third of subjects were interrupted after 6 1/2 minutes and asked if the election were held at that point for whom would they vote. After their preference was recorded they were returned to the campaign. A second third of the subjects were interrupted with the same poll question after 13 minutes. The final third were not interrupted by a poll and did not express their preference until the campaign was over.

Upon arriving for the experiment, subjects began by completing a fairly standard political attitudes questionnaire to determine their political interests, preferences, and knowledge. Following an opportunity to practice with the computer, subjects experienced a twenty-minute primary election campaign presented via the dynamic information board. The flow of information in the simulation was dictated by the flow of information during "real world" presidential campaigns, based on a study by Lau (1995.) Early in the primary, information about candidate attributes predominated, including polls ("horserace" information) and personal characteristics. As the primary continued, information flows changed, so that more issue positions were presented, as well as endorsements of the candidates by various interest groups. Subjects accessed this information by clicking on a statement such as "Thomas's position on Term Limits" and reading a "card" on the computer screen listing the information. In addition to the cards of information which subjects could choose to view, each candidate had two twenty second campaign videos that appeared from time to time without being chosen. At the end of the primary, subjects voted for one candidate in their party. Subjects then took a memory test (unexpected for those in the on-line condition) consisting of six pages, each headed by the name of a candidate and the order of which was randomly determined for each subject. Subjects were instructed to list everything they could remember about each candidate, no matter how trivial. After an exercise to establish whether subjects would have changed their vote with more complete information, i.e., whether they voted "correctly" (Lau and Redlawsk 1997), an extensive debriefing and cued recall procedure began. Subjects were shown the script of all information they examined during the campaign and asked to recall for each card they had viewed what they were thinking while learning the information, and to evaluate each bit of information as to whether its contents made the subject feel good, bad, or neutral about the candidate. Finally, the purposes of the study were explained and subjects allowed to ask questions. The total time required for each subject was about 2 1/4 hours.

Hypotheses

The initial studies of the mechanisms of motivated reasoning provide a promising glimpse into how affect and cognition may work at a non-conscious level to influence the ways in which people search for and process information. However, the research reported to date must be extended into an environment in which people actually make political decisions and during which the decision making process can be closely monitored. While Lodge's reports are interesting and important, it would be even more interesting and important to political science to know that these reaction time biases have measurable effects when people are actually involved in political decision-making, especially in the context of a political campaign.

Given the basic processes of motivated reasoning as described in prior research it is possible to develop and test a series of hypotheses about how decision-makers process information over time while comparing candidates in order to make a voting decision. As voters encounter information about political candidates, for example, they presumably develop affect towards those candidates. The affect may be positive or negative, strong or weak, but it ought to be apparent in the macro level processing of new information as it is encountered. One clear implication of motivated reasoning, if it pertains to political candidates, is that voters encountering affectively incongruent information about candidates should take longer to process that information compared to congruent information. Affectively incongruent information is simply information generating affect opposite to the existing affect felt for the candidate who is the subject of the new information. Thus, learning something one does not like about a favored candidate is to learn incongruent information, as is learning something positive about a disliked candidate. On the other hand, information with an affective valence in the same direction as existing affect for a candidate is congruent.

When encountering incongruent information motivated reasoners may spend time counterarguing against the incongruent information, making an effort to fit it into their existing affect about the target (Lodge and Taber, 2000.) Or they may bolster their existing affect by recalling the reasons they already feel as they do. Or they may attempt to discount the source. In any case, all of the processes take time to carry out. On the other hand, congruent information does not require any special effort since it easily fits the existing attitude towards the candidate. Thus it should take longer for voters to process incongruent information about candidates. Given that motivated reasoning rests in part on online processing, this pattern should be particularly evident for online processors motivated by a directional goal, such as candidate evaluation. Memory processing and motivation towards accuracy, however, may reasonably be expected to counteract this process, since the effort to maintain memory and accuracy may cause processors to focus attention on all types of information and interrupt the online evaluation process. This leads to Hypothesis 1:

> H_1: Voters processing online and motivated towards *directional* goals will take longer to process new affectively incongruent information about a candidate for whom an affective evaluation already exists, compared to congruent information about the same candidate. Voters motivated towards *accuracy* goals and memory processing will not show these effects.

The motivated reasoning process also has implications for information search. In the domain of political issues, Lodge, Taber, and Galonsky (1999b) show a bias towards searching for confirming information. For candidate information processing a similar effect could be expected, as motivated

reasoners seek to confirm their feelings towards preferred candidates. However, it is not as clear whether bias should be expected from memory processors motivated towards accuracy. Kunda (1990) suggests that in some circumstances accuracy goals are not enough to overcome bias. In particular, in this study, subjects were told they would be expected to justify their vote, and thus were especially motivated to be accurate about their preferred candidate. If so, memory processors in this study may show the same biases towards preferred candidates that are expected of online processors. Thus, Hypothesis 2a:

> H_{2a}: Once initial affect towards a candidate is established, all voters will spend more time searching for information about a preferred candidate.

And because contents in memory are at least in part related to the information encountered during the campaign (Redlawsk, 2001; Lodge, McGraw and Stroh, 1989),

> H_{2b}: The number and accuracy of reported candidate memories after a campaign will be significantly biased towards preferred candidates.

The role that memory does or does not play in voter decision-making is uncertain. Lodge, McGraw and Stroh (1989) in their original conception online processing presented evidence that the contents of memory were not related to the evaluation of a single political figure (a supposed "Congressman Williams"). Instead, the online tally, composed of the affective value of all information encountered alone predicted evaluation. This fits well with prior research on person perception. However, in a somewhat more realistic campaign environment, in which voters had to choose from among multiple candidates after searching for and learning information about them over time, memory was found to play a strong role in both the direction of the vote and decision quality (Redlawsk, 2001). Motivated reasoning, which is a more complete conception of information processing, and which subsumes online processing within it, may provide some answers to this paradox. If, as expected, motivated reasoners take longer to process incongruent information, it may be that this stop-and-think process has two effects: first to make memorable the incongruent information encountered and second to strengthen the links between the candidate and congruent information used to bolster existing affect during the extra time spent processing incongruent information. If so, processors who encounter incongruent information about candidates may have stronger links to all kinds of memories about the candidate, leading to Hypothesis 3a:

> H_{3a}: Encountering and processing incongruent information will increase the likelihood of reporting all types of affective memories for a candidate.

During the "stop-and-think" process of evaluating incongruent information motivated reasoners can be expected to do what it takes to maintain existing affect, even if it means finding ways to discount incongruent information. One of the ways to do this is to simply overwhelm the new incongruent information with lots of reasons why the existing affect should not be changed. The more often this has to happen the stronger the links to the original reasons why the candidate is liked or disliked may become. Rehearsal of memory strengthens it (Collins & Loftus, 1975; Srull, 1981.) Thus, Hypothesis 3b:

> H_{3b}: Encountering and processing *incongruent* information will increase the likelihood of reporting *congruent* memories for a candidate.

Support for this hypothesis would be strong evidence that motivated reasoners are using memory to help overcome incongruency, and may well help explain why memory matters in an election campaign even when voters are making on-line evaluations.

Lodge, Taber, and Galonsky (1999a), and Lodge and Taber (2000) report an interesting and counterintuitive result when they find that politically sophisticated subjects evaluating issue information were likely to report even stronger support for their pre-treatment issue positions after encountering arguments incompatible with their own position. Rather than attenuate their attitudes by incorporating views expressed in the new incongruent information, these subjects appeared to completely discount arguments opposed to their position.[5] Similar effects for political candidates might be seen given the bolstering process described above. Rather than updating the online evaluation in the direction of the new incongruent information, motivated reasoners may give themselves even more reasons to maintain their existing attitudes. If so, attitude polarization is the likely result.

> H_4: Political sophisticates will show effects of increased attitude polarization as they encounter greater amounts of incongruent information about preferred candidates. Less sophisticated voters will not show this effect.

