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Researchers attempting to understand how citizens process political information have advanced motivated reasoning to explain the joint role of affect and cognition. The prominence of affect suggests that all social information processing is affectively charged and prone to biases. This article makes use of a unique data set collected using a dynamic information board experiment to test important effects of motivated reasoning. In particular, affective biases should cause citizens to take longer processing information incongruent with their existing affect and such biases should also direct search for new information about candidates. Somewhat perversely, motivated reasoners may actually increase their support of a positively evaluated candidate upon learning new negatively evaluated information. Findings are reported that support all of these expectations. Additional analysis shows that these affective biases may easily lead to lower quality decision making, leading to a direct challenge to the notion of voters as rational Bayesian updaters.

Much of the study of voters and elections focuses on the vote itself. Political scientists have advanced many different models to explain how preferences are turned into votes. But before a citizen can cast a vote, he or she generally must learn something about candidates and make some effort to compare the alternatives across a set of salient attributes. Two competing schools of thought have developed about the way in which evaluation proceeds. For rational theorists, voters are Bayesian updaters coolly considering new information in light of prior preferences and accurately updating those preferences by lowering evaluations upon encountering negative information and increasing evaluations when

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learning positive information (Gerber and Green 1999.) Political psychologists, however, caution that the process of updating prior evaluation may be subject to a range of unconscious biases designed to support prior preferences, rather than to rationally update them. For these motivated reasoners (Kunda 1987, 1990; Lodge and Taber 2000) candidate evaluation may be more about reinforcing existing feelings about candidates than about revising them in the face of new information.

The empirical support for motivated reasoning is promising, but somewhat limited to date.[1] As Gerber and Green (1999) forcibly argue in a defense of the Bayesian model, the simple laboratory experiments in which bias has been shown differ substantially from the real world of political information processing. Political campaigns ultimately are about making decisions between candidates, but existing studies have not examined candidate choice. In this article I respond to this critique with a new dynamic process-tracing experiment in which subjects actively participate in a simulated presidential election campaign, search for information about candidates, and decide which one deserves their vote. Using this design, I find significant evidence that during routine information processing both search and candidate evaluation are biased toward existing preferences and that these biases lead to suboptimal decision making. Voters in this study, at least, do not follow the dictates of coolly considered Bayesian updating unless specifically motivated to do so, which I suggest does not represent the way most people process information most of the time.

Candidate evaluation is much like evaluating any other person. Such evaluation routinely occurs *on-line*, that is, evaluation of other people is continuous and immediate upon acquisition of information (Hastie and Park 1986; Hastie and Pennington 1989; Lichtenstein and Srull 1987.) When asked to report their evaluation, on-line processors need only retrieve the tally that maintains the current affect toward the target. Thus, on-line processing is seen to be efficient processing, in the tradition of the cognitive miser (Taylor 1981). Studies by Lodge and his colleagues have established on-line processing as a widely accepted view of how voters consider candidates[2] (Lodge, McGraw, and Stroh 1989; Lodge, Steenbergen, and Brau 1995).

[1] Lodge and colleagues provide the best initial evidence of motivated reasoning in politics. A series of experiments shows motivated reasoning biases operating in many phases of the political issue processing. Lodge and colleagues find that affect is intricately tied to cognition (Lodge and Taber 2000), information processing is biased toward support for prior positions (Lodge, Taber, and Galonsky 1999a), and information search often proceeds in order to confirm prior expectations (Lodge, Taber, and Galonsky 1999b). Steenbergen (2001) finds a conservatism bias operates in maintaining preferences for existing affect. None of these studies examine the role of motivated reasoning in candidate evaluation in a campaign environment.

[2] But see Zaller (1992) for some strong skepticism about the role of on-line processing. Redlawsk (2001) suggests that candidate evaluation, while proceeding on-line generally, benefits from accurate memory processing to enhance the quality of the evaluation and decision process.

