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ORIGINAL PAPER

Social Influences on Online Political Information Search and Evaluation

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Abstract Americans are turning to the Internet to learn about politics in greater and greater numbers. Under the current "Web 2.0" paradigm in which users are encouraged to interact with online content, voters encountering political information on the Internet are typically exposed to more than just the news; online information is often colored by the reactions of previous readers, whether in the form of displayed comments or in readily apparent tallies of the number of "likes" or "shares" a particular item has received. In this paper we consider the effect these social cues have on online political information search and evaluation. Using processing-tracing software to monitor the patterns of information search and evaluation among our subjects, we find that social cues can function as a heuristic, allowing voters to reach judgments similar to those of their more informed counterparts. However, we also find that negative cues can adversely influence candidate evaluation, making subjects less disposed to a candidate than they would be in the absence of such signals.

Keywords Heuristics · Information-processing · Voting · Social media

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Introduction

Americans are turning to the Internet to learn about politics in greater and greater numbers. According to a survey conducted by the Pew Research Center, 55% of adults retrieved political news from the web, participated in an online discussion about politics, or shared or received political information via email or social networking sites during the 2008 election[1]. Unlike citizens who get their political information from newspapers, magazines, and television shows, Internet users frequently get more than just the news—they get information *plus* a variety of social cues and signals. The current Web 2.0 paradigm, in which user interaction with content is commonplace, gives Internet visitors the opportunity to instantly react to information they find online, whether by clicking buttons to indicate that they "like" or "dislike" the piece, sharing it with their friends via social media sites such as Facebook and Twitter, or registering their feelings by commenting directly on the news story. Many websites, including such popular destinations as Twitter, *The New York Times* website and Yahoo! News, track stories based on the number of times they are shared with others and prominently feature the most popular stories and topics. The political information available online is often inextricably colored by the reactions of its readers.[2]

To understand the nature of this new information environment, consider the ways in which a voter might encounter Hillary Clinton's announcement that she will run for President in 2016. The voter might see the link to Clinton's video announcement at CNN's Twitter feed and also note that the news has been shared over 13,000 times and "favorited" 9000 times. Or perhaps a member of the voter's online social network shares a link from Hillary Clinton's Facebook page, which upon visiting he will see that the announcement has 2.8 million views, has been liked 79,000 times, and shared 42,000 times. Or maybe the voter seeks out the announcement on YouTube at the ABC news channel, where he finds that the video had been viewed 280,000 times and garnered 3200 likes and 1500 dislikes. And perhaps prior to viewing Clinton's announcement on YouTube, the voter peruses some of the over 2000 comments that other users had left[3]. In the dynamic and increasingly social world of online news, visitors to the Internet constantly make the choice to click or not to click a link in order to acquire more information. It stands to reason that the signals other viewers have left as to the information's popularity and affective polarity not only play some part in structuring that decision but also in subsequent evaluations of the information as well.

This emerging social information environment raises a number of interesting questions at the intersection of the existing literatures on political information processing, decision-making, and preference formation. The current scholarly consensus points to a portrait of voters as decision-makers who strive to make good choices in an efficient fashion (Lau and Redlawsk 2006). At the same time, it has

[1] Report available at http://www.pewinternet.org/2009/04/15/the-internets-role-in-campaign-2008/.

[2] Indeed, the social cues common to online media have begun to appear in more traditional outlets, as some news programs now incorporate viewer comments and reactions into their stories.

[3] All figures were based on website visits on April 19th, 2015.

become clear that what constitutes a "good" decision for many people deviates significantly from normative models of information use; voters—even politically savvy ones—value cognitive consistency in their judgments (Lavine et al. 2012; Lodge and Taber 2000) and thus are prone to confirmatory information search (Taber and Lodge 2006), reliant on simple cues such as partisan identification when evaluating politicians and policies (Cohen 2003; Lau and Redlawsk 2001; Sniderman et al. 1991), and often fail to properly incorporate new information into their political judgments (Kuklinski et al. 2000; Nyhan and Reifler 2010; Redlawsk 2002). In this paper, we hypothesize that voters interested in both reducing information costs and maintaining cognitive consistency take advantage of social cues during information-processing. By providing information-seekers with signals as to how others have evaluated a politician, online cues can function as important "horserace" data (Lau and Redlawsk 2001; Mutz 1998) that reduces the need for more comprehensive information. Furthermore, cues can encourage cognitive consistency by guiding voters to positive information about their preferred candidates while warning them that certain news items contain negative information that should be avoided.

To investigate the influence of social cues on online information search and evaluation, we carried out a process tracing experiment in which subjects were asked to learn about and then cast a vote for one of three fictional politicians competing in a primary contest. This process tracing environment allows us to mimic the flow of information while experimentally controlling the social cues attached to that information. We find that on the whole, cues do in fact reduce the amount of information subjects used in reaching their decisions while not changing their candidate preferences from those of their more informed counterparts. And yet, our data also suggests that a preponderance of negative cues associated with a candidate can influence both processing strategies and evaluations of a politician. In a predominantly negative information environment, our data show that subjects were less likely to seek out information about their preferred candidate. Furthermore, a bevy of negative cues associated with a candidate led subjects to evaluate that politician more pessimistically than they would in the absence of such signals. Based on our results, we conclude that social cues have both positive and negative consequences for voter behavior: on the one hand, cues can help to reduce information costs for voters; on the other, the tenor of such signals has the potential to adversely affect evaluations of politicians.

Theoretical Background

Although the study of online political information search is a fairly novel endeavor, our research is grounded in several well-established theories of information use and political preferences. Consistent with the current literature, we contend that voters encountering political information online are motivated to make decisions that are both efficient and consonant with their prior attitudes and beliefs. The desire for efficiency leads voters to reduce information costs (Downs 1957). Voters do this by relying on a variety of heuristic devices, such as party identification, endorsements,

group affect, and even the candidates' occupations (Sniderman et al. 1991; Lau and Redlawsk 2001; Popkin 1991; McDermott 2005). The desire for consistency manifests itself in a number of normatively questionable information-processing behaviors that are nonetheless widely recognized by social psychologists and political scientists as part and parcel of preference formation. Voters strive to maintain their prior attitudes, even in the face of incongruent information or convincing counter-evidence (Redlawsk et al. 2010; Redlawsk 2002); they often seek information that confirms what they already believe (Lodge and Taber 2013; Nickerson 1998) and they are prone to reject, ignore, or selectively interpret evidence in order to uphold their beliefs (Bartels 2002; Gaines et al. 2007; Kuklinski et al. 2000; Nyhan and Reifler 2010). Although these behaviors may run contrary to the expectations of some democratic theorists, research indicates that voters are actually fairly good at choosing candidates who espouse policies consistent with their beliefs and preferences (Lau et al. 2008; Lau and Redlawsk 1997).

