

## THE INFORMATIONAL BASIS FOR MASS POLARIZATION

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**Abstract** If nothing else, democratic politics requires compromise. Mass polarization, where citizens disagree strongly and those disagreements magnify over time, presents obvious threats to democratic well-being. The overwhelming presumption is that if polarization is occurring, a substantial portion of it is attributable to the fragmentation attendant an increasingly choice-laden media environment where individuals expose themselves only to opinion-reinforcing information. Under what conditions does mass opinion polarization occur? Through two over-time laboratory experiments involving information choice behavior, this paper considers, first, the effects of slant in one's information environment on over-time opinion dynamics and, second, the moderating role of attitude importance on those effects. The experiments reveal that, despite similar information search behavior, those with strong attitudes are dogmatic, resisting even substantial contrary evidence; those with weak attitudes, by contrast, hear opposing arguments and develop moderate opinions regardless of the prevalence of those arguments in their environment. Evaluations of information, rather than information search behavior per se, explain why individuals with strong attitudes polarize and those with weak attitudes do not. Polarization therefore seems to require more than media fragmentation and, in fact, a more important factor may be the strength of citizens' prior attitudes on particular issues.

If nothing else, democratic politics requires compromise. Mass polarization, where citizens disagree strongly and those disagreements magnify over time, therefore seems to present obvious threats to democratic well-being. Political

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science has demonstrated a modulating, though frequently uneasy, view of political polarization (see [Carmines and Ensley 2004](#); [Fiorina and Abrams 2008](#); [Hetherington 2001](#)). This ambivalence reflects the apparent divisiveness of polarized politics ([Sunstein 2009](#)) against the apparent benefits that polarization might have for citizen decision-making ([Levendusky 2009](#)). Regardless, the overwhelming presumption is that if polarization is occurring, a substantial portion of it is attributable to the fragmentation found in an increasingly choice-laden media environment where individuals can opt into opinion-reinforcing information ([Sunstein 2002](#); [Bennett and Iyengar 2008](#); [Stroud 2011](#)). Yet the literature says surprisingly little about *when* the micro foundations for mass polarization actually occur (but see [Taber and Lodge 2006](#); [Feldman 2011](#); [Levendusky 2013](#)). Indeed, much of the polarization literature focuses on trends in macro opinion (as opposed to individual-level opinion changes over time). While it is plausible that the political information environment contributes to polarization, the mechanisms by which this might occur are not well understood.

What political conditions and what individual predispositions push people to extremes? Through two over-time laboratory experiments involving information choice behavior, this paper considers, first, the effects of slant in one's information environment (like that thought to cause polarization) on over-time opinion dynamics and, second, the moderating role of attitude importance on those effects. I first describe my expectations, then report the design and results of each experiment, and conclude with a discussion of information choices and the effects of those choices on opinion dynamics. Experiment 1 shows how slanted environments may influence information exposure and opinion changes, but experiment 2 shows these effects to be substantially moderated by the strength of individuals' attitudes. While information choices facilitate polarization for those with the strongest opinions, slanted information environments alone are insufficient to polarize the electorate.

## Information and Polarization

Recent commentary on political communication has pointed to the political information environment—the set of information available to a given individual at a given point in time—as a central mechanism in the construction, perpetuation, and implications of polarizing politics (see especially [Sunstein 2002](#); [Bennett and Iyengar 2008](#); [Iyengar and Hahn 2009](#); [Levendusky 2009](#)). But does information choice alone produce polarization?

### INFORMATION CHOICE

Political debate is frequently competitive—posing arguments supportive of and opposed to particular policies against one another—and research has shown that captive exposure to competing messages is unlikely to polarize opinions ([Petty and Cacioppo 1986](#); [Chong and Druckman 2007b](#)). It is less clear how