If voters, especially sophisticated ones, strengthen their support for a preferred candidate even in the face of negative information about that candidate, what is the likely result in an election context? It seems a logical conclusion that such voters might well be led astray by their affect, ultimately voting for a sub-optimal candidate simply because they started out liking that candidate based on early information. This suggests that the order of information search is important, and that a voter who learns positive information early about a candidate is not very likely to find it easy to adjust affect and change candidates even if later information search turns up negative information. In this fashion, motivated reasoning predicts a process similar to anchoring and adjustment (Kahneman and Tversky, 1982) but one in which the anchor is far stronger than the adjustment, and the adjustment may in fact be in the wrong direction. Given this, Hypothesis 5 follows:

> H_5: Attitude polarization effects will lead to lower quality decisions. As a voter encounters greater amounts of negative information about a preferred candidate and therefore strengthens the *positive* affect towards that candidate, a lower quality vote decision will result.

Defining Information Congruency

Information congruency is defined as the relationship between pre-existing affect for a candidate and the affect generated by the new information encountered about the same candidate. Four possibilities exist, assuming that neither the candidate affect nor the affect towards new information are neutral[6]. If the pre-existing affect towards the candidate is positive, and the affect towards the new information is also positive, we label the new information as congruent. Likewise, if the candidate is viewed negatively, and the new information about the candidate is also negative, once again the new information is congruent. In the other two cases, when new negative information is encountered about a

liked candidate or positive information is encountered about a disliked candidate, the new information is affectively incongruent.

Thus in order to operationalize information congruency, we must first define affect towards the candidates and affect towards new information. Subjects were asked to rate each of the six candidates in the Republican and Democrat primaries on a standard feeling thermometer labeled from 0 to 100. A candidate is defined as liked by the subject if the candidate's rating on the feeling thermometer is above the subject's overall mean rating for all six candidates. Conversely, the candidate is considered disliked if the rating is below the subject's mean for all candidates. Any candidate rated at the mean was considered neutral and dropped from the analysis. Affect towards new information about the candidates was measured by using the cued recall procedure detailed above in which subjects were shown the script recording their information search. Information that made subjects feel good was coded as positive and that which made them feel bad coded as negative, while neutral information was removed from this analysis. Information congruency then simply crosses the two measures, so that congruent new information (in which affect for the new information matched affect for the candidate) was coded as 1 and incongruent coded as 0. The unit of analysis is the pairing of subjects and information, so that for each subject there are as many observations as there are cards of information examined for each candidate.

In addition to the cued recall of information, subjects took a memory test in which the only cue was the name of each candidate. Subjects were instructed to list every memory, no matter how trivial, that they could recall for each candidate. The experimenter then reviewed the memory list with subjects and asked for each discrete memory whether the information it represented made the subject feel better about the candidate, worse, or had no effect on their feeling. Memories that included positive or negative affect are used in this analysis, while neutral memories are discarded.

Thus, this study has three measures of affect available. First is global affect towards the candidates, measured by the feeling thermometers, but also by whether a candidate was selected in the poll or chosen in the voting booth. Second is affect towards each piece of information subjects could recall viewing, through a cueing process in which they were shown the script recording the detail of their information search. Finally, we have affect relating to the raw memories about each candidate elicited by cueing simply the candidates' names.

Results

Information Congruency and Processing Time

Previous research in information processing provides evidence that in general incongruent information can be more difficult to incorporate into existing schemas than is schema-congruent information (Fiske and Taylor, 1991.) The cognitive processes necessary to categorize such discrepant information may be more complicated and thus take longer. Steenbergen and Lodge (1998) argue that it is affect that plays the key role. Affect, connected to the activated cognitive concept, determines if new information will be readily incorporated into the existing structure or whether more detailed processing will be needed. Hypothesis 1 predicts that for on-line processors the amount of time required to process affectively incongruent information will be greater than the time required for congruent information.

Table 1 reports the results of a series of OLS regression analyses in which the mean adjusted processing time for new information is the dependent variable, and information congruency along with a number of important controls are the predictors.[7] Because subjects knew nothing about any of the

candidates in the election simulation before the campaign started, they began the study with no affect towards any candidate. Therefore time for affect to develop was allowed by discarding the first two pieces of information that a subject viewed for each candidate. The analyses for on-line and memory processing subject groups are reported separately, since very different findings are anticipated for the two groups. Controls include the remaining two experimental conditions: task demands and poll interruption, measures of political sophistication and education, and measures of reading ability and the number of words per information card.[8] These covariates, all of which are constants within subjects, also serve the role of "dummy variables" to control for within-subjects effects created by the use of subject-candidate pairings for observations.[9]

The first two columns of Table 1 report the analysis across all subject-candidate observations. In this initial analysis no significant main effects for information congruency are evident for either on-line or memory processors. Only sophisticated on-line subjects show the expected increased processing time when faced with incongruent information. The primary predictors of processing time are the number of words in each information card and the subject's reading ability. While the minimal effects for information congruency might seem somewhat troubling, in some ways it should not be surprising. Subjects faced six candidates overall: two or four in their party and four or two in the other party. Any analysis of all candidates includes some candidates for whom affect has probably developed (those within the party) and some for whom little or no affect has developed (out party candidates; ignored candidates.) A better test of the hypothesis is to look only at candidates towards whom we are certain some affective feeling has developed.

The third and fourth columns of Table 1 show the effects of information congruency on processing examining only those candidates subjects chose when they voted at the end of the campaign. For subjects in the online condition, the findings are clearly in line with the expectations of motivated reasoning. Incongruent information slows down processing, so that subjects who read information challenging their existing affect towards a candidate took significantly longer to process that information. The lack of interaction effects with sophistication indicates that the need to spend more time processing information challenging existing affect occurs for both sophisticates and non-sophisticates.

As expected, the information congruency effect, however, does not exist for subjects in the memory processing condition. In fact, the coefficient for information congruency switches signs, indicating a small and statistically insignificant tendency to spend more time on congruent information than incongruent. As Kunda (1987) suggests, the accuracy goal (memory processing) appears to attenuate the affective bias that is found in subjects with an evaluative goal (online processing.) Additional evidence is found in the lack of significant effects for reading ability for memory subjects, who were presumably taking more care to read the information with a goal of remembering it.[10]

A potential conceptual problem arises with the analyses in the first four columns of Table 1. While affect towards the candidates is determined either by the feeling thermometer evaluations provided by subjects after the election (columns 1 and 2), or by the actual vote (columns 3 and 4), both measures were collected after the campaign and neither allows us to say with certainty that subjects held the indicated affect from beginning to end. In fact, it is very likely that at least some subjects changed their affect towards the candidates as the campaign progressed.[11] While the results appear to support using these measures, the analysis would be better served by a measure of affect captured during the campaign. Fortunately, for two-thirds of subjects such a measure is available in the form of the poll interruption experimental condition. The information search process for these subjects was interrupted either one-third or two-thirds of the way through the campaign, at which point subjects were asked to

indicate which candidate they currently supported. This then provides us with a measure of candidate evaluation collected while the campaign was underway.

The analyses in the last two columns of Table 1 takes into account only the information these subjects viewed after the poll was taken. All information encountered before the poll is discarded in this analysis. Subjects in the on-line condition show effects for information incongruence which are, if anything, even stronger, as would be expected if the Hypothesis 1 is supported. And again, for on-line subjects the effects of both the length of the information cards and reading ability are strong and in the expected direction. Once more, memory processors show no significant information effects, nor effects for reading ability. Overall, these findings provide clear support for the hypothesis that incongruent information about candidates slows down information processing.

Insert Table 1 about here

Congruency and Information Search

Hypothesis 2a predicts that affect will influence information processing by directing information search, while Hypothesis 2b extends this prediction to memory recall after the election is over. Table 2 presents evidence of these additional influences examining on-line and memory processors separately. Turning first to online processors, the first row of the top section of the table reports the mean amount of information searched per candidate as measured simply by counting the number of cards viewed for each candidate. The table entries are the proportion of the total cards viewed that were viewed for different types of candidates. Since there were six candidates in every primary election, purely random search would have resulted, on average, in each candidate receiving one-sixth (.167) of all information accesses. Using this as the standard, we see that candidates who were liked by online voters accounted for about 21% of all information card accesses, while disliked candidates accounted for only 12%. The candidate ultimately chosen by the voter received over 25% of all information accesses. All of these information search rates are significantly different from purely random search. Thus, a clear bias in information search emerges, with subjects seeking information about candidates they like and avoiding information about those they do not like.