Given this portrait of voter behavior—largely informed by the heuristics literature—we believe the social signals attached to online information are likely to have three major effects on information search strategies and decision-making. First and foremost, social cues should decrease the total amount of information voters need to process in order to evaluate a candidate. While some scholars are justifiably skeptical of the utility of heuristic decision-making in politics (Bartels 1996; Delli Carpini and Keeter 1996; Kuklinski and Quirk 2000), the rather low levels of political knowledge and attention among the citizenry suggest that many voters rely on low-cost information short-cuts when forming their political preferences (Lupia and McCubbins 1998; Popkin 1991) and experimental work has revealed a high incidence of heuristic use among subjects (Lau and Redlawsk 2001). The most intuitive way that social cues might decrease online information acquisition is by focusing voter attention to certain popular or "viral" news items. Online content can go viral when it is viewed, liked, or shared frequently (Berger and Milkman 2012), and this viral content may crowd out other information that might be more pertinent to a voter's political needs. Essentially, social cues might promote herd behavior (Banerjee 1992) during the information-gathering process. Herd behavior occurs when people ignore private information and base their decisions on the choices of others; in the context of online information search, voters might simply attend to the information that becomes popular rather than seek out news more relevant to their objective political interests. Information-seekers with limited attention to and time for political matters may therefore ignore certain pieces of news and attend to others simply because other people have already done so, reasoning that if many people think a topic is important than it must be. A preponderance of social cues attached to a piece of news may garner the interests of voters, not necessarily because this news is crucial to the voter's decision but simply because the information has reached a critical mass of views from others. By focusing attention on certain stories and ignoring others, overall information search would decrease.

While we think that in general, social activity surrounding a news item might make it more attractive and therefore decrease the need for other pieces of information, we further propose that positive and negative cues might decrease

information acquisition in particular ways. In the case of positive cues (such as "likes" or "upvotes"), one possibility is that the signals function similar to polls or other "horserace" information, which give voters a sense of the popularity and potential electoral success of a candidate. Conceivably, the amount of activity associated with a piece of online political news—including the number of views or the number of times it has been shared—can clue voters in as to the viability of a politician, while a high number of positive cues attached to an information item can convey to voters that a particular candidate or policy has popular approval. Since people are often ambivalent about a large number of political issues (Zaller and Feldman 1992), positive social cues may thus promote the use of a consensus heuristic (Mutz 1998); rather than search out specific information on a large number of a candidate's policies, voters may focus on the one or two issues they care about and use the cues to reassure themselves that the politician's other positions have mainstream acceptance.[4]

When it comes to negative information, we hold that cues will reduce overall information acquisition by steering voters away from news that casts their preferred candidate in a derogatory light. The general psychological phenomenon of confirmation bias is well-documented (Nickerson 1998) and in a political context people have been shown to seek out information that supports their prior political attitudes and ignore information that challenges their political beliefs, even when those beliefs are based on factually inaccurate evidence (Kuklinski et al. 2000; Taber and Lodge 2006). Since people tend to avoid encountering evidence that may contradict their attitudes, negative social signals can provide information-seekers with a warning that a particular news story is likely to portray a favored candidate poorly; with these cues, voters can bypass certain information items entirely. In sum, we propose that positive cues will decrease information search by promoting the use of a consensus heuristic; conversely, negative cues will decrease information search primarily by helping people avoid encountering unflattering news about their favorite candidate.

In addition to decreasing the amount of information a voter seeks out online, we suspect social cues also have the ability to influence evaluations of politicians. This influence may occur indirectly via the mechanisms described above; if social cues change the quantity or type of information a voter encounters, then they may affect candidate evaluations by altering the balance of considerations a person brings to mind when forming a political judgment (Lodge and Taber 2013; Zaller 1992). Additionally, social cues may also have a more direct effect on evaluation if they are able to shift a subject's response to a given piece of information. The quintessential political case of this phenomenon is the effect opinion polls can have on candidate evaluations, which Mutz (1998) terms "impersonal influence". In Mutz's study, attitudes towards a fictional politician were changed when voters were presented with information in the form of poll results as to how other people had evaluated the candidate.

[4] In a largely positive information environment, another mechanism that may decrease overall information search is suggested by Marcus and colleague's "Affective Intelligence Theory" (Marcus et al. 2000). Affective Intelligence Theory proposes that a positive political context activates the brain's "disposition" system, resulting in a decreased motivation to expand cognitive effort. In effect, positive signals tell the voter that the status quo is fine and there is no need to be on alert or vigilant. Thus, positive signals surrounding political information should decrease a person's need to acquire information.

In the online environment, the social cues attached to news would seem to play much the same role as a traditional opinion poll, alerting readers to the general mood surrounding an information item. Evidence of the potential power of user-supplied social reactions to online information has been demonstrated by Muchnik, Aral, and Taylor (2013) who report evidence of such influence in reactions to articles posted to an unnamed website. Comments submitted to the site were randomly assigned to be either "up-voted" or "down-voted" (i.e., receive an apparent positive or negative user reaction). Over a 5 month period, items that were randomly assigned a positive rating were 32% more likely to receive additional positive ratings than were control comments with no rating. A negative initial rating did result in a significantly higher probability (compared to a control comment) that the comment would receive a subsequent negative reaction, but this finding was offset by a "correction" effect in which negative ratings were also found to generate a higher rate of positive ratings. These results indicate that cues may actually condition how people evaluate information. If so, then the opinions of others about a candidate or policy may directly affect attitudes.