The efficiency of routine on-line processing may well come with a price. The same directional goals that motivate toward immediate evaluation of information may drive information search toward reinforcing existing affect and reaching a specific preselected conclusion. These motivated reasoners may discount, counterargue, or simply ignore new information that challenges existing evaluation and affect (Kunda 1987, 1990; Lodge and Taber 2000). Information congruent with expectations is easily assimilated since it requires no effort to accept what one already knows is true. But incongruent information interrupts normal processing and instead engages a process where some effort must be expended to make sense of the world.[3]

Thus, affect and cognition interact for the motivated reasoner engaging in the evaluation of another person. The interaction is driven by what Lodge and Taber (2000) describe as a three-part process: on-line processing, hot cognition, and the "How-do-I-feel?" heuristic. Memory for on-line processors contains not only cognitive information but also the affective on-line tally, updated immediately upon the acquisition of new information. Hot cognition (Anderson 1981) suggests that affect is automatically activated along with the cognitive node to which it is tied.[4] Finally, the process of on-line evaluation and the structure of hot cognition 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 toward the new information to form a virtually instantaneous assessment of the new information.[5] The result of this process can be bias toward maintaining existing affect even in the face of disconfirming information.

[3] Person-perception research regularly reports that trait congruency determines the ease with which traits are processed. Congruent trait pairs (pairs of traits where both traits are descriptively or evaluatively viewed as similar) generate more easily imagined personalities than do incongruent pairs, while incongruent traits take longer to assimilate than do congruent traits (Casselden and Hampson 1990.) Davies (1997) reports that favorable traits are considered more accurate statements of personality than unfavorable traits and generate more evidence confirming their accuracy. Ditto et al. (1998) show that information opposed to existing preferences (that is, affectively incongruent) requires more effortful processing than does congruent information.

[4] 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 et al. 1992.) Motivated reasoning appears to assume that attitude accessibility is all but automatic for candidates and issues of importance to voters.

[5] Some might suggest that motivated reasoning is simply a new approach to the old ideas represented by dissonance theories. While cognitive dissonance (Festinger 1957) and balance theories (Heider 1958) focus on the need to keep attitudes/behaviors in congruence, ascribing this need to a psychological drive, they do not directly address how affect and cognition interact. Motivated reasoning, especially in the specification of the "How-do-I-feel" heuristic, attempts a more complete conception of the causes of biased processing, specifying under what conditions (on-line evaluation), with what structure (hot cognition), and through what mechanism (the How-do-I-feel heuristic) bias is likely to occur. The by-product of this process may well be a tendency toward cognitive consistency.

In order to study on-line processing and motivated reasoning, a reference point is necessary. Researchers usually contrast on-line processing with memory processing (Hastie and Park 1986). Memory processors withhold evaluation until the moment of decision, when the contents of memory are used to inform the choice. Research shows quite clearly that on-line processing is the default when processors have directional goals, that is, when they wish to generate a global evaluation (Hastie and Pennington 1989; Lichtenstein and Srull 1987). In order to generate memory processing, some intervention is usually required. Typically, researchers provide an accuracy motivation to interfere with on-line processing and to motivate toward memory processing (Hastie and Pennington 1989). The motivation toward accuracy is believed to interfere with the evaluative goals that drive on-line processing (Neuberg 1989; Neuberg and Fiske 1987). Comparing accuracy motivated subjects with those processing in the default on-line manner allows researchers to highlight the role played by the interaction of cognition and affect.

Hypotheses

As voters encounter information about political candidates they develop affect toward those candidates. The affect may be positive or negative, strong or weak, but it ought to be apparent in the processing of new information as it is encountered. The clearest indication of the motivated reasoning process would be if voters encountering affectively incongruent information about candidates take longer to process that information compared to congruent information. Learning something one does not like about a favored candidate is to learn incongruent information, as is learning something positive about a disliked candidate while information with an affective valence in the same direction as existing affect is considered congruent.

When encountering incongruent information, motivated reasoners may spend time counterarguing against it, making an effort to fit it into their existing affect about the target (Lodge and Taber 2000). Other processes may also be engaged, including bolstering existing affect by recalling from memory the reasons for it. In any case, these processes take time to carry out. Congruent information, however, does not require any special effort since it easily fits existing expectations. Given that motivated reasoning rests in part on on-line processing, this pattern should be particularly evident for on-line processors motivated by a directional goal, such as candidate evaluation. Memory processing and an accuracy motivation, however, may be expected to counteract this process since the effort to maintain memory and accuracy may cause processors to focus equal attention on all types of information. This leads to Hypothesis 1:

> *H_1: Voters processing on-line and motivated toward* directional *goals will take longer to process new affectively incongruent information about a candidate for whom an affective evaluation already exists, compared to congru-*

ent information about the same candidate. Voters motivated toward accuracy *goals and memory processing will not show these effects.*