A similar bias exists in the memory reported by subjects at the end of the campaign simulation. The second row of Table 2 reports the number of memories recalled as a proportion of the number of cards viewed for each candidate. Across all candidates, an average of just under 18% of all cards viewed resulted in a memory report. However, for liked candidates, the proportion increases to nearly 25% ($t=3.051$, $p<.01$), while for disliked candidates the proportion falls to about 14%, though in this case the difference is not statistically significant ($t=-1.654$.) Again, the bias is strongest towards the candidate for whom subjects voted, with memories representing 26% of all cards viewed ($t=2.891$, $p<.01$). Finally, when we examine memory for accuracy, by coding reported memories for the extent to which they match the actual information subjects viewed, the same pattern again emerges, with better accuracy for liked candidates, worse for disliked, and best of all for the preferred candidate.

These results suggest that not only does affect influence the processing of new information once it is encountered, but that affect also influences the direction of the actual search for new information. On-line information processors appear guided by their existing affect towards candidates in looking for

new information which they then hope will continue to reinforce their pre-existing feelings towards the candidates. When the new information fails to do so, processing it becomes more difficult.

The bottom section of Table 2 reports the same information for memory processors. The results appear to support Kunda's (1990) assertion that the accuracy goal does not necessarily resolve the search and memory bias generated by affect. Memory processors were just as guided by their affect to focus much of their information search on liked candidates, while exhibiting far less interest in learning about disliked candidates. However, the memory effects that are clear for online processors are less so for the memory group, although there are marginally statistically significant differences. Given that memory processor knew ahead of time that they would be required to recall information the finding makes sense, as they were motivated to remember as best they could, regardless of affect towards the candidates. Overall, the results provide generally strong support for Hypotheses 2a and 2b.

Insert Table 2 about here

Information Congruency and Memory

In general, motivated reasoners take more time to process incongruent information during which they are presumably making a cognitive effort to account for the unexpected. One result should be that the more incongruent information that is encountered the stronger the links in memory between the candidate and information received. Hypothesis 3a suggests that these stronger links should result in the greater likelihood of reporting all types of candidate memories. The unit of analysis is subject-candidate pairings, so that the focus is on the number of memories per candidate across all subjects. The analysis includes 212 candidates across the 50 online processing subjects[12]. At least one affectively charged memory was recalled for 74 of the candidates, with no such memories reported for the remaining 138[13.]

An initial look at the data provides some support for the basic proposition that encountering incongruency will enhance memory. Figure 2 displays the percentage of candidates for whom memories were reported by whether or not incongruent information about those candidates was encountered. Examining memories for all types of information viewed (positive, negative, and neutral) subjects reported at least one memory for just under 50% of the candidates for whom only congruent information was encountered. But for those candidates where subjects learned both congruent and incongruent information, memories were reported for 57%. The difference is starker when examining only memories for affectively charged information (which is the only information for which congruent/incongruent assessments could be made.) Memories for both kinds of affectively charged information were reported for 24.5% of candidates for whom only congruent information was encountered, while 43.9% of candidates for whom both types of information was encountered generated at least one memory. And if we examine only memories for congruent items, we see that encountering incongruent items appears to increase the likelihood of reporting congruent memories. (24.5% for congruent only, 37.8% for congruent and incongruent information.)

Insert Figure 2 about here

Table 3 reports logistic regression models predicting the likelihood that candidate information will be recalled from memory. All of the models include a series of controls. These include affect expressed towards candidates, since subjects typically report more memories for liked candidates compared to disliked, along with an indicator of party status, since again subjects focus more and report more memories for in-party candidate compared to out-party. Individual subject differences including age in years and political sophistication, and a measure of cognitive (reading) ability, as well as the experimental manipulations are also included. Column1 is the test for Hypothesis 3a, the likelihood that any items viewed will be recalled from memory, congruent or incongruent. As subjects view more congruent information as a percentage of all information viewed during the campaign the greater the likelihood that at least one memory will be recalled. Subjects also clearly show a greater likelihood of reporting memories for candidates for whom they viewed greater amounts of incongruent information. This effect persists even controlling for the total amount of information viewed during the campaign, which includes congruent, incongruent, and affectively neutral information. The results support the expectations of Hypothesis 3a.

A stronger test of the motivated reasoning process is needed however, since it could simply be that viewing more information in general leads to a greater likelihood of reporting memories. The more interesting prediction of motivated reasoning is that because encountering incongruent information generates a process that may include bolstering by recalling congruent information from memory the strengthening of congruent memory is expected upon encountering incongruent information. Thus Hypothesis 3a predicts that encountering incongruent information should increase the likelihood of reporting memories for congruent information. The second column of Table 3 reports the test of this hypothesis. As expected, as the amount of congruent information encountered increases, the likelihood of reporting a congruent memory for the candidate increases as well, again controlling for the total amount of information encountered. Given that, encountering any incongruent information increases the likelihood of reporting a congruent memory. The effect is not simply a result of encountering more information in general. Column 3 reports the effects of encountering congruent information on the likelihood of reporting memories for incongruent information. While viewing greater amounts of incongruent information increases the likelihood of reporting incongruent memories, as would be expected, encountering congruent information does not add anything to the model. Thus there is some confidence that the effect shown in column 2 is the effect expected if incongruent information enhances congruent memory, as suggested by Hypothesis 3a.

Insert Table 3 about here

Information Congruency and Decision-Making

Overall the results so far provide strong evidence for the basic proposition that information processing is influenced by affect and that affectively incongruent information is harder to process. I now turn to the question of whether the greater processing time and biased search processes lead to any real consequences. Hypothesis 4 predicts that politically sophisticated subjects who encounter incongruent information about candidates will exhibit attitude polarization. This follows from Lodge and Taber's (2000) report of such an effect in the domain of issue attitudes. Of course, issue positions on gun control and affirmative action, as tested by Lodge and Taber, tend to be strongly held and unlikely

to be easily moved. Candidate preferences within a political campaign simulation might be more malleable, especially when all of the candidates are unknown to the subject prior to the experiment. If so, even motivated reasoners may find it easier to adjust their candidate ratings in the face of incongruent information.

Univariate ANOVA was used to examine the basic effects of both information congruency and expertise on the ratings subjects gave to the candidate chosen in the poll taken either one-third or two-thirds of the way through the campaign. Because this candidate is by definition a liked candidate, incongruent information will always be negatively evaluated information. The processing manipulation, the measure of subject political sophistication, and information congruency were entered into the ANOVA in a full-factorial design. As can be seen from Table 4, no main effects for either the existence of incongruent information or political sophistication are found. However, the prime interest here is the interaction between the two, which also shows no significant effects on candidate ratings. However, strong effects are found for the processing condition and the interaction between processing and information congruency. This interaction is what would be expected if online processors differ from memory processors in attitude polarization. That they differ is not surprising, given that it is the online processors who are presumed to be motivated reasoners.

The nature of the interaction becomes clear in the marginals reported in Table 4 and shown graphically in Figure 3. Motivated reasoners show exactly the attitude polarization effects predicted by the Lodge studies, while memory processors do not. In fact, memory processors, in part due to the instructions which generated an accuracy goal, show a normatively correct pattern -- as they encounter negative information about a preferred candidate, they lower their evaluation of that candidate. Online processors, however, increase their rating of their chosen candidate by an average of nine points on the 101 point scale when they have encountered negative information about that candidate after choosing him or her in the poll. That no sophistication effect is found may be due to the difference in the domains studied, where previous studies have focused on issue positions that may require a certain amount of political sophistication to process effectively. With the exception of the expectation about sophistication, Hypothesis 3 is supported in the general sense that all motivated reasoners show attitude polarization.