In line with the view that voters are motivated reasoners who strive to make good and efficient decisions, we contend that the social signals attached to online information play a vital part in structuring search behavior and influencing evaluations. We theorize these signals have the potential to reduce information costs, direct attention to certain news items, and perhaps directly or indirectly influence attitudes and voting decisions. In the subsequent sections, we generate several hypotheses based on this theoretical orientation and present the results of a process-tracing experiment designed to investigate the impact of social signals on online political information search and evaluation.

Hypotheses

Based on our theoretical discussion above, we derive the following hypotheses. First, we hypothesize that the presence of social cues—regardless of their valence—will decrease the amount of information subjects access:

H1 Subjects exposed to social cues will be less likely to access information about candidates than will be subjects not exposed to such cues

Our next set of hypotheses are designed to explore the mechanisms behind this proposed decrease in information search.

H2A Consistent with the view that cues encourage some items to go viral, subjects are more likely to view an information item with cues attached than they are to view the same item absent such cues; further, subjects become less likely to view non-cued items in the presence of social cues

H2B Consistent with the use of a consensus heuristic, subjects will be less likely to view items with positive signals attached to them than they would be to view the same item with no such signals present

H2C Consistent with the the desire to engage in confirmatory processing, subjects exposed to negative social cues will be less likely to access information about their preferred candidate than will be subjects not exposed to such cues

Last, we hypothesize that cues will influence the evaluation of political information:

H3 Subjects are more likely to evaluate a certain piece of information negatively (positively) in the presence of negative (positive) cues than they are when the same information is associated with positive (negative) cues.

We test these hypotheses in an experimental study employing Lau and Redlawsk's (2006) dynamic processing tracing environment (DPTE) software, which allowed us to conduct a mock primary campaign in which participants are presented with candidates in an information rich environment and tasked with making a vote choice.[5] As we describe in greater detail below, the DPTE environment captures many of the features of online information search, albeit in a simpler, stylized fashion.

Experimental Design

To simulate in a controlled experimental setting some of the key features of online information search, we employ the DPTE software.[6] Process tracing experiments are well-suited to our research questions because they allow researchers to monitor the type and quantity of information subjects access when making a decision. The dynamic software we use improves upon static process-training designs by presenting subjects with an ever-changing array of information which represents the way information oftentimes moves quickly through our fields of perception.

For our mock primary, we created three fictional candidates. Although invented, our candidates were modeled closely on real-world politicians and designed to embody moderate, liberal (or libertarian, in the case of the Republican candidate), and conservative policy preferences within their respective parties. We defined each candidate with 33 unique pieces of information (15 policy stands, 10 demographic items, and 8 human interest pieces), meaning 99 distinct pieces of information were available during the campaign; however, since the primary lasted only 12 min, voters were not able nor expected to learn everything possible about each of the candidates.

During the campaign, six text boxes appeared on the computer screen for 10 s, each with a headline indicating the type of information available (e.g., "Smith's Position on Drone Strikes." See Fig. 1). Clicking on the text box with the mouse made the information available to the voter. Every 10 s, the information on the screen

[5] We use a primary campaign to eliminate reliance on party identification when making a voting decision. In a primary, our subjects will presumably need more information to make their choices, giving us more leverage on our research question.

[6] The DPTE software is free to use and available to any researcher at www.processtracing.org.

Fig. 1 Dynamic information board

was randomly refreshed, giving the voter an opportunity to learn new information or perhaps revisit previously accessed information. Just as the online information environment does, our study presents voters with a rapidly changing menu of news options—with little more than a thumbnail sketch of the content—from which they must choose the information that they believe to be most relevant to their decisions.

To simulate the cues attached to online political information, we added tallies of likes, dislikes, shares, and comments to the headlines (see Fig. 2), which we subsequently manipulated as part of our experimental design. These signals mimic the ways in which news is presented on the Internet. For example, the Huffington Post displays the number of comments garnered by a news item under its headlines and stories shared on sites such as Facebook and Twitter are typically accompanied by a count representing the number of times other viewers have liked the content. The dislike feature is somewhat less common— YouTube is one site that notably includes this information—but Reddit allows users to "down vote" content and some sites permit visitors to "dislike" others users' comments, which themselves may contain links to still more information. Thus, the signals we employ may be considered to reproduce some of the specific ways in which content is tagged on the Internet as well as to serve as a general representation of the signals of popularity and affective polarity that accompany online information.

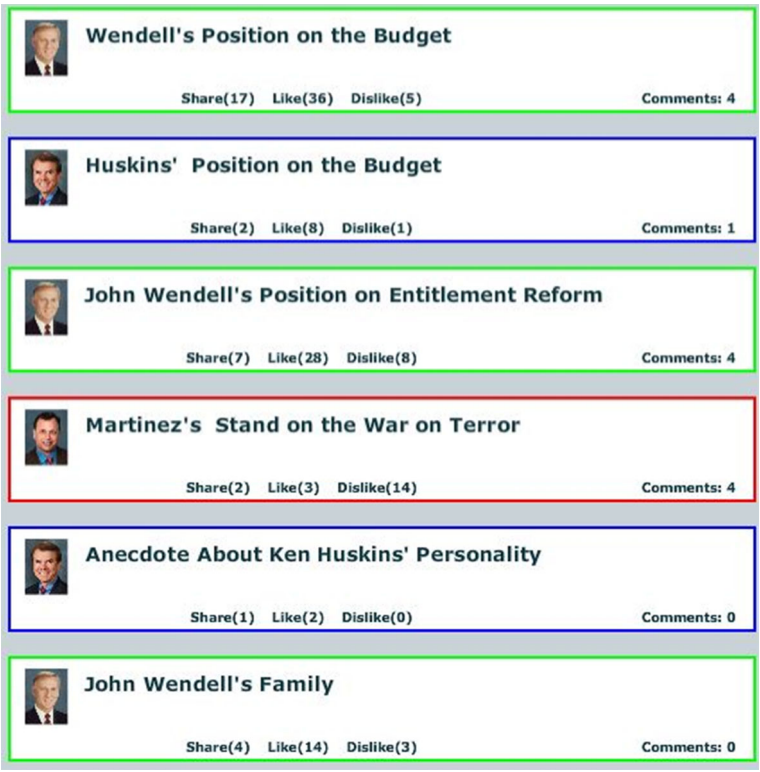

Fig. 2 Dynamic information board with social cues

Subjects were told that these signals were left by previous study participants, and in some cases they were; once an information item was accessed by one of our subjects, she could in fact click buttons to indicate one of the aforementioned reactions or even leave a comment for others to read. However, in order to ensure that all of our participants saw a suitable number of cues, we seeded the information environment with varying numbers of likes, dislikes, shares, and comments as detailed below.