information choice behaviors might enable individual-level opinion dynamics that aggregate to polarization. Despite considerable evidence for how people choose (political) information (Redlawsk 2004; Lau and Redlawsk 2006; Fischer, Jonas, et al. 2005; Fischer, Lea, et al. 2011; Valentino et al. 2008), little research has examined how people choose from within different information environments or how those choices affect opinions downstream. Choice is a critical part of the media influence, but it is better understood as a mechanism rather than outcome in and of itself. Yet there is limited extant research that considers information choice in this fashion. Arceneaux and Johnson (2013), for example, suggest that choice undermines the polarizing effects of partisan media. Whereas captive exposure to Fox and MSNBC leads people to hold quite different opinions toward issues, choice allows individuals to choose ideologically congruent information exposure or opt out of political information altogether. Levendusky (2013), however, finds that exposure to chosen messages magnifies the effects of partisan media observed under captive exposure. In other research, Redlawsk, Civettini, and Emmerson (2010) show that in the face of counter-attitudinal information about one's preferred political candidate, campaign search behavior and affect toward that candidate eventually "tip" toward the slant of the environment. Beyond these few experiments, however, we know little about the opinion-dynamic effects of information choice, and the mixed results from Arceneaux and Johnson (2013) and Levendusky (2013) suggest that the effects of choice on polarization are largely unresolved.

This discussion leads to an initial premise that, because the information environment shapes the choices that people *can* make, the information environment causes the choices that people *do* make (and to some extent directly affects their opinions). Just as in the real world, the information environment itself may influence opinions aside from any effects of the particular information that people choose to read. While people make choices from the environment they are presented with, they often have little choice over the environment itself (which is set by editorial decisions and political agendas; see McCombs and Shaw [1972]; Baumgartner and Jones [1993]; Boczkowski [2010]) and are often incidentally exposed to the information that they choose to avoid (Zukin and Snyder 1984; Tewksbury, Weaver, and Maddex 2001). Operating within an environment that disproportionately favors (pro) or disproportionately opposes (con) a particular viewpoint would therefore seem to have divergent effects on information choices.

Hypothesis 1: Pro-slanted environments will lead to greater numbers of pro articles being chosen, con-slanted environments will lead to greater numbers of con articles being chosen, and mixed environments will tend to lead people to choose an even number of pro and con arguments.

By constraining choices and by exposing individuals to a mix of pro and con headlines (and further information contained within chosen information), information environments also change people's opinions in the direction of the

environment's slant. We can therefore expect that individuals should react to their information environment by moving their opinions in the direction of the slant of the environment, as if they were exposed to information in a captive fashion (Chong and Druckman 2007a; Druckman, Fein, and Leeper 2012).

Hypothesis 2: Pro-slanted environments will lead to more favorable opinions on an issue, con-slanted environments will lead to less favorable opinions, and mixed environments will tend to lead to moderate opinions (comparable to those of the control group).

#### POLARIZATION FOR SOME

If information environments sway opinions, then there is little reason to believe that polarization would happen at all. Polarization requires that individuals move to opposite extremes, not reach the same conclusion. So when is this likely to occur? When individuals select information from their environment and evaluate that information in an attitude-reinforcing fashion (Kunda 1990; Taber and Lodge 2006), they are less likely to respond to the informational contents of their environment even if that environment is stacked against their predispositions (Redlawsk, Civettini, and Emmerson 2010; Sheagley 2012). Developing more extreme viewpoints—the foundation of polarization—would be much more likely. Indeed, Taber and Lodge (2006) suggest that exposure to any information increases attitude extremity, but they consider only a balanced information environment. Yet only individuals with strong, personally important attitudes are likely to engage in attitude-defensive reasoning.<sup>1</sup>

The effects of the information environment might therefore be highly conditional—depending on the way that individuals obtain and process information, the slant of one's information environment might be a central factor in the formation of one's opinions or it might be irrelevant. Personally important attitudes should increase the likelihood of attitude-congruent information seeking and attitude-defensive evaluations of political information.

Hypothesis 3: High attitude importance will lead those with pro *t1* (pre-treatment) opinions to choose more pro information and those with con *t1* opinions to choose more con information, regardless of environment.

1. This view is broadly consistent with considerable evidence that attitude importance is a distinct psychological construct from other attitude attributes, such as accessibility or certainty (Visser, Bizer, and Krosnick 2006), and that attitudes become important when one's interests are at stake (Boninger, Krosnick, and Berent 1995). But the initial evidence, in experiments by Leeper (2012) and Brannon, Tagler, and Eagly (2007), suggests that high attitude importance leads individuals to prefer attitude-congruent information over incongruent information. Other extant evidence documents increased searching for information when an issue is personally important (Holbrook et al. 2005; Lee et al. 1999; Hart et al. 2009; Kim 2008), but no published work documents how the contents of the environment constrain choice behavior.