Motivated reasoning also has implications for information search. Lodge, Taber, and Galonsky (1999b) show a confirmation bias during information search about political issues when subjects knew the likely valence of available information. For candidate information processing a similar effect could be expected, as motivated reasoners seek to confirm their feelings toward candidates, perhaps assuming that they will a priori like what a favored candidate has to say. It is not as clear whether such a bias should be expected from memory processors motivated toward accuracy. Kunda (1990) suggests that in some circumstances accuracy goals are not enough to overcome bias. If so, memory processors may show the same biases toward preferred candidates that are expected of on-line processors. Thus, Hypothesis 2:

H_2: *Once initial affect toward a candidate is established, voters will spend more time searching for information about preferred candidates and avoiding disliked candidates.*

Lodge, Taber, and Galonsky (1999a), and Lodge and Taber (2000) report an important and counterintuitive result in that many subjects evaluating issue information report even stronger support for their pretreatment issue positions after encountering arguments incompatible with their own position. Rather than attenuate their attitudes by incorporating the views expressed in the new incongruent information, motivated reasoners appear to discount arguments opposed to their position.[6] Once again the question is whether this finding extends to the realm of political candidates competing for the vote in a campaign. If so, attitude strengthening is the likely result, leading to Hypothesis 3:

H_3: *Voters who are on-line processors will show increased support for preferred candidates if they encounter incongruent information about those candidates. Memory processors, motivated toward accuracy, will not show a similar increase in support under the same conditions.*

If voters 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? Such voters might well be led astray by their affect, ultimately voting for a suboptimal candidate simply because they start 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 likely to find it difficult 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 (Tversky and Kahneman 1974) but one in which the anchor is far

[6] Ansolabehere and Iyengar (1995) report a similar finding in their study of negative advertising.

stronger than the adjustment, and the adjustment may in fact be in the wrong direction. Such process would clearly violate the requirements of Bayesian updating.

> *H_4: Attitude strengthening effects will lead to lower quality decisions. As a motivated reasoner encounters greater amounts of negative information about a preferred candidate and therefore strengthens the* positive *affect toward that candidate, a lower quality vote decision will result.*

Method

Dynamic Process Tracing

Process tracing starts with the assumption that decision-making is best studied by collecting data while the decision is actually being made (Ford et al. 1989; Jacoby et al. 1987). The major research technique is the information board, which presents subjects with a static $m \times n$ matrix of information. Subjects choose among several alternatives (columns of the matrix) that differ on one or more attributes (rows). Richard Lau and I 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 1997, 2001a, 2001b; Redlawsk 2001; Redlawsk and Lau 1995). 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. 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 data set 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 candidates and issues, 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 toward the candidates, and the affective value of each memory they can recall. As a means of testing the effects of both information and affect, the dynamic information board provides the best available insight into what voters are actually doing during a campaign.

Procedure

A total of 99 subjects participated in a mock presidential primary election featuring six candidates, divided between the two parties.[7] Subjects were told that the computer would present the kind of political information that would normally be available in a primary election and that the candidates, while all invented, were designed to represent a realistic ideological spectrum for their respective political parties. Subjects were registered as either Democrat or Republican prior to the election and could only vote for the candidates from within the chosen party, though they could actually learn about all six candidates. By creating mock candidates, crucial control was retained over the differences between subjects in prior knowledge of actual politicians since no subject knew anything about any of the candidates ahead of time.[8] The specific procedures followed by subjects are detailed in Figure 1.

Two manipulations crucial to this analysis were embedded in the primary election.[9] The *processing manipulation* was designed to randomly assign subjects into either an on-line or memory-based processing mode. Since on-line processing is the default method by which people evaluate social information (Hastie and Park 1986; Lodge 1995; Lodge, McGraw and Stroh 1989) and given that all subjects knew they would have to vote for a candidate, the existing incentive to form an evaluation and process on-line was strong. Accordingly, no specific instruction was given to create the on-line condition. 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.) This should have had the effect of creating a memory-based accuracy motivation for this group of subjects. The memory instructions were

[7] A total of 102 subjects were recruited from central New Jersey in the fall of 1994. Of these, three could not complete the study due to fatigue or inability to operate the computer. 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, ranging from 18 to 82. Twenty-five percent had household incomes over $75,000 per year, while 13% were under $25,000. Ninety-three percent were white. Partisanship was distributed as 57% Democrat, 7% independent, and 36% Republican. Subjects were recruited primarily through organizations invited to provide participants in return for a donation of $20 per participating member. These organizations included a YMCA, a senior citizen's center, a day care center, and others. Recruiting was done by the organizations themselves using parameters provided by the researchers.