We designed two sets of manipulations for our subjects. First, we varied the distribution of likes and dislikes, creating three manipulation levels: no cues, positive cues, and negative cues. Subjects in the "no cues" condition simply saw the headlines in the text boxes, with no other information present (as shown in Fig. 1). These subjects also were unable to interact with information in any way, having no capacity to indicate likes, dislikes, or shares. The rest of our subjects were assigned to a social version of the experiment in which the full functionality of the signals was enabled. For these groups, we selected one of the three candidates to be the "manipulated" candidate; this politician had 22 of the 33 available items marked with a random count of between 10–30 likes and dislikes. The other two politicians in our study had just 11 of the 33 available pieces of information cued, with each containing 1–9 likes and dislikes.

In the positive cue condition, the starting ratio of likes to dislikes for the manipulated candidate was roughly 3:1, while the ratio for other candidates was closer to 1:1. In the negative cue condition, the ratios remained the same, although now dislikes outnumbered likes by a 3:1 ratio. All told, at the beginning of the experiment members of the positive or negative cues condition saw that at least 44% of the information available had some sort of social marker attached to it and depending on the group assignment and candidate, these markers were either on balance positive, negative, or neutral. Our expectation is that a preponderance of positive or negative cues attached to the information about one of the candidates will influence evaluations of that politician.

Our second manipulation involved the presence of comments; subjects were randomly assigned to either a comment or no comment group. In the comment group, subjects saw both a tally of the comments left for each item on the headlines and also had the opportunity to read the comments after they opened the particular story. However, the content of the comments would not be visible unless the subject choose to open the comment panel; absent that action, voters would know that comments were present but have no knowledge of their tenor or content. And while subjects could in fact leave comments if they felt so inclined, we again seeded the environment with a number of pre-generated comments. At the outset of the experiment, 14 of the 33 information items about our manipulated candidate had one or two comments appended, with positive comments outnumbering negative ones by a 2:1 ratio; for the other candidates, the ratio was reversed, with more negative than positive comments. All told, we created a 3 (social signals) $\times$ 2 (comments) between-subjects design, with one group—with no signals and no comments—functioning as a control group.

Data

For our study, we recruited 308 subjects through Amazon's Mechanical Turk service (Berinsky et al. 2012; Buhrmester et al. 2011). Errors in the delivery of the experiment caused the program to terminate early for six subjects, but we include their processing data in our analyses when available. During recruitment, subjects were told they would take part in a study on information and voting decisions and would be paid a nominal fee ($2.00) for their time (on average about 30 min). After completing a number of demographic and political behavior questions and a short practice session, participants were asked to "register" for either the Republican or Democratic primary based on their political affiliation. Those who did not identify with either of the two major parties were asked to participate in the primary of the party to which they felt closest.

Our sample has an average age of 32.4 years and is 45% female. The modal respondent attended some college (38.1%) and reported a 2012 household income between $50,000 and $75,000 (20.5%). Almost three-quarters (75.5%) of the sample is white and 62.9% identify as a Democrat, though the sample is ideologically moderate (mean score of 3.32 on a 0–6 scale of conservatism). The subjects are fairly politically engaged—79% of the respondents say they voted in 2012 and the sample has mean score of 2.99 on a four-point scale of political

interest and 2.68 on a five-point scale of frequency of political discussion (higher values indicate more interest and more discussion). Subjects correctly answered 4.2 political knowledge questions out of five (Delli Carpini and Keeter 1993), indicating that our sample was politically knowledgeable.[7] However, since the study was delivered over the computer, we cannot rule out the possibility that subjects looked up the answers to the questions online or asked someone nearby for the correct response. Since we recruited our subjects from an online labor market, we have good reason to believe that our sample is composed of precisely the type of people that are likely to use the Internet to acquire political information, although we make no claim that our subjects are representative of all voters.

Results

The Effect of Social Cues on Information Acquisition

Our first question is whether social cues influence the quantity of information subjects use to make their voting decisions. During the 12-min primary, over 200 information items were available to our study participants. We treated each appearance of an item as an observation and estimated the probability that the subjects in our various experimental groups would open any given piece of candidate information. There are at least three potential sources of variance to account for when considering the probability that any given item will be opened. The first factor to consider is the subjects themselves; some of our participants will be more interested in the task than others and thus be more likely to open the items. A second factor to consider is the subject matter of the information items. Certain topics (e.g. abortion or same sex marriage) will necessarily be more captivating than others and therefore be more likely to be viewed. And lastly there are our manipulations, which we hypothesize will affect the probability of accessing the information.

In order to ensure that any changes in open probability we observe are due to the manipulations rather than properties of the subjects themselves or the information items, we use a mixed-effects logistic regression in which the subjects (n = 308) and the item topics (n = 33) are treated as random effects. This model clusters standard errors at the subject and topic level, allowing us to account for the variance in open propensity due to the idiosyncratic features of our participants and to the fact that some issues are inherently more interesting and presumably more likely than others to be opened by our subjects. Our dependent variable is whether a particular item encountered was opened (coded 1) or not (coded 0). Since the DPTE system presents items in a random fashion and not all items appear the same number of times, we included as a covariate a count of the times an item appeared (this variable ranged from 1 to 4 with a mean of 2.5) as well as a dummy variable indicating whether the particular item was about a policy issue in order to see if the cues made people more or less attentive to substantive news.

[7] When we added a measure of political expertise to our models, subjects' level of political sophistication had no substantive effects on the results reported here. Complete results are available from the authors.