In other words, selective exposure and evaluation may not be constrained by the contents of the information environment alone. An importance-driven motivation to seek out congruent information has the potential to yield selective exposure when the environment is evenly balanced or even when it is stacked against one's prior opinions. Those with high-importance pro (con) attitudes at *t*<sub>1</sub> will seek out pro (con) information regardless of the environment they are in at *t*<sub>2</sub>. For those with low importance, however, the environment should be much more influential in shaping the choices that people make and the opinions they hold thereafter. This leads to two very different expectations about how those with high- and low-importance attitudes, respectively, will respond to similar environments:

Hypothesis 4a: Those with high-importance pro (con) *t*<sub>1</sub> attitudes will hold similarly positive (negative) opinions regardless of the environment they are in.

Hypothesis 4b: Those with low-importance pro and con *t*<sub>1</sub> attitudes will tend to hold positive opinions in a pro environment, negative opinions in a con environment, and moderate opinions in a mixed environment (comparable to the control group).

Those most likely to engage with politics (those for whom politics or particular issues are personally important; see [Krosnick \[1990\]](#)) are most likely to polarize, while the remainder of the public might simply comply with the slant of the information environment. In testing these hypotheses, study 1 examines hypotheses 1 and 2. Study 2 serves to replicate those findings and then tests hypotheses 3 and 4, using a manipulation of personal importance in order to identify clear causal effects. While past work has examined information search behavior, it has typically done so with an eye toward understanding choice per se ([Lau and Redlawsk 2006](#); [Taber and Lodge 2006](#)) rather than the effects of search on opinion dynamics (but see [Druckman, Fein, and Leeper 2012](#)). The critical difference between this research and extant work (e.g., [Arceneaux and Johnson 2013](#); [Levendusky 2013](#)) is a focus on the effects of multiple distinct information environments and the manipulation (rather than measurement) of the key causal variable: attitude importance. The research presented here therefore sets up a robust, realistic test of whether information choice serves as a micro foundation for polarization.

### *Study 1*

In order to test hypotheses 1 and 2, study 1 looked only at the effects of slanted information environments relative to captive exposure to pro, con, or nonpolitical control information on information choices and the opinions that result from those choices on two different issues: health-care reform and U.S. military actions in Libya. The pro health-care articles focused on the benefits that health-care reform would bring to those without insurance and with poor access to medical care, while the con articles focused on the expansion of government bureaucracy. The pro Libya articles focused on protecting

civilians from violence on the part of the (then-reigning) Gaddhafi regime, while the con articles focused on the burden placed upon the military and costs of U.S. involvement in, then, a third overseas conflict. All of these frames were selected for use in the study as a result of pretests conducted with respondents not involved in the full study, the results of which are described in the online [appendix](#).

The study involved two manipulations. First, half of the participants were assigned to “search” conditions, where they were presented with a 4x4 matrix of news article headlines from which they could choose to read any number of articles for up to 15 minutes (the approximate amount of time it took captive participants to read eight articles; thus, participants were not expected to read every article). [Figure 1](#) shows an example search environment. Eight of these articles were nonpolitical filler, four addressed Libya, and four addressed health-care reform. Second, participants were assigned either to a pro condition where all the Libya and health-care reform articles were pro-framed, or to a con condition where all the Libya and health-care reform articles were con-framed. In other words, respondents were assigned to the same treatment condition for two simultaneous experiments: one about Libya and one about health-care reform. However, 50 percent of the available articles did not address either of the target issues.

Though the information environments used in both experiments are stylized—being relatively context-free—they simulate the common experience one might have on an online news site, where different news stories on different topics (political and nonpolitical) are available to read. Beyond the mundane similarity to such online news-viewing, the information environments also mimic the broader process by which individuals choose to focus on subsets of the stimuli in their political environment.