[8] Subjects did not even know the names or parties of the candidates until the election began. The names became available immediately as part of the information board label, e.g. "Thomas's Position on the Middle East." Party was not known until the party item was actually accessed.

[9] A third manipulation was included in the experiment and is used as a control in the analysis reported in this article. The *task demand* manipulation varied the number of in-party candidates during the primary election. One-half of subjects faced 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).

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; conduct manipulation check on difficulty of choice (*about 3 minutes*).

3. Memory Task

Subjects asked to remember as much as they could 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).*

embedded in the general instructions subjects read at the beginning of the primary election simulation.

The second crucial manipulation, the *poll interruption*, provides a way of assessing candidate affect prior to the end of the campaign. One-third of subjects were interrupted after one-third of the campaign had passed and asked for whom would they vote if the election were held at that point. After their preference was recorded, they were returned to the campaign. A second one-third of the subjects were interrupted with the same poll question after two-thirds of the campaign. The final one-third were not interrupted by a poll and thus made their only evaluation at the end of the election.

Following completion of a questionnaire about political attitudes and knowledge and an opportunity to practice with the computer, subjects experienced a 20-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 (Lau 1995.) 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, each candidate had two 20-second campaign videos that appeared at various times 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) in which they were instructed to list everything they could remember about each candidate. After an exercise to establish whether subjects had cast a "correct vote" (Lau and Redlawsk 1997), an extensive debriefing and cued recall procedure began. Subjects were shown the script of all information they had examined and asked to recall what they were thinking while learning each piece of information, as well as to evaluate each as to whether its contents made the subject feel good, bad, or neutral about the candidate. The time required for each subject was about $2\frac{1}{4}$ hours.

Defining Congruency

Congruency is defined as the relationship between existing affect for a candidate and the affect generated by the new information encountered about the same candidate. In order to operationalize information congruency, affect toward the candidates and affect toward new information must be determined. Three measures of affect toward candidates are available. First, subjects were asked to rate each of the six candidates in the Republican and Democrat primaries on a standard 101-point feeling thermometer. A candidate is defined as liked by the subject if the candidate's rating on the feeling thermometer is above the subject's mean rating for all six candidates. Conversely, the candidate is considered disliked if the rating is below the subject's mean for all candidates. Affect toward any candidate rated at the mean is considered neutral and dropped from analyses using this measure. Second, affect can be defined based on the actual vote cast at the end of the campaign since all subjects voted for a candidate they liked. The third measure of candidate affect is found in the poll that two-thirds of subjects were asked to answer while the campaign was under way. In this case, affect toward the candidate chosen in the poll is believed to be positive at the time the poll was administered.

Affect toward new information about the candidates was measured by using the cued recall procedure in which subjects were shown the script recording their information search. Information that subjects said made them feel good about a candidate was coded positive and that which made them feel bad was coded negative, while neutral information was dropped from this analysis.[10] 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.

Results

Information Congruency and Processing Time

Cognitive research shows that incongruent information can be more difficult to incorporate into existing schemas than schema-congruent information (Fiske and Taylor 1991.) Steenbergen and Lodge (1998) argue that affect 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.[11] Because subjects knew nothing about any of the candi-

[10] Some concern is warranted for the ability of subjects to accurately recall affect. In order to minimize this problem, subjects had an opportunity to express a "don't remember" position when asked about their recall of information. Approximately 17% of items viewed were not recalled by subjects and dropped from this analysis. There is evidence in the literature that affect can be recalled reasonably accurately (Thomas and Diender 1990.) A direct test of recall accuracy is possible using a very limited subset of items in this study. For nine of the issues, subjects were queried before the simulation on their own positions using a standard 7-point scale. Because candidates were invented and their issue positions known with certainty, a comparison can be made between candidate position and subject position on this small subset of issues. This analysis shows a mean of 67% agreement across all subjects and issues between self reports of like/dislike and a constructed like/dislike measure based on subject-candidate agreement, with a range of 56% for taxes to 83% for the environment. (Other issues include crime, military intervention, abortion, affirmative action, health policy, homeless, and welfare.) These nine issues represent only about 10% of all items examined during the simulation, and direct measures of others are not available.