Table 1 Probability of opening an information item, by treatment group

	Model 1	Model 2
(Intercept)	−1.24***	−1.24***
	(0.11)	(0.12)
Times available	0.49***	0.49***
	(0.02)	(0.02)
Policy item	0.30**	0.30**
	(0.10)	(0.10)
Comment only group	−0.44***	
	(0.12)	
Likes only group	−0.18	
	(0.12)	
Dislikes only group	−0.39**	
	(0.13)	
Likes+comments group	−0.57***	
	(0.12)	
Dislikes+comments group	−0.53***	
	(0.11)	
All cue groups		−0.43***
		(0.10)
AIC	37346.74	37351.24
BIC	37429.88	37401.12
Log likelihood	−18663.37	−18669.62
Num. obs.	30149	30149
Num. groups: SubID	308	308
Num. groups: Topic	33	33
Variance: SubID.(Intercept)	0.35	0.37
Variance: Topic.(Intercept)	0.07	0.07
Variance: Residual	1.00	1.00

***$p<0.001$, **$p<0.01$, *$p<0.05$

Results from our first cut at the data are presented in Model 1 in Table 1, in which each experimental group is represented by a dummy variable and the intercept captures the behavior of the control group (i.e., when all of the other group variables are 0). As the results show, among subjects in our experimental groups the probability of opening any given stimulus item was decreased relative to the probability in the control group. Because the effects are in the same direction, to simplify interpretation of these results we collapsed all of the experimental groups into one and compared this omnibus group to the control (Model 2, Table 1). Assuming an item appears 2.5 times, the model estimates that members in the control group have a 50.3% chance of opening the stimulus (95% CI 44.2, 55.4%).[8] But for those exposed to some type of cue, whether positive or negative, the probability of opening an item drops over 10 points to 39.4% (95% CI 35.6, 43.1%).

[8] These and subsequent estimates from our statistical models are generated using the "sim" function for the Zelig statistical package in R (Imai et al. 2012).

Note that this effect occurs regardless of whether the item in question is a policy item or not; the chance of opening a non-policy items drops to 39.4% (95% CI 35.7, 43.2%) in the cues groups from 49.9% (95% CI 44.6, 55.2%) in the control, while the probability of opening a policy item falls to 46.6% (95% CI 42.8, 50.4%) in the cues groups from 57.3% (95% CI 52.4, 62.4%) in the control condition. Consistent with our first hypothesis, then, it appears that cues do decrease either the motivation or the need to acquire information when learning about political candidates online. Even though voters had access to the exact same pieces of information in each of our treatment groups, the subjects in our cues conditions were less likely to view them.

In order to better understand why this decrease occurred, we need a more detailed model. First, we divided our treatment groups into "positive" environments (comprising both the positive cues only and the positive cues and comments group) and "negative" ones (the negative cue group and the negative cues and comments group). Next, we included a dummy variable to indicate whether the information item in question was one of the pieces that we manipulated by adding likes, shares, dislikes, and/or comments to.[9] We also added an additional dummy variable to indicate whether the item pertained to the subject's preferred candidate, which we determined based on the subject's final vote choice.

We interacted each of these new variables with the treatment group dummies; consequently, the main effects in the model show the change in probability that one of our selected items was opened in the control group, while the interaction terms show the change in open propensity for that very same item when cues (either positive or negative) were added. Since the headlines the voters are presented with are unchanged, this model specification reveals whether subjects were more attentive to the cued items than they would be were the exact same items offered without any social signals.

Model results appear in Table 2. To establish a baseline for our analysis, it is first worth noting how subjects in the control condition reacted to the news items we chose to manipulate as well as to items about their favored politicians. In the control condition, the 22 items that we selected for manipulation were no more likely to be viewed than the 77 other items; the predicted probability of opening one of the non-manipulated items was 48.7% (95% CI 43.3, 53.8%), a value statistically indistinguishable from the 49.8% (95% CI 44.2, 55.2%) rate for the subset of items we choose to add cues to. Of course, this makes sense as the absence of social cues in the control condition means there is no reason why subjects should either seek out or avoid these particular headlines, but this result does show that there was nothing about the items we chose that caused them to "stand out" to our subjects prior to the introduction of our social cues. Our control subjects, did, however, show a marked tendency to view information about their preferred politician. Items about the rejected candidates were opened at a 48.8% (95% CI 43.9, 53.8%) rate, while those pieces of information pertaining to the favored politician were 63.3% (95% CI

[9] Recall that 22 of the 33 items pertaining to our manipulated candidate were marked with social cues. Of these, 11 items were initially presented with 20–30 likes or dislikes. The other 11 items contained 10–19 likes or dislikes and the final 11 items had no cues attached at all. The effects we report hold for both high and low–cued items, so we combine them here.

Table 2 Probability of Opening an Item, by Item Type and Treatment Group

	Model 3
(Intercept)	−1.38***
	(0.12)
Times available	0.53***
	(0.02)
Manipulated item	0.04
	(0.06)
Preferred candidate item	0.60***
	(0.05)
Comment only group	−0.45***
	(0.13)
Positive cue groups	−0.42***
	(0.11)
Negative cue groups	−0.50***
	(0.11)
PosGroup * manipulated	0.25**
	(0.08)
NegGroup * manipulated	0.16*
	(0.08)
PosGroup * preferred	−0.02
	(0.07)
NegGroup * preferred	−0.07
	(0.07)
AIC	36834.68
BIC	36942.76
Log likelihood	−18404.34
Num. obs.	30149
Num. groups: SubID	308
Num. groups: Topic	33
Variance: SubID.(Intercept)	0.38
Variance: Topic.(Intercept)	0.09
Variance: Residual	1.00

***$p < 0.001$,
**$p < 0.01$,*$p < 0.05$

58.7, 67.9%) likely to be viewed. Thus, even without any cues or signals present, our voters were disposed to prefer information about their chosen politician.