The remaining respondents were assigned to “captive” conditions, where they were assigned to read eight news articles. These respondents were assigned to read either 2 pro articles about Libya and 2 pro articles about health-care reform (along with four nonpolitical filler articles) or to instead read 2 con articles about Libya and 2 con articles about health-care reform

Please choose some articles to read. You may read any article, in any order. You do not need to read every article.

The Path to Playoffs in College Football?	Health Care Reform Aims to Reduce the Number of the Uninsured	Foreign Journalists, Finally Allowed in Libya, Report on Atrocities Against Civilians	Told to Eat Its Vegetables, America Orders Fries
Top Priority for Reform: Improving the Health of At-Risk Populations	Qaddafi's Siege on Populace Leads Thousands to Flee Country	Noise Pollution from SunChips Bags Prompts Change in Packaging	The Coffee-House Effect
Obsessions With Minutiae Thrive as Databases	Action Needed to Protect the Rising Numbers of Uninsured Americans	The Gimmick Makes the Beer	Working Class Families Have Most to Gain from Healthcare Reform
Libyan Civilians Struggle to Resist Unprovoked Attacks by Qaddafi's Forces	Qaddafi Brutalizes Foes, Armed or Defenseless	Community-Garden Rules Receive a Mixed Reaction	Why are 3-D Movies so Bad?

**Figure 1. Screenshot of Example Study 1 Search Environment.**

(along with the same nonpolitical filler). An additional control condition read only nonpolitical articles in a captive fashion.

A total of 176 Northwestern University undergraduates participated in the study in spring 2011 in order to fulfill a course requirement. Though questions are persistently raised about the appropriateness of student participants, there is little a priori reason to believe they should behave differently than others (Druckman and Kam 2011). Participants were not told anything about the purpose or content of the study prior to entering the laboratory. The study involved pretest measurement of opinions ( $t_1$ ) about one month before the 30-minute, in-person experimental session. These pretreatment opinions are needed to assess within-condition variations in information choice among those supportive of and opposed to each policy. At the lab session, individuals read articles (in either the search or captive fashion) and then completed a short post-treatment questionnaire that measured their opinions toward both issues.<sup>2</sup> All variables are coded 0–1, with higher values indicating greater support. Given the experimental design, all results focus on treatment-group means and statistical significance is calculated based upon nonparametric randomization/permutation tests.

## RESULTS

I first examine evidence testing hypothesis 2, that slanted environments move opinions in the direction of the slant, then relate this back to evidence of information choice behavior for testing hypothesis 1, which predicts that the contents of the information environment shape search behavior.

At  $t_1$  participants reported favorable opinions toward government involvement in health care and, on average, moderate opinions toward military involvement in Libya. The first column of [table 1](#) reports changes in mean health-care opinions (by treatment group) between  $t_1$  and  $t_2$ ; the second column does the same for the Libya issue.<sup>3</sup> Exposure to pro rather than con messages (in either search or captive fashion) appears to have affected opinions (with pro participants holding more positive opinions than con participants), consistent with hypothesis 2. More specifically, on the health-care issue, the difference between reading information from a slanted pro or slanted con information environment is a difference in opinions of 0.04 (on a 0–1 scale,

2. The opinion question about Libya asked, “To what extent do you oppose or support U.S. military action in Libya?” and allowed respondents to indicate their opinion on a seven-point scale from “strongly oppose” to “strongly support.” Following the lead of [Druckman, Fein, and Leeper \(2012\)](#), the health-care question asked respondents, “Some people feel there should be a universal government insurance plan that would cover medical and hospital expenses for all citizens. Others feel that medical and hospital expenses should be paid by individuals and through private insurance plans. Where would you place yourself on this scale...” and allowed them to favor, on a seven-point scale, the relative balance between private and public health-care insurance. Exact question wordings are available in the online [appendix](#).

3. Given that treatment conditions differed somewhat in their  $t_1$  opinions, changes rather than  $t_2$  opinions are a better metric of treatment effects.