Insert Table 4 and Figure 3 about here

Given the evidence for attitude polarization among motivated reasoners it is important to see whether there are consequences for the actual vote choice. Hypothesis 5 predicts that voters who show attitude polarization will be less likely to make a high quality decision. This follows logically from the evidence that such voters apparently ignore information that runs counter to their existing affect, rather than adjusting their beliefs to be in line with the new information. Failure to make an accurate adjustment in attitude seems very likely to lead to sub-optimal decision-making. Ditto, Scepansky, Munro, Apanovitch, and Lockhart (1998) argue that "although people may direct attention toward preference-inconsistent information in the hope of uncovering alternative explanations for it, the effortful processing that is the by-product of that hope can lead people towards nonpreferred as well as preferred conclusions" (p. 61). Information processors may be led astray by making extra effort to counteract the incongruency in information that does not support pre-defined affect. Lodge and Taber (2000) suggest that information processors counterargue against positions they do not like, and in so doing they strengthen their existing attitude rather than using the new information to update and perhaps attenuate previous beliefs. If the same results occur when voters are processing candidate information it

would suggest that those who encounter more negative information about a candidate they already like would be more likely to remain with that candidate rather than switching to another, even when there might be a better candidate in the race. The result would be a lower quality decision.

In order to test Hypothesis 5 a definition of decision quality in candidate selection is needed. Lau and Redlawsk (1997) show that decision quality can be measured by allowing the voter to self-determine whether he or she would change the vote initially cast after having the chance to view all available information about the candidates in the choice set. This "fully informed" decision quality measure allows the researcher to establish the difference between a vote cast on the basis of the information actually viewed during the campaign, which is subject to the information search and affective biases shown earlier and is never a complete set of all possible information, and the vote which would have been cast if the voter had the time and resources to view all information about all candidates in their choice set.[14] Subjects in the present study were given the opportunity to change their vote to another candidate after the election was over and after spending as long as they liked reviewing all available information about all the candidates. Those who declined to change their vote were coded as casting a "correct" vote (about 75% of subjects) while those who were willing to change were coded for an "incorrect" vote.

Across all subjects in the on-line condition, a mean of 7.9% of all information encountered about the candidates for whom subjects voted was reported to be incongruent, with a range from 0 to 50%. Since chosen candidates were also liked candidates, incongruent information in this context is limited to negative new information about a candidate for whom a positive evaluation exists. Subjects who voted incorrectly, and thus evidenced lower decision quality, encountered on average 14.2% incongruent information for the candidate they selected, while those casting correct votes, and thus making a higher quality decision, reported only 5.9% incongruent information on average. The difference between these groups is significant, t=2.521, $p<.05$. Thus some support is provided for the hypothesis that encountering more incongruent information leads to a lower quality decision.

However, decision quality can be affected by a number of other factors, including maintenance of the on-line evaluation counter (Lodge, McGraw, and Stroh, 1989), the difficulty of the task environment, and the amount of accurate memory voters hold about the candidates (Redlawsk, 1998.) Thus, in order to test the role of information congruency we must start first with a model of decision quality that takes into account these factors. Such a model is reported in Redlawsk (2001) and a somewhat simplified version is taken as the starting point for this analysis. In this basic model decision quality is directly affected by the difficulty of the task, with subjects facing four candidates performing worse than those facing two candidates. In addition, subjects who spend a longer time making the decision do a better job, while those who report unconstrained political attitudes do worse. Finally, subjects who report more accurate memories for their preferred candidate also show high quality decision making, whether in the on-line or memory processing conditions. This base model correctly classifies nearly 84% of subjects, with a Cox and Snell pseudo R^2 of .343. The question for the present analysis is about the nature of the information itself, that is, whether or not the congruency of new information as it relates to pre-existing affect adds anything to this basic model of decision quality.[15]

The results of the information effects model reported in Table 5 show that in fact information congruency significantly improves the base model. Importantly, none of the original significant predictors changes either its sign or its significance: memory accuracy remains important, as does decision time and issue constraint. The main interest however, is in the terms describing the role of incongruent information. Clearly the affective nature of the information viewed plays a part independent of the importance of any other factor in predicting decision quality. The main effects for incongruency show that for subjects in the on-line processing condition, encountering more incongruent (i.e. negative)

information about the chosen candidate leads to a lower quality decision. This provides clear support for the motivated reasoning hypothesis that the effort to overcome disliked information about liked candidates can lead voters to discount important negative cues about a candidate they prefer. However, the incongruency by processing interaction term indicates that subjects in the memory processing condition, whose goal was accuracy rather than evaluation, showed a significant tendency to do a better job as more incongruent information was encountered. Memory processors, therefore, do seem to take into account new information in a more accurate way than do on-line processors. These effects were independent of both task demand and political sophistication. When making a voting decision, both sophisticates and non-sophisticates process incongruent information in similar ways, regardless of whether they are facing an easier or harder decision. The new model is significantly improved over the original (X^2_{diff}=14.28, 4df, p<.01) and the Cox & Snell Pseudo R^2 improves from .343 to .437. Hypothesis 4 is supported for online processors only.

Insert Table 5 about here

Discussion

Motivated reasoning rests on three propositions: that people process evaluative information on-line, that affect and cognition are bound together tightly as hot cognition, and that information acquisition and evaluation is guided by a "How-do-I-feel?" heuristic. This paper describes efforts to test the premises of motivated reasoning with data generated while people make a decision in a political campaign simulation. While such simulations have their limitations as analogues of "real-world" campaigns, the process that subjects followed in this study resembles the broad processes needed to evaluate candidates: learning about the candidates, developing affect towards them, and expressing that affect by casting a vote. Because the campaign simulation proceeds over time and because subjects have no knowledge of or affect towards the candidates before starting the campaign, crucial control is maintained over the information subjects use to generate affect, with the computer tracking the complete information search process.

This study provides the first support for motivated reasoning in an environment that mimics the processes of a political campaign. Motivated reasoning suggests that affect linked to a cognitive node is retrieved into working memory at the same time the node itself is retrieved, and thus becomes a kind of perceptual screen through which information is viewed. The result should be that new information in line with existing affect is easily assimilated, while incongruent information takes longer to process. Results show clear evidence of this effect on a macro level, with incongruent information requiring significantly greater processing time for subjects in the on-line condition, while showing no processing effects for those in the memory condition. Not only does this hot cognition bias the processing of information, it also appears to bias the search for additional information. Subjects specifically looked for information about candidates they liked, while choosing not to look at information about those they did not like. While this seems like an obvious and perhaps logical process for voters to follow, choosing to ignore candidates for whom some negative feeling has developed can mean failing to consider completely the full choice set available. The bias towards looking at liked candidates means that the order in which information is searched is critical. If a voter has several dimensions of interest but eliminates a candidate from consideration based on only the subset of those dimensions that have

generated negative affect early in the campaign, she ignores the possibility that this initially disliked candidate might be her best choice on the dimensions she has failed to consider.[16]

The biases generated by affect appear to have a real world consequence. Subjects who encountered greater incongruency during their information search showed attitude polarization and a degradation in the quality of their decision. This might be accounted for by considering that when incongruent information is encountered, the automatic process of assimilation and update of the on-line evaluation is interrupted, as greater attention is paid to the new incongruent information. However, it is not clear exactly what information processors who encounter incongruent information are doing during the extra time they spend assimilating it. Motivated reasoning suggests that they are actively counterarguing the information, attempting to explain it away (Lodge & Taber, forthcoming.) Such a cognitive process entails developing reasons why the information is wrong or should otherwise be ignored, such as source considerations or the weakness of the argument. Alternatively, subjects might be bolstering their existing affect by searching memory for congruent information about the candidate, in a kind of balancing effort akin to that suggested by Heider's (1958) balance theory. In any case, while this study could not directly test these propositions, it is easy to see how failing to adjust affect in accord with new incongruent information could easily lead to lower quality decisions. The process of attempting to make sense of incongruent information might result in downplaying the importance of that new information. The investment in affect towards candidates arising from learning even basic information appears to create an anchor which motivated reasoners have a hard time moving in the correct direction.