We now turn to Hypothesis 2A, which states that cues decrease information acquisition by creating a"viral" effect; social signals increase the probability that voters will attend to a given item, while decreasing the probability that non-cued items will be examined. Based on the predicted probabilities generated from the model in Table 2, we find mixed support for this hypothesis. Among our subjects in the positive information environments, the presences of social cues made them no more likely to investigate the cued items: in fact, the predicted open probability for cued items in the positive information environments is 45.5% (95% CI 40.4,

50.1%)—a value 4.1 points smaller than the 49.6% (95% CI 43.9, 55.3%) probability in the control condition, although not significantly different from zero (95% CI of the difference $-10.4, 2.5$). However, consistent with our prediction, the cues did draw attention away from the non-cued items. Our model predicts that in the presence of social cues, items lacking such signals were opened 38.3% of the time (95% CI 34.4, 42.3%), a drop of more than 10 points from the predicted rate in the control group (95% CI of the difference $-15.6, -4.9$).

While the positive cues did not make certain items any more popular than they would be absent such signals, their presence did make non-cued items less popular; in effect, then, subjects attended to these cued items at the expense of the other items, providing some support for Hypothesis 2A. At the same time, the data reported here do not lend credence to Hypothesis 2B, which posited that information decrease in a positive environment would result from use of a consensus heuristic. The notion behind Hypothesis 2B was that subjects would avoid cued items since the signals provided a clue as to the tenor of the information and focus on the non-cued headlines, but that is not what we find in our study.

In the negative information environment, negatively-cued items were significantly less likely to be viewed than were their counterparts in the control condition. The probability of viewing a cued item in the negative environment is predicted to be 41.3% (95% CI 36.1, 45.6%), a roughly eight-point drop from the likelihood of viewing the item in the control group (95% CI of the difference $-14.7, -2.4$). Thus, while positive cues had no effect on the rate at which our subjects accessed certain pieces of information, negative cues depressed the propensity to acquire news about the candidate in question. As in the positive cue condition, the probability of accessing non-cued items in the negative environment dropped to a rate of 36.6% (95% CI 33.0, 40.2%), significantly lower than the likelihood in the control group (95% CI of the difference $-17.0, -6.8$). In sum, we find partial support for Hypothesis 2A; while cues did not *increase* the popularity of certain items relative to their popularity in a control group, social signals did *decrease* the attractiveness of non-cued items. Consequently, within each of our treatment groups the cued items were significantly more likely to be investigated than the non-cued headlines.

Moving to our prediction concerning the effect of social cues on information about a voter's preferred candidate, Hypothesis 2C posits that the probability of viewing items about one's preferred politician will decrease when those items have negative social signals attached to them. Using the coefficients from Model 3, we found the predicted probability of opening one of our manipulated items when that item also happened to pertain to the subject's preferred option. In the positive cue conditions, the probability of opening a manipulated item (i.e., an item with positive signals attached) about one's favored politician is 59.9% (95% CI 55.3, 64.6%), a rate statistically similar to the 64.1% (95% CI 59.2, 68.8%) rate in the control group (95% CI of the difference $-9.9, 1.9$). Consistent with our expectations in Hypothesis 2C, however, the open probability is significantly lower when negative cues are associated with items about the subjects' preferred candidates. In the negative cue conditions, the open probability drops to 54.6% (95% CI 50.0, 58.8%), significantly lower than the rate in the control group (95% CI of the difference $-15.6, -3.3$). Similar to our previous findings, then, positive signals made our

voters no more likely to attend to certain items, even when those signals were focused on the subjects' preferred candidate. Negative signals, however, caused our study participants to avoid seeking out information related to their favored politician.

To summarize our main findings thus far, cues of all types reduced information acquisition among our subjects. This decrease appears to be due to the ability of the social signals to draw attention away from non-cued items, although we did not find any evidence that the cued items themselves became more popular. Negative social cues were particularly effective at decreasing information acquisition for two reasons. First, negative cues, unlike positive ones, significantly decreased the likelihood of opening both cued and non-cued items. And second, negative cues made our subjects less likely to view information about their preferred politician, while positive cues had no such effect.

Although we find consistent evidence of a decline in the propensity to examine information in all of our treatment groups, the nature of our design raises the possibility of a potential confound; as Table 1 shows, the largest decrease in open probability occurred in the groups in which some items contained additional comments. Could it be the case that these subjects opened fewer items simply because they spent extra time reading these comments? To investigate this possibility further, we ran a linear regression model with average processing time (the number of seconds that elapsed between when the subject opened the item and closed it) as the dependent variable and the treatment groups as predictors. We also ran an additional model with a count of the total number of information items opened as a dependent variable. To these models we included a count of the number of comment panels opened as a covariate[10]. This variable ranged from 0 to 27, with a mean of 4.75 (SD 5.38). Our results appear in Table 3. We find that processing time is significantly increased in both of the comment and cues conditions, even when subjects did not read any comments.[11] Similarly, subjects in our positive and negative comment groups opened 14.25 and 12.85 fewer items on average than those in the control group, even when no comments were read. Taken together, these data suggest that additional reading time is not the sole driver of the decrease in information acquisition.[12]

The Effect of Social Cues on Evaluation

Our initial analyses demonstrate that cues reduce the overall propensity to examine information, suggesting that they can function as a heuristic by reducing information costs when evaluating politicians. We now turn to the important

[10] While all subjects in our treatment groups were alerted to the presence of comments on a news item, in order to actually view the comments subjects had to choose to open a separate panel within the information box, much like visitors to Internet news sites must choose to read user comments.

[11] In the "negative + comments" treatment, the p value for the dummy variable is .051.

[12] A likely explanation for the increase in processing time is a "cognitive response" mechanism (Mutz 1998). Our subjects are probably taking the time to stop and think about the cues and what they imply. This interpretation is bolstered by the fact that subjects in the negative cues only group (i.e., no comments, only "dislikes"), also saw their processing time increase significantly.