**Table 1. Health Care and Libya Opinion Changes**

	<i>Health care</i>		<i>Libya</i>	
Search pro	0.00	(0.03)	0.05	(0.04)
Captive pro	-0.05	(0.02)	0.03	(0.03)
Search con	-0.04	(0.04)	-0.04	(0.03)
Captive con	-0.12	(0.04)	-0.03	(0.04)
Control	0.03	(0.03)	0.06	(0.03)

NOTE.—Cell entries are treatment-group means (of individual-level changes  $t2 - t1$ ) with standard errors in parentheses.

$p = 0.21$ ), as opposed to a difference of 0.07 ( $p = 0.04$ ) for being captively exposed to the same messages. Searching within a slanted environment thus appears to have a similar effect to being captively exposed to a biased subset of available information. The effects for Libya opinions are similar. The difference in opinions between those captively exposed to pro rather than con information was 0.06 ( $p = 0.02$ ), while the difference for those searching in slanted pro and slanted con environments was 0.09 ( $p = 0.11$ ). While these effects are fairly small (on average about .07 on a 0–1 scale), and differ in their statistical significance (but see [Gelman and Stern 2006](#)), the consistency across issues and between search and captive conditions suggests that the effects of information exposure are substantively meaningful despite only a relatively short exposure to the framed messages.

Thus, on both issues, captive exposure to messages and the search for messages within slanted information environments appear to produce comparable effects on opinions, consistent with predictions about opinions laid out in hypothesis 2. This suggests that while extant research has shown individuals to resist counter-attitudinal information in the updating of their opinions, the information environment can have effects on opinion extremity. The reason for this is clear in a simple examination of information choice behavior (which provides a test of hypothesis 1). [Table 2](#) clearly shows that when faced with an environment containing only pro information or only con information, individuals—regardless of  $t1$  opinion—choose to read approximately equal proportions of issue-relevant information, which is consistent with the environment effects predicted by hypothesis 1. If there is no attitude-congruent information to choose, individuals must ultimately face incongruent information.

In sum, I find support for hypothesis 2—the information environment shapes opinions by exposing individuals to potentially slanted information. I also find that individuals with different prior opinions seem to behave in similar ways within a given information environment. Substantively, however, this leaves little room for polarization. If everyone is swayed by the environment—in both their behavior and their opinions—choice per se would seem to matter very little, the environment alone being the driver of opinion dynamics. If information



**Table 2. Issue-Relevant Articles as Proportion of Total Articles Read, by SearchCondition and Prior Opinion (Study 1)**

	<i>Healthcare</i>				<i>Libya</i>			
	<i>t1 con</i>		<i>t1 pro</i>		<i>t1 con</i>		<i>t1 pro</i>	
Search pro	0.18	(0.03)	0.17	(0.03)	0.25	(0.04)	0.29	(0.05)
Search con	0.15	(0.04)	0.20	(0.03)	0.26	(0.05)	0.25	(0.04)

NOTE.—Cell entries are the mean proportion of issue-relevant articles selected out of all articles read, with standard errors in parentheses. The pro (con) environment contained only pro (con) information, so values in the first row indicate pro articles as a proportion of all articles read and values in the second row indicate con articles as a proportion of all articles read.

choice is supposedly the basis of polarization, there must be more complicated relationships linking the information environment, choice, and opinion change.

*Study 2*

Study 2 aimed to provide a replication of the results from study 1 and to further understand the heterogeneity of both information search behavior and opinion changes between those with high- and low-importance attitudes (that is, to test hypotheses 3 and 4). Recall that hypothesis 3 predicted that high attitude importance would lead individuals with pro *t1* opinions to choose more pro information and those with con *t1* opinions to choose more con information, regardless of how much attitude-congruent information was available in their environment. Hypothesis 4a expected that those with high attitude importance would therefore develop more extreme opinions regardless of environment, and hypothesis 4b expected that the opinions of those with low attitude importance would move in the direction of the environment. To provide a rigorous test of these hypotheses, I largely replicate the design of study 1 but gain leverage on the causal effects of attitude importance by providing a direct manipulation of importance. Similar to the first experiment, study 2 focused on an aspect of health-care reform, which I describe before turning to the details of the experimental design.