Yet subjects who were motivated towards accuracy concerns seemed to readily overcome this effect, so that in encountering incongruent information they did not show significant attitude polarization or fail to update their prior affect. Memory processors do not show the longer processing times for incongruent information evident in on-line processing. And memory processors made better decisions when encountering this information; they appear to have incorporated it and adjusted their preferences accordingly, so that in the end they were more likely to vote correctly.

It is intriguing that no effects were found for political sophistication, despite clear attitude polarization effects for sophisticates discovered in previous research. This could be due to the differences in the information being processed. In the studies by Lodge and his colleagues processing times were measured in hundreds of milliseconds and subjects were making decisions about the congruence and incongruence of target words as they related to priming words. In their information search studies, subjects focused on political issues, not candidates, in which sophisticates might have an advantage over non-sophisticates in terms of general political knowledge. In the present study subjects were making a choice between candidates in a political campaign which unfolded over time. That non-sophisticates were in most cases as biased by affect as more knowledgeable subjects were may be accounted for by these differences. This argues all the more for studies that attempt to duplicate as much as possible real-world campaign effects when looking at the importance of political information.

Also intriguing is the possibility that memory effects as I have reported elsewhere (Redlawsk, 2001) and are found here may be a natural consequence of the stop-and-think process generated by incongruent information. As motivated reasoners look to counter information that opposes their existing affect towards a candidate they may strengthen existing memories, especially those that are affectively congruent. This process appears to leave memories traces that can later be recalled. So while the strict application of online processing suggests no role for memory, a more complete conception of motivated reasoning, which includes not only online processing, but also memory processing, may help explain why memory matters in the evaluation of competing candidates. To be sure, the memory findings here do not necessarily explain the complete role of memory. Memory may also matter when citizens wish to

compare candidates to one another on one or more issues, and the information is not readily available except as memories of information previously encountered.

While the findings reported here appear to favor a motivated reasoning explanation, a word of caution about this theory must be raised. Recent work by Way and Masters (1996) and Marcus and his colleagues (Marcus, Neuman, and MacKuen, 2000; Marcus and MacKuen, 1993) should give pause to some of the simplifying assumptions of motivated reasoning. In particular, evidence that there are in fact multiple types of memory and processing systems, and the studies that show that the affective system can operate completely independently and in the absence of the cognitive processing system (see Tranel, et al., 1985), lead to concern that motivated reasoning's working memory/long term memory conception of the mind, along with the binding of affect to the cognitive node may be gross oversimplifications which underplay the true role of the affective system. Where Lodge, et al., propose cognitive explanations for affective bias, Marcus, et al., argue that affect is generated independently of cognition, via an emotional system which operates through arousal. While affect and cognition certainly interact, the increased processing time found here could be explained not by additional cognitive processing, but instead by the presence of an aroused emotional state. Encountering incongruent information could be expected to generate anxiety, which in turn would slow processing time as processors pay greater attention to the anxiety provoking stimulus. However, as with the cognitive counterargument or balance hypotheses, this study cannot directly test the emotional underpinnings of increased processing time either, since there is no useable measure of subject anxiety levels during information processing. Additional work will be needed to assess the extent of cognitive processing versus emotional arousal when incongruent information is encountered. This will require some means of recording the arousal of anxiety as information is encountered.

In any case, the normative implications of this line of research are quite important. Those who prefer voters as affect-free calculators who can coolly consider candidates and issues and make even-handed evaluations if simply given enough clear information are missing an important and even critical piece of the puzzle. Affect counts. Human beings can no more process political information without being aware of how it makes us feel than we can make reasoned candidate choices with no information at all. Thus we can not really hope to avoid the biases that affect brings with it. At best, once we understand the nature of those biases and who is subject to them under what processing conditions we can devise ways to correct for them. Yet, consideration of affect is absent in many comprehensive models of political behavior for what often seems to be a very good reason -- it is extremely difficult to understand, let alone measure, the processes inside our heads. The experimental methods used in this study can offer hope to those who aim to achieve this goal. Despite the challenges we face in order to "open the black box" of human information processing, the findings in this study remind us that we cannot ignore affect.

References

Abelson, Robert. 1963. "Computer Simulation of 'Hot' Cognition." In Silvan S. Tomkins and Samuel Messic (Eds.) *Computer Simulation of Personality: Frontier of Psychological Theory*. New York: Wiley.

Allison, Graham and Philip Zelikow. 1999. *Essence of Decision: Explaining the Cuban Missile Crisis*. (2nd ed.) New York: Addison Wesley Longman.

Anderson, John R. 1983. The Architecture of Cognition. Cambridge, MA: Harvard University Press.

Ansolabehere, Stephen, and Shanto Iyengar. 1995. *Going Negative: How Political Advertisements Shrink and Polarize the Electorate*. New York: The Free Press.

Bargh, J. A., S. Chaiken, R. Govender, and F. Pratto. 1992. "The Generality of the Automatic Attitude Activation Effect. *Journal of Personality and Social Psychology* 62:893-912.

Collins, A and Elizabeth Loftus. 1975. "A Spreading-Activation Theory of Semantic Processing." Psychological Review 82:407-428.

Dawes, Robyn M. 1988. *Rational Choice in an Uncertain World*. San Diego: Harcourt Brace Jovanovich.

Ditto, Peter H., James A. Scepansky, Geoffrey D. Munro, Anne Marie Apanovitch, and Lisa K. Lockhart. 1998. "Motivated Sensitivity to Preference-Inconsistent Information. *Journal of Personality and Social Psychology* 75(10): 53-69.

Fazio, Russell H. 1995. "Attitudes as Object-Evaluation Associations: Determinants, Consequences, and Correlates of Attitude Accessibility." In Richard E. Petty and Jon A. Krosnick, (Eds.) *Attitude Strength: Antecedents and Consequences.* Mahwah, NJ: Lawrence Erlbaum.

Fazio, Russell H., J. Chen, E. C. McDonel, and S. J. Sherman. 1982. "Attitude Accessibility, Attitude-Behavior Consistency, and the Strength of the Object-Evaluation Association. *Journal of Experimental Social Psychology* 18: 339-357.

Fischoff, B. 1977. "Perceived Informativeness of Facts." Journal of Experimental Psychology: Human *Perception and Performance* 3:349-358.

Fiske, Susan T. and Shelley E. Taylor. 1991. *Social Cognition*. (2nd Ed.) New York: McGraw-Hill.

Ford, J. K., N. Schmitt, S. L Schechtman, B. M. Hults, and M. L. Doherty. 1989. "Process Tracing Methods: Contributions, Problems, and Neglected Research Questions." *Organizational Behavior and Human Decision Processes* 43:75-117.

Hastie, Reid and Bernadette Park. 1986. "The Relationship between Memory and Judgment depends on whether the task is Memory-based or On-line." *Psychological Review* 93:258-268.

Jacoby, J., J. Jaccard, A. Kuss, T. Troutman, and D. Mazursky. 1987. "New Directions in Behavioral Process Research: Implications for Social Psychology." *Journal of Experimental Social Psychology* 23:146-175.

Kahneman, D. and Tversky, A. 1972. "Subjective Probability: A Judgment of Representativeness." *Cognitive Psychology* 3:430-454.

Kunda, Z. 1987. "Motivation and Inference: Self-serving Generation and Evaluation of Evidence." *Journal of Personality and Social Psychology* 53:636-647.

Kunda, Z. 1990. "The Case for Motivated Political Reasoning." *Psychological Bulletin*. 108:480-498.

Lau, Richard R. 1985. "Two Explanations for Negativity Effects in Political Behavior." *American Journal of Political Science* 29 (February): 119-38.

Lau, Richard R. 1995. "Information Search during an Election Campaign: Introducing a Process Tracing Methodology for Political Scientists." In Milton Lodge and Kathleen McGraw (Eds.) *Political judgment: Structure and Process*. Ann Arbor, MI: University of Michigan Press.