[11] The adjusted processing time measure was calculated using the time required to read an information card beginning when a subject clicked to access a piece of information and ending when the subject clicked on a button to return to the main screen. The raw measure thus contains both the 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 within subjects on the number of words in the candidate information card. The resulting constant represents the mean time required for each subject to read a card with zero words, thus approximating the time needed to handle the task of accessing the DONE button. For each subject, this constant was subtracted from the raw reading time for each piece of information accessed.

TABLE 1

Effects of Information Incongruency on Processing Time

	All Observations		Chosen Candidate		Candidate Preferred in Polling	
	On-Line n = 968	Memory n = 803	On-Line n = 359	Memory n = 348	On-Line n = 147	Memory n = 93
Information Incongruency	.202	.169	1.883**	−.382	3.103**	−4.087
(1 = Incongruent)	(.327)	(.452)	(.757)	(1.039)	(1.172)	(2.719)
Political Sophistication	−.014	−1.084***	−.682*	−1.648**	−2.209**	−2.717
	(.233)	(.333)	(.406)	(.579)	(.868)	(1.709)
# of Words per Card	.133***	.139***	.122***	.139***	.124***	.134***
	(.005)	(.007)	(.009)	(.012)	(.017)	(.033)
Reading Ability	−.031***	−.003	−.030***	.002	−.040***	.019
	(.003)	(.004)	(.004)	(.007)	(.007)	(.015)
Task Demands Condition	−.627**	.574	−1.060**	1.017	−1.396	1.482
(1 = Difficult)	(.284)	(.393)	(.505)	(.633)	(.870)	(1.596)
Sophistication × Task Demands	−.638**	.487	.201	.682	2.052*	1.683
	(.299)	(.423)	(.527)	(.684)	(1.222)	(1.719)
Poll Interruption Condition	.364**	.365	.455	.580	−.899	4.675**
	(.167)	(.227)	(.296)	(.358)	(1.053)	(1.810)
Education	.057	−.124	.222	.074	.021	1.444*
	(.111)	(.159)	(.199)	(.254)	(.417)	(.662)
Chosen Candidate	−.133	1.105*	—	—	.710	4.160*
	(.292)	(.421)			(1.516)	(2.344)
Constant	−5.292***	−.787	−4.027**	−.796	−2.251	−13.823**
	(1.169)	(.973)	(1.730)	(2.109)	(3.054)	(5.362)
Adjusted R^2	.479	.347	.433	.297	.381	.236

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. *$p < .1$ **$p < .05$ ***$p < .01$

dates in the election simulation before the campaign started, they began the study with no affect toward 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 (0 = 2 candidates, 1 = 4 candidates) and poll interruption (1 = early evaluation, 2 = middle evaluation, 3 = late evaluation), measures of political sophistication and education, and measures of reading ability and the number of words per information card.[12] These covariates, all of which are constants within subjects, also serve the role of "dummy variables" to control for between-subjects effects created by the use of subject-candidate pairings for observations.[13]

The first two columns of Table 1 report the analysis across all available subject-candidate observations. In this initial analysis, no significant effects for information congruency are evident for either on-line or memory processors. 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 toward 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 voted for at the end of the campaign. For subjects in the on-line 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 toward a candidate took significantly longer to process that information. As expected, the information congruency effect, however, does not exist for subjects in the memory processing condition. As Kunda (1987) suggests, the accuracy goal (memory processing) appears to attenuate

[12] 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 instructions provided, as recorded by the computer.

[13] OLS regression analysis assumes no autocorrelation of residuals. Because this analysis includes multiple observations of individual subjects as they chose pieces of information, some concern about a lack of independent observations might exist. The individual difference variables, in addition to being theoretically important, 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.

the affective bias that is found in subjects with an evaluative goal (on-line processing).

A potential conceptual problem arises with the analyses in the first four columns of Table 1. While affect toward 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 toward the candidates as the campaign progressed.[14] 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 manipulation that provides a measure of candidate evaluation collected while the campaign was under way.