ISSUE SELECTION AND FRAMES

The experiment focused on opinions surrounding medical provider compensation—an aspect of health-care policy that, while important, has received dramatically less media coverage and public debate than other facets of the Patient Protection and Affordable Care Act (PPACA). The specifics of provider compensation are—like most areas of health-care policy—complex, but status quo policy is that most providers are paid fixed dollar amounts based upon an itemized list of procedures or services performed, regardless of how those procedures benefit or harm patient well-being. Some argue that this current “fee-for-service” system leads to over-utilization of health care because providers have little incentive to withhold unnecessary care and providers benefit from performing unnecessary

tests and procedures. As one possible alternative, compensation schemes built around physician performance in terms of patients' health outcomes have been proposed in order to increase accountability for services rendered and reduce overall health-care spending, somewhat analogously to proposals for performance-based pay for educators. Reforms could feasibly reduce health-care expenditures by more efficiently improving health without the excessive use of costly tests or procedures. Outcome-accountable care is a topic of ongoing policy debate spurred by portions of the PPACA, so understanding public preferences over alternative compensation schemes is therefore a relevant contemporary issue. And, unlike more general opinions about health-care policy, individuals' opinions toward this specific policy should not be heavily crystallized.

Articles used in the experiment were constructed from a mix of recent news coverage and academic writing on different compensation schemes and were framed, as in study 1. The pro framed articles focused on improvements to health-care quality under outcome-based compensation, and the con framed articles focused on possible reductions in health-care access under that scheme. These frames were chosen as a result of pretesting, described in the online [appendix](#).

## DESIGN

Similar to study 1, the experiment involved two stages because it is necessary to examine information search and attitude changes in the context of prior opinions. Basic participant characteristics and opinions were measured during the first stage ( $t_1$ ), and treatments were applied and outcomes measured during the second stage ( $t_2$ ) several weeks later. At  $t_2$ , two manipulations were introduced. The first provided an exogenous manipulation of attitude importance, which has been shown to be driven in part by self-interest ([Boninger, Krosnick, and Berent 1995](#)). The importance manipulation was embedded in instructions provided to participants at the beginning of  $t_2$ , which read: "In today's session, you will have the opportunity to choose to read a number of recent news articles." Half of the participants were then primed about the personal importance of health care,<sup>4</sup> whereas the other half were given instructions designed to make them believe the issue was unimportant.<sup>5</sup> While attitude importance is often seen as a relatively fixed characteristic of attitudes, these manipulations can be seen as attempting to increase (or decrease) importance directly as well as priming (or not) participants' existing levels of attitude importance. After

4. The exact text read: "Some of the articles focus on issues of clear direct personal relevance to you, such as rules regarding how physicians are paid (which affects your access to quality health care). Other articles focus on issues that are likely of little direct personal relevance to you, such as issues surrounding agricultural policy."

5. The exact text read: "Some of the articles focus on issues of direct personal relevance to you, such as agriculture policy (which affects prices consumers pay for food). Other articles focus on issues of little direct personal relevance to you, such as health regulations (which are not currently being debated and seem like they will not significantly affect you personally). Other articles address additional topics that have nothing to do with policymaking."

Reports From the Hive, Where the Swarm Concur	Doctors Can Work Together to Improve Patient Health, But Need Appropriate Incentives	SEC Vote Requires Business Filings to Add Environmental Risks to Bottom Line	Wellness, Rather Than Illness, Is Focus Under Outcome-Accountable Care
Pay for Performance Improves Quality of Health Care Through Collaborative Medicine	Patients Better Served When Providers Paid for Health Outcomes	Anatomy of a Tear-Jerker	Gender Differences in Education Need Innovative Solutions
Why are 3-D Movies so Bad?	Improving America's Health Requires Provider Incentives, Not 'Fee-for-Service'	Spammers Use the Human Touch to Avoid CAPTCHA	Heart Attack While Dining at Heart Attack Grill in Las Vegas
Physicians Group Says Quality Will Improve Under Outcome-based Payments	When Paid for Outcomes, Doctors Have Little Reason to Treat Highest Risk Patients	USDA Raises Corn Export Outlook	Out of the O.R., T.R. Knight Back Onto the Stage
Council Is Set to Consider Increases in Hotel and Property Taxes	A Bowl of Chili with Bragging Rights	Will a Standardized System for Verifying Web Identity Ever Catch On?	Paying Doctors Based on Outcomes Will Lead to Rationing