Lau, Richard R. and David P. Redlawsk. 1992. "How Voters Decide: A Process Tracing Study of Decision-making during Political Campaigns." Presented at the annual meeting of the American Political Science Association, Chicago.

Lau, Richard R., and David P. Redlawsk. 1997. "Voting Correctly." *American Political Science Review* 91(3):585-598.

Lau, Richard R. and David P. Redlawsk. In Press. "An Experimental Study of Information Search, Memory, and Decision-making during a Political Campaign." In . James Kuklinski (Ed.) *Political Psychology and Public Opinion*. New York: Cambridge University Press.

Lodge, Milton. 1995. "Toward a Procedural Model of Candidate Evaluation." In Milton Lodge and Kathleen McGraw (Eds.) *Political Judgment: Structure and Process*. Ann Arbor: University of Michigan Press.

Lodge, Milton, Kathleen McGraw, and Patrick Stroh. 1989. "An Impression-driven Model of Candidate Evaluation." *American Political Science Review* 83(2):399-419.

Lodge, Milton and Charles Taber. 2000. "Three Steps Toward a Theory of Motivated Political Reasoning." In Arthur Lupia, Matthew McCubbins, and Samuel Popkin (Eds.) *Elements of Political Reason: Understanding and Expanding the Limits of Rationality*. London: Cambridge University Press.

Lodge, Milton, Charles Taber, and Aaron Chase Galonsky. 1999a. "An Exploration on the Mechanics of Motivated Reasoning." Presented at the Annual Meeting of the Midwest Political Science Association, Chicago.

Lodge, Milton, Charles Taber, and Aaron Chase Galonsky. 1999b. "The Political Consequences of Motivated Reasoning: Partisan Bias in Information Processing." Presented at the Annual Meeting of the American Political Science Association. Atlanta.

Lord, C. G., M. R. Lepper, and E. Preston, 1984. "Considering the Opposite: A Corrective Strategy for Social Judgment." *Journal of Personality and Social Psychology* 47:1231-1243.

Marcus, George E., and Michael MacKuen. 1993. "Anxiety, Enthusiasm, and the Vote: The Emotional Underpinnings of Learning and Involvement during Presidential Campaigns. *American Political Science Review* 87(September): 672-685.

Marcus, George E., W. Russell Neuman, and Michael MacKuen. 2000. *Affective Intelligence and Political Judgement*. Chicago: University of Chicago Press.

Miller, G. 1956. "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information." *Psychological Review* 63:81-97.

Ottati, V. C. and R. S. Wyer, Jr. 1990. "The Cognitive Mediators of Political Choice: Toward a Comprehensive Model of Political Information Processing." In J. A. Ferejohn & J. H. Kuklinski (Eds.) *Information and Democratic Processes*. Urbana, IL: University of Illinois Press.

Redlawsk, David P. 1992. "Using Hypermedia to Develop a Political Science Simulation." Presented at the 25th annual meeting of the Association of Small Computer Users in Education (ASCUE), Myrtle Beach, SC.

Redlawsk, David P. 2001. "You Must Remember This: A Test of the On-line Model of Voting." *Journal of Politics* 63(February): 29-58.

Redlawsk, David P. and Crista Hubby. 2000. "Hot cognition or cool consideration: Testing the theory of motivated reasoning." Presented at the annual meeting of the International Society of Political Psychology, Seattle, WA.

Redlawsk, David P. and Richard R. Lau. 1995. "The Miserly Voter: Heuristics and Rational Voting Behavior." Presented at the annual meeting of the Midwest Political Science Association, Chicago.

Schank, R. C. and R. P. Abelson. 1995. "Knowledge and Memory: The Real Story." In R. S. Wyer, Jr. (Ed.) *Knowledge and Memory: The Real Story (Vol. VIII.)* Hillsdale, NJ; Lawrence Erlbaum Associates.

Simon, Herbert A. 1978. "Rationality as a Process and Product of Thought." *American Economic Review Proceedings* 68:1-16.

Srull, T. K. 1981. "Person memory: Some tests of associative storage and retrieval models." *Journal of Experimental Psychology: Human Learning and Memory*, 7, 440-463.

Steenbergen, Marco R. and Milton Lodge. 1998. "Process Matters: Cognitive Models of Candidate Evaluation." Presented at the annual meeting of the American Political Science Association, Boston.

Taber, Charles S., Jill Glather and Milton Lodge. Forthcoming. "The Motivated Construction of Political Judgements." In James H. Kuklinski, ed., *Political Psychology*. London: Cambridge University Press.

Tversky, A. and D. Kahneman. 1973. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5:207-232.

Way, Baldwin M. and Roger D. Masters. 1996. "Emotion and Cognition in Political Information Processing." *Journal of Communication* 46(3): 48-65.

Wyer, R. S. and Victor C. Ottati. 1993. "Political Information Processing." In S. Iyengar & W. J. McGuire (Eds.) *Explorations in Political Psychology*. Durham, NC: Duke University Press.

Wyer, R. S. and T. K. Srull. 1986. "Human Cognition in its Social Context." *Psychological Review* 93:322-359.

Table 1
Effects of Information Incongruency on Processing Time

	All Observations		Chosen Candidate		Candidate Preferred in Polling	
	On-Line n=967	*Memory* n=802	*On-Line* n=358	*Memory* n=347	*On-Line* n=143	*Memory* n=92
Information Incongruency (1=Incongruent)	.234 (.327)	.137 (.454)	2.014*** (.783)	-.243 (1.065)	3.150*** (1.177)	-3.949 (3.223)
Sophistication X Incongruency	.643* (.349)	.405 (.477)	-.597 (.890)	-.659 (1.087)	1.191 (1.852)	.365 (4.536)
Political Sophistication	-.517 (.358)	-.795* (.476)	-1.158 (.817)	-2.177** (1.048)	-1.220 (1.767)	-2.353 (4.834)
# of Words per Card	.132*** (.005)	.139*** (.007)	.122*** (.009)	.139*** (.012)	.124*** (.017)	.134*** (.033)
Reading Ability	-.031*** (.003)	-.003 (.004)	-.030*** (.004)	-.002 (.007)	-.040*** (.007)	.018 (.016)
Task Demands Condition (1=Difficult)	-.641** (.283)	.605 (.395)	-1.046** (.506)	.964 (.640)	-1.409 (.872)	1.508 (1.640)
Sophistication X Task Demands	-.623** (.299)	.509 (.424)	-.009 (.552)	.573 (.707)	2.274* (1.272)	1.677 (1.731)
Poll Interruption Condition	.378** (.167)	.363 (.227)	.478 (.298)	.592* (.359)	-.919 (1.056)	4.661** (1.830)
Education	.071 (.111)	-.117 (.159)	.210 (.200)	.077 (.255)	.040 (.419)	1.448** (.668)
Chosen Candidate	-.103 (.292)	1.061** (.425)	---	---	.854 (1.535)	-13.746** (5.478)
Constant	-5.391*** (.973)	-.882 (1.174)	-3.924** (1.738)	-.672 (2.121)	-2.482 (3.082)	-8.110*** (2.720)
Adjusted R2	.480	.347	.432	.296	.378	.227

Observations were taken beginning after the first two pieces of information were examined for each candidate. Table entries are OLS regression coefficients, standard errors in parentheses. Reading time is measured in seconds. *p<.1 **p<.05 ***p<.01

Table 2
Information Search and Memory

On-Line Processors	All Candidates n=295	All Liked Candidates n=111	All Disliked Candidates n=147	Chosen Candidate n=50
Mean Proportion of Cards Viewed Per Candidate	.167	.209 (.084) t=5.245 *p*<.001	.116 (.060) t=-10.225 *p*<.001	.254 (.095) t=6.535 *p*<.001
Mean # of Memories as Proportion Of Cards Viewed	.177 (.211)	.245 (.196) t=3.051 *p*<.01	.142 (.209) t=-1.654 n.s.	.265 (.197) t=2.891 *p*<.01
Accurate Memories As a proportion of Cards Viewed	.121 (.166)	.172 (.159) t=2.818 *p*<.01	.097 (.172) t=-1.383 n.s.	.192 (.166) t=2.797 *p*<.01
Memory Processors	n=219	n=98	n=121	n=48
Mean Proportion of Cards Viewed Per Candidate	.167	.216 (.088) t= 5.521 *p*<.001	.121 (.064) t=-7.843 *p*<.001	.256 (.083) t=7.440 *p*<.001
Mean # of Memories as Proportion Of Cards Viewed	.205 (.323)	.256 (.208) t=2.140 *p*<.05	.199 (.417) t=-.146 n.s.	.264 (.174) t=2.338 *p*<.05
Accurate Memories As a proportion of Cards Viewed	.148 (.254)	.185 (.173) t=2.094 *p*<.05	.144 (.319) t=-.136 n.s.	.192 (.159) t=1.913 *p*<.1

Standard deviations in parentheses. Proportions are of total cards viewed, including cards viewed more than once. T-test compares to all candidates.