Table 3 Time spent per item and total items opened, controlling for comment opens

	Average time/item	Total items opened
(Intercept)	7.33***	65.84***
	(0.70)	(2.65)
Positive cues	1.29	−6.11
	(1.01)	(3.83)
Negative cues	2.20*	−11.86**
	(1.10)	(4.19)
Positive+comments	2.93**	−14.25***
	(1.08)	(4.10)
Negative+comments	1.96*	−12.85***
	(1.00)	(3.80)
Comments only	1.50	−9.93*
	(1.09)	(4.14)
Comments opened	0.41***	−0.61*
	(0.08)	(0.29)
R^2	0.17	0.10
Adj. R^2	0.15	0.08
Num. obs.	308	308
RMSE	5.18	19.68

***$p<0.001$, **$p<0.01$, *$p<0.05$

follow-up question of whether the presence of social cues influences these evaluations of political information and by extension, the candidates themselves. Since by design subjects in our control group and our comments-only group were unable to register their likes and dislikes to the items they encountered, we necessarily restrict the following analyses to subjects in the cues groups (n = 204). To investigate our subjects' propensity to like or dislike information, we once again employ a mixed-effects logit model with the subjects and the item topics treated as random effects. Since our subjects had to open an item in order to like or dislike it, we drop the count of the number of times the item was available from our model; however, we replace it with a variable counting the number of times the item was opened (this variable ranges from 0 to 6 and has a mean of .54) to account for the possibility that subjects are more likely to react to an item after reading it multiple times. We again include a dummy variable indicating whether the item itself was one of our manipulated headlines. Our dependent variables are whether a subject "liked" or "disliked" any given information item they read, coded 1 if they indicated one of the reactions and 0 otherwise. Hypothesis 3 holds that subjects in the positive cues conditions will be more likely to respond favorably to the items they read, while those in the negative cues conditions will more be likely to dislike the information.

We first present the model results for the probability of liking an item, shown in the first column of Table 4. Once we translate the logit coefficients into predicted probabilities, we find no evidence that positive cues made our subjects any more likely to "like" our cued items. Our model provides the same point estimate in the

negative and positive groups for the probability of liking one of our manipulated items —32.0% (95% CI 24.9, 40.3%) in the negative group and 32.4% (95% CI 24.8, 41.0%) in the positive. We therefore conclude that positive cues have no ability to condition evaluations among our subjects.

Shifting our focus now to the probability of disliking an item (the second column of Table 4), we do see evidence of the cues affecting evaluations. In the positive cues conditions, the predicted probability of disliking an item is 3.2% (95% CI 2.0, 4.7%), but this rate doubles in the negative environments to 6.6% (95% CI 4.5, 9.3%), a significant increase (95% CI of the difference 1.3, 5.7). Once again we find a disparity between positive and negative social signals; while positive cues did not make our subjects any more likely to express positive affect, negative ones created more negativity among our voters.

We now examine the related question of whether our subjects' voting preferences for the manipulated candidate were influenced by the cues. To do so, we specified a simple logit model with vote for the manipulated candidate as the dependent variable, coded 1 if the study participant ultimately voted for the manipulated politician and 0 otherwise[13] (Table 5). Our predictors are once again our treatment groups, consolidated into positive and negative environments, as well as a count of the number of manipulated items viewed by the subject. Since our previous analysis showed that people in the negative information condition were more likely to dislike these manipulated items, we would expect that overall evaluations (i.e., vote preferences) of subjects in the positive and negative conditions to diverge.

As the coefficients from Model 4 in Table 5 suggest, the effect of viewing the manipulated items on vote probability differs by the nature of the cues. In the positive environment, each cued item accessed increases the probability of voting for the candidate, but in the negative environment, each cued item viewed decreases the likelihood of a vote. Interestingly, this effect does not significantly influence vote preferences for the "average" subject in our study, who viewed 9.48 (SD 3.61) manipulated items. However, as more of the cued items are viewed, the disparity in preferences between the positive and negative groups increases (Fig. 3). For subjects who viewed more than 12 cued items—which encompasses the top quartile of participants in both the positive and negative groups—vote preferences were significantly different by treatment group. In the positive group, participants in the top quartile of cued-item views had a predicted vote probability for the manipulated candidate of 78.6% (95% CI 64.3, 89.1%). But among those in the top quartile of cued-item views in the negative treatment group, the predicted vote probability for the manipulated candidate dropped to 56.2% (95% CI 39.3, 72.3%). Although the large standard errors in the model give these estimates a fairly wide confidence interval, the difference in vote probabilities is significant (95% CI of the difference −42.7, −.4).

These findings suggest that relying on social cues when evaluating political information online can be a double-edged sword. On the one hand, the cues in our

[13] Although there were three candidates in the primary, our design focused the bulk of the cues on one politician. Our goal was to make one candidate appear to be either exceedingly popular or unpopular. The other two "non-manipulated" candidates received a smattering of cues simply to make the environment more realistic.

Table 4 Probability of liking and disliking items

	DV: like	DV: dislike
(Intercept)	−1.74***	−2.27***
	(0.19)	(0.19)
Times opened	0.33***	0.24***
	(0.06)	(0.06)
Manipulated item	0.59***	−0.68***
	(0.10)	(0.12)
Positive cue groups	−0.29	−0.01
	(0.19)	(0.17)
PosGroup * manipulated	0.31*	−0.77***
	(0.13)	(0.18)
AIC	9114.34	7022.46
BIC	9163.91	7072.03
Log likelihood	−4550.17	−3504.23
Num. obs.	8793	8793
Num. groups: SubID	204	204
Num. groups: Topic	33	33
Variance: SubID.(Intercept)	1.60	1.17
Variance: Topic.(Intercept)	0.45	0.51
Variance: Residual	1.00	1.00

***$p<0.001$, **$p<0.01$, *$p<0.05$

Table 5 Probability of voting for manipulated candidate by treatment group

	Model 4
(Intercept)	−1.59
	(0.84)
Manipulated item opens	0.18*
	(0.07)
Comment only group	0.77
	(0.48)
Negative cues groups	1.29
	(0.98)
Positive cues groups	−0.99
	(1.12)
Manipulated opens * NegGroup	−0.14
	(0.09)
Manipulated opens * PosGroup	0.10
	(0.10)
AIC	400.03
BIC	426.00
Log likelihood	−193.02
Deviance	386.03
Num. obs.	302