Figure 2. Screenshot of Example Study 2 Search Environment.

reading these instructions, participants were given 15 minutes to choose and read articles from a search environment.<sup>6</sup>

The second manipulation targeted the contents of the search environments.<sup>7</sup> In the pro (con) conditions, the environment contained six articles about provider compensation using pro (con) frames and two using con (pro) frames. In the mixed environment, there were four pro and four con articles. For the control group, these articles were substituted by eight nonpolitical articles. The search environment for all conditions additionally included four articles on other political issues (unrelated to health care and the frames) and eight nonpolitical articles, for a total of 20 articles (see figure 2). Note that an additional control group received no treatment.

After choosing and reading articles from the environment, participants reported their opinions and answered a few additional questions. In order to test the robustness of effects, two issue opinion questions were used: one that measured respondents' preferences for fee-for-service versus performance-based provider compensation on a seven-point scale<sup>8</sup> and a secondary measure (asked only

6. Participants had to remain in the environment for the full 15 minutes, but could choose to stop reading at any point.

7. The environment was designed to be larger than what the average participant could read in the allotted time, consist of a mix of political and nonpolitical articles, and not be composed disproportionately of articles addressing the target issue, with only 40 percent of articles addressing health care (see Druckman, Fein, and Leeper 2012).

8. The exact wording asked, "There is ongoing debate about how medical providers (i.e., physicians and hospitals) should be compensated for the care they provide. Some argue that these providers should be paid based entirely upon the services and procedures they perform. Others argue that pay should be based entirely or at least partially on the quality of patients' health outcomes. How do you think medical providers should be paid?" The available responses ranged from "Pay based entirely on services performed" to "Pay based entirely on health outcomes."

at  $t_2$ ) that captured preferences on an 11-point scale of exact percentages of compensation that should be generated by services-based fees versus patients' health outcomes.<sup>9</sup> These opinion questions structure the issue of provider compensation as degree of support for one possible move away from the status quo position of service-based compensation rather than trying to capture support for all possible policy alternatives. Given that both questions are intended to measure the same construct, hypotheses for both measures are the same.<sup>10</sup> All outcomes are scaled  $-1$  to  $1$  and, as in study 1, nonparametric tests are used for testing all hypotheses.

Data were mostly collected in the Northwestern Political Science Research Laboratory, involving a diverse sample of 300 participants. The sample included 109 students who completed the study for partial course credit; 96 nonstudents recruited from the campus area and online advertisements, who completed the study for a \$15 cash payment; and 95 participants recruited from Amazon Mechanical Turk, who completed the study remotely and were paid \$6 each. Recruitment of each sample was planned in order to increase statistical power and diversify the subject population lest students respond differently to the experiment than others (Druckman and Kam 2011).<sup>11</sup>

## RESULTS

Though study 2 largely serves to test hypotheses 3 and 4, it also allows for a replication of the results of study 1 with regard to the direct effects of information environment on search behavior (hypothesis 1) and opinion dynamics (hypothesis 2). Consistent with the results in study 1, the pro environment made individuals more supportive over time relative to the control group and the con environment made individuals less supportive relative to the control group. These results are consistent with the direct effect of the environment outlined in hypothesis 2. Averaging across all conditions, opinions became significantly more negative between  $t_1$  and  $t_2$  ( $\bar{x} = -0.31$ ,  $SE = 0.07$ ), but these changes were uneven across treatment groups.<sup>12</sup> Given the overall

9. The question asked, "In your view, what percentage of medical provider compensation should be based on services performed and what percentage should be based on their patients' health outcomes?" The responses were on a scale from "100 percent based on services performed and 0 percent based on health outcomes" and "0 percent based on services performed and 100 percent based on health outcomes," with each option summing to 100 percent. Exact question wording is available in the online [appendix](#).

10. A pretest of the dependent measures was conducted with 21 of the participants from the frame selection pretest, described in the online [appendix](#). On the original variable scales, these respondents reported a mean opinion of 4.71 ( $SD = 1.55$ ) on the ordinal measure and a mean of 62.86 percent ( $SD = 21.94$ ) on the percentage measure, both of which indicate a slight preference for service-based compensation. The two measures correlated at  $r = .86$ , suggesting they likely measure the same attitude construct. Treatment group means for each outcome measure are shown in the Appendix.