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 that are, if anything, even stronger, as would be expected if Hypothesis 1 is supported. Memory processors show very different effects. While not statistically significant, there appears a tendency for accuracy-motivated subjects to focus on congruent information, spending less time on incongruent items. Overall, these findings provide clear support for the hypothesis that incongruent information about candidates slows down information processing for on-line processors, as would be expected if they are motivated reasoners.

Congruency and Information Search

Hypothesis 2 predicts that affect will influence information processing by directing information search. Table 2 reports an analysis of information search patterns. Subjects in the on-line processing condition show evidence of being guided by like/dislike for candidates in selecting information. 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 on-line 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 rates. Memory processors were just as guided by their affect also focusing

[14] 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.

TABLE 2

Biased Information Search

On-Line Processors	All Candidates n = 295	Chosen Candidates n = 50	All Liked Candidates n = 111	All Disliked Candidates n = 147
Mean Proportion of Cards Viewed Per Candidate	.167	.254 (.095) t = 6.535 $p < .001$	.209 (.084) t = 5.245 $p < .001$	.116 (.060) t = −10.225 $p < .001$
Memory Processors	n = 219	n = 48	n = 98	n = 121
Mean Proportion of Cards Viewed Per Candidate	.167	.256 (.083) t = 7.440 $p < .001$	.216 (.088) t = 5.521 $p < .001$	.121 (.064) t = −7.843 $p < .001$

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

their information search on liked candidates, while exhibiting far less interest in learning about disliked candidates. This appears to support Kunda's (1990) assertion that the accuracy goal does not necessarily resolve the search and memory bias generated by affect. Overall, the results provide generally strong support for Hypotheses 2.

Information Congruency and Decision Making

I now turn to the question of whether the greater processing time and biased search processes lead to any real consequences. Hypothesis 3 predicts that motivated reasoners who encounter incongruent information about preferred candidates will exhibit stronger support for those candidates, rather than reducing their support as should be expected in the face of negative information. Voters motivated toward accuracy should not show this effect. An ANOVA model was used to examine the effects of information congruency on the ratings subjects gave to the candidate chosen in the poll. Because this candidate is by definition a liked candidate, incongruent information will always be negatively evaluated information. The processing manipulation and information congruency were entered into the ANOVA in a full-factorial design along with subject political sophistication and an indicator of whether the candidate was voted for at the end of the election as controls. As shown in Table 3, strong effects are found for the processing condition and the interaction between processing and information congruency. This interaction is what would be expected if on-line processors differ from memory processors. That they differ is not surprising, given that motivated reasoning assumes on-line processing.

The nature of the interaction becomes clear in the marginals reported in Table 3. On-line processors show exactly the attitude strengthening effects predicted by the Lodge studies, while memory processors do not. In fact, memory processors show a normatively correct pattern—as they encounter negative information about a preferred candidate, they lower their evaluation of that candidate. On-line processors, however, increase the rating of their chosen candidate when they encounter negative information about the candidate chosen in the poll, thus supporting the expectations of Hypothesis 3. Figure 2 provides a graphical presentation for the ANOVA results, including the control variables.

Given the evidence that attitude updating does not occur in a normatively correct manner for motivated reasoners, it is important to see whether this leads to consequences for the actual vote choice. Hypothesis 4 predicts that voters who show attitude strengthening effects 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 suboptimal decision making. Ditto et al. (1998) argue that "although people may direct attention toward preference-inconsistent information in the hope of uncovering

TABLE 3

Information Incongruency and Attitude Strengthening

Analysis of Variance					
	SS (Type III)	df	MS	F	Prob.
Incongruent Information (I)	12.854	1	12.854	.103	ns
Processing Manipulation (P)	548.198	1	548.198	4.373	.041
P × I	430.354	1	430.354	3.433	.069
Sophistication	2.079	1	2.079	.017	ns
Chosen Candidate	2146.136	1	2146.136	17.121	.000
Corrected Model	3649.544	5	729.909	5.823	.000
Residual	7019.810	56	125.354		
Adjusted R^2 = .283					