Table 3
Information Congruency and Candidate Memory

	Total Memory	Congruent Memory	Incongruent Memory
% Congruent Information	.044***	.045***	
	(.009)	(.009)	
Any Congruent Information (1=yes)			.866
			(.991)
% Incongruent Information	.039**		.082***
	(.012)		(.018)
Any Incongruent Information (1=yes)		1.022*	
		(.471)	
Total Information Viewed	.159**	.130**	.255***
	(.049)	(.048)	(.081)
Candidate Affect (1=Like)	.345	.525*	-.033
	(.228)	(.235)	(.007)
In-party Candidate	1.190*	.827*	.390
	(.479)	(.479)	(.774)
Age in Years	-.020	-.017	-.009
	(.015)	(.015)	(.022)
Political Sophistication	.206	.254	.029
	(.250)	(.254)	(.376)
Reading Ability	.005	.006	-.004
	(.004)	(.004)	(.007)
Task Demand Condition	.017	.063	-.970
	(.427)	(.429)	(.699)
Poll Interruption Condition	.912***	.837**	.344
	(.266)	(.269)	(.366)
Constant	-6.489***	-6.521***	-6.492**
	(1.512)	(1.543)	(2.483)
-2LL	166.180	161.124	82.327
Chi-Square Model	108.089	106.388	54.628
	10df p<.001	10df p<.001	10df p<.001
Cox & Snell Pseudo R2	.399	.395	.227
Correctly Classified	79.7%	82.1%	94.3%

Table entries are logistic regression coefficients, standard errors in parentheses. n=212.
*p<.10 **p<.01 ***p<.001.

Table 4
Information Incongruency and Attitude Polarization
Analysis of Variance

	SS	df	MS	F	Prob.
Processing Manipulation (P)	846.18	1	846.18	5.236	.026
Sophistication (S)	113.87	1	113.87	.705	n.s.
Incongruent Information (I)	23.98	1	23.98	.148	n.s.
P x I	1076.93	1	1076.93	6.664	.05
P x S	20.53	1	20.53	.127	n.s.
S x I	207.31	1	207.31	1.283	n.s.
P x I x S	135.05	1	135.05	.836	n.s
Residual	8726.25	54	161.60		

Mean Feeling Thermometer Ratings
for Candidates Selected in Poll

	N	Mean	Std. Dev.
Online Processors			
Incongruent Information	13	86.15	7.40
No Incongruent Information	20	77.25	13.81
Memory Processors			
Incongruent Information	7	68.57	10.29
No Incongruent Information	22	78.41	14.26

Table 5
Effects of Information Incongruency on Decision Quality

	Base Model		*Information Effects Model*	
% Incongruent Information Viewed			-.114**	(.056)
Incongruency X Task Demand			.014	(.101)
Incongruency X Processing			.198*	(.112)
Incongruency X Sophistication			.028	(.054)
Accurate Memory	.836**	(.384)	1.306**	(.611)
Memory X Task Demand	.113	(.363)	.856	(.619)
Memory X Processing	2.125***	(.799)	2.656**	(1.149)
Memory X Sophistication	.462	(.284)	1.017*	(.540)
On-line Tally	.006	(.064)	-.038	(.086)
Tally X Task Demand	.231*	(.137)	.389**	(.198)
Tally X Processing	-.198	(.146)	-.139	(.199)
Tally X Sophistication	.035	(.070)	.078	(.095)
Sophistication	-.613	(1.130)	-1.676	(1.644)
Decision Time	.071**	(.035)	.089**	(.045)
Lack of Issue Constraint	-.360**	(.167)	-.516**	(.243)
Task Demand Condition	-5.892***	(2.265)	-12.022***	(4.355)
Processing Condition	.357	(2.452)	-4.406	(4.217)
Processing X Task Demand	.937	(1.625)	6.434*	(3.773)
-2LL	60.26		45.97	
Model X^2	39.10 14df	$p<.001$	53.38 18df	$p<.001$
Difference X^2			14.28 4df	$p<.01$
Cox & Snell R^2	.343		.437	
% of cases correctly classified.	83.9		88.0	

Table entries are logistic regression coefficients, standard errors in parentheses. Dependent variable is decision quality, 1=high quality decision.
*p<.1 **p<.05 ***p<.01

Figure 1
Outline of Experimental Procedure

1. Political Attitudes Questionnaire

Subjects asked questions to measure political preferences; political interest, participation, knowledge, and media usage; importance of different types of political information for 1992 vote choice; background/demographic information (*about 30-40 minutes*).

2. Mock Primary Election Campaign

a. Practice session using the mouse to access information about 1988 Presidential election (*about 8 minutes*).
b. Explicit instructions and 1996 campaign scenario; random assignment to different experimental conditions (hidden from subjects) (*about 5 minutes*).
c. Primary election campaign involving 6 candidates (*about 22 minutes*).
d. Vote in party's primary election; evaluate all six candidates; manipulation check on difficulty of choice (*about 3 minutes*).

3. Memory Task

Subjects asked to remember as much as they can about all six primary election candidates. Task was unexpected for on-line processing condition, and expected for memory-processing condition (*about 10 minutes*).

4. Correct Voting Determination

Subjects presented with complete information about two candidates from primary (the one they voted for, and the candidate closest to the subject on the issues, of the remaining candidates in that same party) and asked to decide which they would have voted for if they had obtained all of this information when they actually had to make their choice during the primary election (*about 10-15 minutes*).

5. Detailed Protocol Analysis

Subjects completed detailed guided protocol analysis where they explained why they had selected the items they chose to examine during the primary (*about 15 Minutes*).

6. Debriefing

Subjects' general impressions of experiment gathered; any remaining questions answered; etc. (*about 5 minutes).*