***$p<0.001$, **$p<0.01$, *$p<0.05$

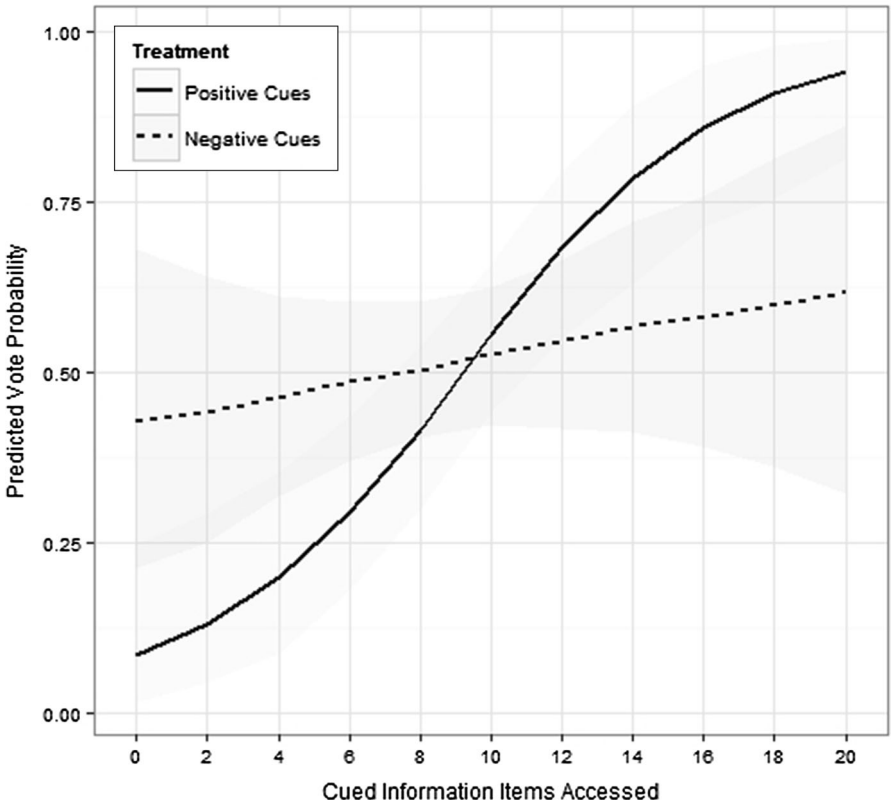

Fig. 3 Probability of voting for manipulated candidate by number of cues accessed and cue type

study reduced information costs for our participants, causing them to access fewer pieces of information when evaluating candidates. This suggests that social cues can help less "fully informed" voters make judgments about politicians that are similar to those made by more informed voters. At the same time, exposure to negative cues attached to online political information can condition evaluations and make voters less disposed to certain candidates than they would be in a more positive environment, although this effect is only manifest at higher levels of information acquisition. The effectiveness of social cues as a political heuristic is thus contingent on other factors, a finding echoed by other research on political information processing (Lau and Redlawsk 2001; Dancey and Sheagley 2013).

Conclusions

Our study finds three main ways that social cues can influence online political information search and evaluation. First, the presence of cues significantly decreases the amount of information subjects sought out during the study. This effect was

manifest across all of our cues condition, suggesting that the mere presence of social signals—rather than some particular ratio or quantity—is sufficient to reduce information acquisition.[14] Furthermore, we find evidence of the decrease in information acquisition among subjects who choose not to read any of the comments that accompanied certain pieces of information, indicating that our results are not merely a necessary consequence of our participants devoting time to additional reading. Based on our analysis, the decrease in information acquisition largely results from a reduced attention to non-cued items, suggesting that people seeking information online will be less likely to view news that does not have a certain amount of social activity surrounding it.

Second, our data support the hypothesis that voters can use cues to promote confirmatory information search. In a positive information environment, subjects were just as likely to open favorably portrayed items about their preferred politician as were subjects in a control condition with no such cues. But in a negative environment, subjects were less likely to seek out cued information about their favored politician. We interpret this pattern as consistent with the notion that people do not like to have their preferences or attitudes challenged with incongruent information. Rather than potentially expose themselves to news that might cast their choice in a poor light, subjects in our negative cues condition apparently preferred to simply avoid engaging the material.

Third, we find that negative social evaluations of political information can lead subjects to become more negative about the information they encounter. Simply knowing that others had an unfavorable view of a piece of information made it up to twice as likely that the subjects also had a negative reaction. However, positive cues did not influence evaluations in a similar manner. The impact of these socially-induced negative evaluations on preferences is clearly an area for further study; among our subjects, final vote choices diverged by treatment group only among participants who viewed a high number of the cued items.

Our work provides a starting point for understanding the social nature of online political information search but more research is yet required. One major issue raised by our experimental design is whether the behaviors observed here would apply to a general election. We would venture to guess that in a electoral contest between a Republican and Democrat, the information-dampening effects of social signals would hold and perhaps be even more pronounced; after all, for many voters, party identification provides a ready information shortcut, so the need for news is already reduced. Similarly, we think that in a general elections, voters would be less likely to defect to the other party and thus less interested in viewing any potentially negative news about their favored politician. As for the ability of the negative cues to change evaluations of candidates, we would hypothesize that this effect would be muted in a general election, again simply because defection to the other party is not

[14] To further investigate whether the distribution of cues mattered, we re-ran our analysis with dummy variables indicating whether the subject took the experiment early in the process (among the first third of subjects) or late (the last third). Since the later groups saw a different array of cues—because of the cues left by previous participants—we might see differences in information acquisition among these groups. However, the likelihood of opening an item declined for all subjects, regardless of when they took the study.

a common practice in American politics and there is little incentive for voters to downgrade evaluations of the in-party option. Finally, our work—like all experimental work—raises questions of external validity. Further research is needed to see if the behaviors we detail here translate outside the confines of a controlled study.

Taken together, our results are consistent with a portrait of voters who are at once efficient in their use of cues to decrease the need for information, motivated to avoid potentially negative information about their favored candidates, and apparently ambivalent enough about certain political topics as to be susceptible to impersonal influence when evaluating information. Perhaps we should not be too surprised by these conclusions; after all, while our advances in information technology come at an ever-quickening pace, our basic psychological needs for consistency, efficiency, and affirmation are little changed.

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