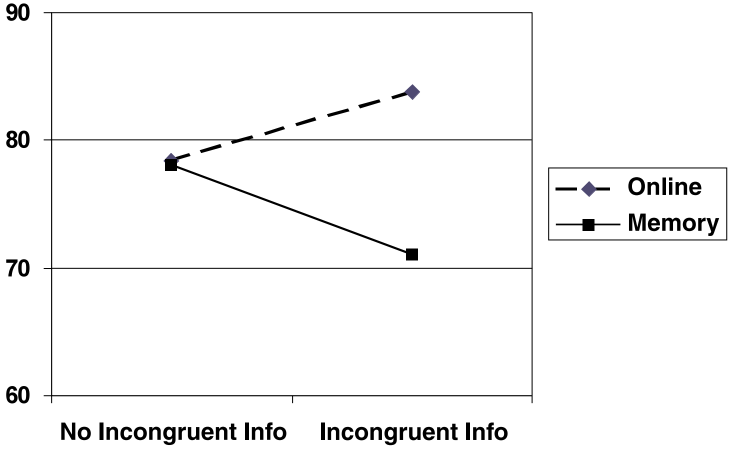
Mean Feeling Thermometer Ratings for Candidates Selected in Poll			
	N	Mean	Std. Dev.
On-line Processors			
Incongruent Information	13	86.15	7.40
No Incongruent Information	20	77.25	13.81
Memory Processors			
Incongruent Information	7	68.57	10.29
No Incongruent Information	22	78.41	14.26

alternative explanations for it, the effortful processing that is the by-product of that hope can lead people towards non-preferred as well as preferred conclusions" (61). Information processors may be led astray by making extra effort to counteract the incongruency in information that does not support predefined 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 process occurs when voters are learning about candidates, it would suggest that those who encounter more negative information about a candidate whom they like would be more likely to remain with that candidate than to switch 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 4, a definition of decision quality in candidate selection is needed. Lau and Redlawsk (1997) show that decision quality can be measured by allowing voters to self-determine whether they would change their vote after having the chance to view all available information about the candidates in the choice set. This "fully informed" decision-quality measure allows me to establish the difference between a vote cast on the basis of the information actually viewed during the campaign and the vote that would have

FIGURE 2

Estimated Means of Thermometer Ratings for Candidates Selected in Poll Controlling for Sophistication and Vote Preference



been cast if the voter had the time and resources to view all information about all candidates in their choice set. 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. During this process, the experimenter emphasized the importance of an accurate decision and assured subjects that changing their vote was reasonable and normal. Thus, all subjects were given an accuracy motivation at this point. 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 chosen candidate 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 affectively negative information. 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, $p < .05$.

However, decision quality is affected by a number of 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 2001). Thus, in order to test the role of information congruency, we must start 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 as reported in Table 4. The dependent variable is correct voting with a correct vote coded 1 and an incorrect, 0. 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 mak-

TABLE 4

Effects of Information Incongruency on Correct Voting

	Base Model		Information Effects Model	
% Incongruent Information Viewed			−.114**	(.056)
Incongruency × Task Demand			.014	(.101)
Incongruency × Processing			.198*	(.112)
Incongruency × Sophistication			.028	(.054)
Accurate Memory	.836**	(.384)	1.306**	(.611)
Memory × Task Demand	.113	(.363)	.856	(.619)
Memory × Processing	2.125***	(.799)	2.656**	(1.149)
Memory × Sophistication	.462	(.284)	1.017*	(.540)
On-line Tally	.006	(.064)	−.038	(.086)
Tally × Task Demand	.231*	(.137)	.389**	(.198)
Tally × Processing	−.198	(.146)	−.139	(.199)
Tally × 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 × Task Demand	.937	(1.625)	6.434*	(3.773)
−2LL	60.26		45.97	
PRE			.237	
Model X^2	39.10	14df $p<.001$	53.38	18df $p<.001$
Difference X^2			14.28	4df $p<.01$
% of cases correctly classified	83.9		88.0	

Table entries are logistic regression coefficients, standard errors in parentheses.
Dependent variable is decision quality, 1 = Correct Vote.
PRE calculated as $-((-2LL_{model\ 2}) - (-2LL_{model\ 1})/(-2LL_{model\ 1}))$
*$p < .1$ **$p < .05$ ***$p < .01$

ing, whether in the on-line or memory processing conditions. This base model correctly classifies nearly 84% of subjects.[15]

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 preexisting affect adds anything to this basic model of decision quality. The results show that in fact information congruency significantly improves the base model. Importantly, none of the original significant predictors changes either sign or significance. 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. The new model is significantly improved over the original ($X^2_{diff} = 14.28$, 4df, $p < .01$), and a proportional reduction in error of .237 is shown. Hypothesis 4 is supported for on-line processors only as would be expected by motivated reasoning.