Figure 2

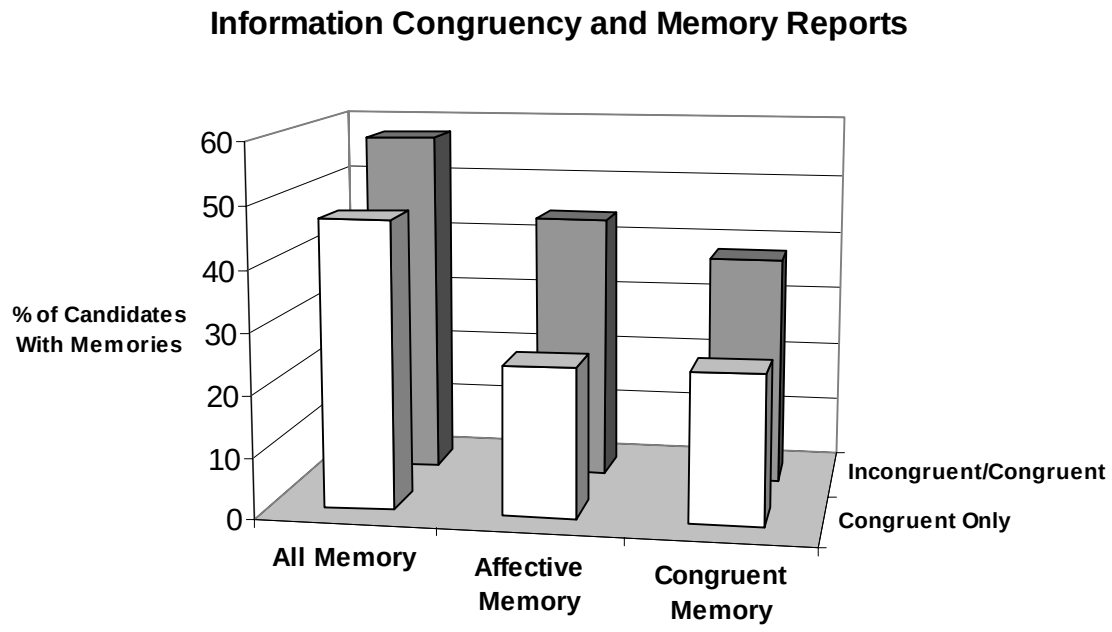
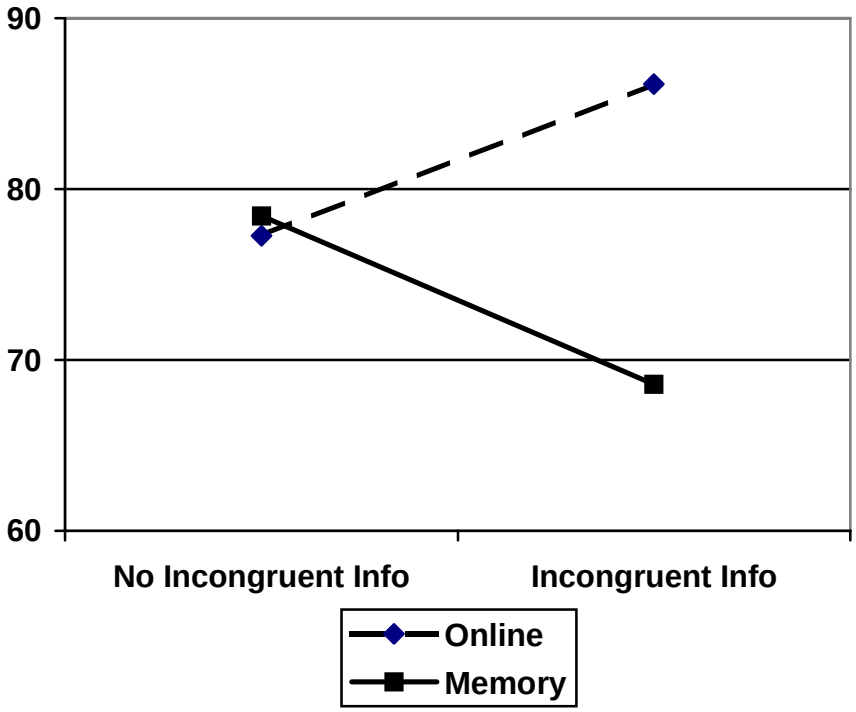

Information Congruency and Memory Reports
% of Candidates With Memories
60
50
40
30
20
10
0
All Memory
Affective Memory
Congruent Memory
Incongruent/Congruent
Congruent Only

Figure 3
Estimated Means of Thermometer Ratings
for Candidates Selected in Poll



[1] The likelihood of any particular cognitive node being activated is related to the strength of its link with the node initially cued. Some links may be very strong (such as the political party membership of the president) and are activated very quickly. Other links may be quite weak (such as the president's position on some obscure issue encountered once or twice) and may not carry enough energy to activate the connected node at all.

[2] Fazio (1995) argues that the likelihood of an attitude becoming accessible upon the activation of the cognitive node is conditioned upon the strength of the association between the node and affect. Only strong associations result in automatic attitude accessibility. There is some disagreement over this claim (see Bargh, Chaiken, Govender, and Pratto, 1992.) Lodge and his colleagues appear to believe that in the realm of political decision-making about candidates and issues of importance to voters attitude accessibility is all but automatic, though they do not explicitly discuss this point.

[3] The bulk of the following section closely follows a similar discussion in Redlawsk, 2001.

[4] Subjects were recruited primarily through organizations that were invited to provide members to participate in the study, in return for the member donating the $20 payment to the organization. These organizations included a local YMCA, a senior citizen's center , a day care center, and other community organizations. Recruiting was done by the organization using parameters provided by the researchers. Subjects were told they would be participating in a study of campaigns that would include a mock presidential primary election campaign.

[5] Ansolabehere and Iyengar (1995) report a similar finding in their study of negative advertising. They find that subjects who viewed negative ads about a candidate from their own political party often felt even more strongly positive towards their own candidate.

[6] In those cases in this study where subjects indicated a neutral feeling towards a candidate or piece of information the candidate or information was removed since our interest was in affectively charged information.

[7] The adjusted processing time measure used here was calculated using the time required to read a card of information as recorded by the computer. The computer began measuring reading time when a subject accessed a piece of information about a candidate and ended when the subject clicked on a button to return to the scrolling information list. The raw measure thus contains both actual reading time and the physical time required to move the computer mouse and click on the button. To adjust for this, the raw reading time measure was regressed on the number of words in the candidate information card. These regressions were carried out within subjects. The resulting constant represents the average time required for each subject to read a card with zero words, thus approximating the time needed to handle the physical task of accessing the DONE button to end the card. This constant derived for each subject was subtracted from the raw reading time for each piece of information that subject accessed. This new adjusted reading time measure is used as the dependent variable in this analysis.

[8] Political sophistication is an index of political behavior, political interest, and political knowledge, all collected as part of a pre-experiment questionnaire. Reading ability is measured by the amount of time subjects took to read the provided instructions, as recorded by the computer.

[9] OLS regression analysis assumes no autocorrelation of residuals. Because this analysis includes multiple observation of individual subjects as they choose pieces of information, some concern might exist that there is a lack of independent observations. The individual difference variables, in addition to being theoretically important, help control for this since they carry a constant value within subjects. An examination of the Durbin-Watson Statistic (Durbin and Watson, 1950) indicates that all regressions reported in Table 1 do not show signs of autocorrelation and thus can be considered based on independent observations.

[10] This is borne out by analysis which shows that memory-based subjects read fewer pieces of information overall (72.1 to 78.5) and spending longer on average on each piece of information they did read, whether or not it was congruent information.

[11] For example, 18 out of 64 subjects (28%) chose to vote for a candidate at the end of the election who was different from the candidate they preferred in a poll taken during the campaign.

[12] It is obvious from the earlier analyses that the subjects in the memory processing condition in this study cannot be considered motivated reasoners. Not only does motivated reasoning presume online processing as one of its bases, but in the data presented testing hypotheses 1 and 2, only the online processors perform as expected.

Thus, for this memory analysis, subjects in the memory processing condition are dropped.

[13] The dependent variable for this analysis includes only the presence of memories for items viewed for which subjects reported either positive or negative affect, and could thus be coded as either congruent or incongruent items.

[14] Lau and Redlawsk (1997) propose another measures of decision quality determined by their own assessment of how the voter ought to have voted, given the political preferences expressed in a pre-experiment questionnaire. Using this alternative measure of decision quality produces results similar to those reported in this paper.

[15] See Redlawsk (2001) for a comprehensive description of each of the variables in the model. In general, the on-line tally measure summarizes the affect developed for candidates as the campaign progresses. It is the additive sum of all information encountered about the candidate judged closest to the subject based on a pre-experiment political attitudes questionnaire. The memory measure is the count of accurate memories reported for that candidate. Political sophistication was measured using a battery of political knowledge questions. Decision time was calculated as the time required to choose a candidate during the voting process. Issue constraint was a measure of how consistent subjects were in their political attitudes as reported on the questionnaire.

[16] Allison and Zelikow (1999) make a similar point about information search, as does Dawes (1988.) Assuming that a decision-maker fails to consider all relevant dimensions about all alternatives, the risk is very real that a suboptimal decision will be reached, simply because the information search started in a particular place and proceeded in a particular order.