Discussion

While simulations have their limitations as analogues of "real-world" campaigns, the process that subjects followed in this study broadly resembles the processes needed to evaluate candidates: learning about the candidates, developing affect toward them, and expressing that affect by casting a vote. Because this campaign simulation proceeds over time and because subjects have no knowledge of or affect toward candidates before starting the campaign, crucial control is maintained over the information used to generate affect, and the complete information search process is recorded.

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

The findings provide the first direct support for motivated reasoning in an environment mimicking the processes of a political campaign. Incongruent information requires significantly greater processing time for subjects in the on-line experimental condition. Further, information search was specifically focused on liked candidates, while ignoring those who were disliked. While this seems like an obvious and logical process for voters to follow, ignoring initially disliked candidates means failing to consider completely the full choice set. The bias toward looking at liked candidates suggests 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 a subset that generated negative affect early in the campaign, she ignores the possibility that an initially disliked candidate might be her best choice on many unconsidered dimensions.[16]

Most important, the biases generated by affect appear to have real consequences. On-line processors who encountered greater incongruency during information search showed attitude strengthening and degradation in decision quality. It appears that when incongruent information is encountered, the automatic assimilation and update process is interrupted as greater attention is paid to the new incongruent information. During this time, voters may be actively counter-arguing the information, developing reasons why it is wrong or should otherwise be ignored in an attempt to explain it away (Lodge and Taber 2000). Voters also might bolster 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 does not directly test these possibilities, it is easy to see how failing to adjust affect in accord with new incongruent information could lead to lower quality decisions as the value of the new information is discounted. The investment in candidate affect arising from learning even a small amount of information appears to create an anchor from which voters have a hard time moving in the normatively correct direction.

Yet accuracy-motivated subjects seemed to readily overcome this effect, even while still showing search biases, so that in encountering incongruent information they correctly updated their prior affect. Memory processors do not show the longer processing times for incongruent information evident in on-line processing. In addition, 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. Yet they still show the same search bias as on-line processors, preferring to search for information about liked candidates over disliked. Apparently the accuracy motivation is not enough to overcome the preference for liked candi-

[16] Allison and Zelikow (1999) make a similar point about information search, as does Dawes (1988).

dates during information search. This preference may lead memory processors astray just as readily as on-line processors (after all, not all memory processors cast a "correct" vote). But memory processors clearly attenuate the effects of this bias by their ability to modify their prior affect when encountering negative information about these liked candidates.

These findings provide a direct challenge to the notion of candidate evaluation as a Bayesian updating process in which voters readily modify their prior expectations based on the value of new information. While Gerber and Green (1999) argue that a "Bayesian public . . . is not incapable of being persuaded by new information," the results of this study leave questions about how that persuasion might work. The clear findings of attitude strengthening among on-line processors, along with the evidence of lower quality decision making in the face of affectively incongruent information, seems evidence that whatever process is operating, it cannot be readily squared with rational Bayesian updating.

A caveat is in order. While motivated reasoning speaks to the difficulty of assimilating incongruent information, and this difficulty is supported in the study presented here, at least some of the reason for slower processing might be the negative valence generally carried by the incongruent information. Because this study focuses primarily on candidates that subjects liked, the incongruent information they encountered was necessarily information they disliked. Studies have shown some differential effects for negative affect compared to positive, especially in the realm of person evaluation. Fiske (1980) finds that more weight is given to unusual and negative cues in evaluating personality, concluding that negative cues are considered more informative than positive ones. Pratto and John (1991) concur, showing that negative stimuli grab attention and are weighted more heavily in evaluation. There appears to be a clear asymmetrical effect between positive and negative events (Taylor 1991). While unable to say for certain whether the cause is the simple incongruence of new information or its negativity, the findings in this study do point clearly to important implications for information that does not match with affective expectations.

The normative implications of this line of research are important. Political scientists who prefer voters as affect-free calculators who coolly consider candidates and make even-handed evaluations if simply given enough information miss a critical piece of the puzzle. Affect counts. We 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 cannot really hope to avoid every bias affect brings. At best, by understanding the nature of these biases we can devise ways to correct for them. Yet 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.

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