11. Supplemental regression results, included in the online [appendix](#), indicate that there were no significant differences in causal dynamics across samples.

12. Treatment-group sample sizes, as well as means for  $t_1$  opinion,  $t_2$  opinion, the change over time, and the secondary  $t_2$  opinion measure, are reported in the online [appendix](#).

negative change in opinions, results will be presented hereafter as difference-in-differences estimates. Specifically, the control-group change in opinion ( $t2 - t1$ ) is subtracted from every other treatment conditions' mean change in opinion ( $t2 - t1$ ).<sup>13</sup>

Breaking out results by  $t1$  opinion, interesting patterns of effects emerge that allow us to examine hypotheses 3 (that  $t1$  opinions shape information choices) and 4 (that  $t1$  opinions and attitude importance shape over-time opinion changes). With regard to opinion changes, significant differences across treatment conditions emerge when looking at both  $t1$  *opponents* (those with con  $t1$  opinions; Kruskal-Wallis  $\chi^2(6) = 10.62, p = 0.10$ ) and  $t1$  *supporters* (those with pro  $t1$  opinions;  $\chi^2(6) = 26.83, p = 0.00$ ).<sup>14</sup> The same pattern emerges for the salary measure, which was asked only at  $t2$  (opponents:  $\chi^2(6) = 16.93, p = 0.00$ ; supporters:  $\chi^2(6) = 29.30, p = 0.00$ ).<sup>15</sup>

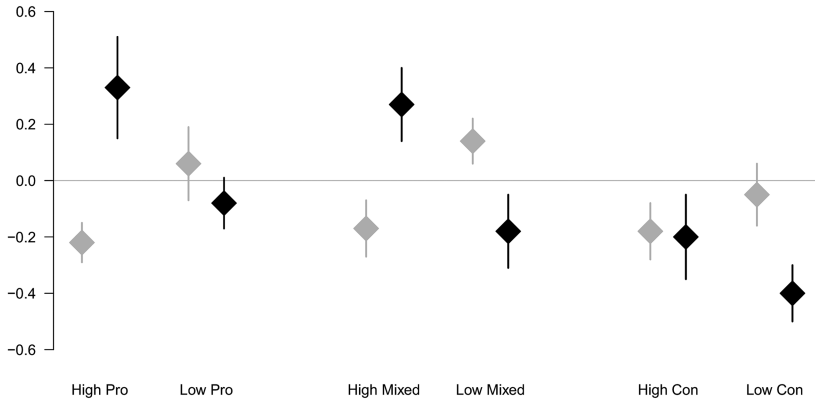
To clarify the pattern of effects, [figure 3](#) shows the changes in opinions over time in each treatment condition (relative to the control group, as discussed above), separated by opponents (gray bars) and supporters (black bars). Looking at the pro environment conditions (left set of four bars), opponents who were induced to have high-importance attitudes actually became more negative over time, while supporters became more favorable toward outcome-based compensation. The plot clearly shows that the effect of the environment on polarization is highly conditional—the environment alone seems to matter less than how different types of individuals behave within that environment. The high-importance respondents engaged in motivated evaluation of the available information, polarizing in their responses to the same pro information (consistent with hypothesis 4a). Under low importance, however, opinions among those with low importance moved in a fashion very similar to the no-information control group, which was unexpected (by hypothesis 4b).

A similar pattern emerges in the mixed conditions (middle set of bars). High-importance respondents again polarized in response to the even balance of pro and con information available to them, while low-importance respondents moderated (con respondents becoming more supportive and pro respondents becoming less supportive).

13. This has no effect on inference, but eases interpretation by having a change of zero within a treatment group signify no change relative to the control group (which received no issue-relevant information at any time during the experiment). When results are presented for individuals with con  $t1$  (pro  $t1$ ) opinions, the control-group average for only those participants with con  $t1$  (pro  $t1$ ) opinions is used in making this calculation. Regression results, available in the online [appendix](#), show that inference is substantively similar if either  $t2$  opinion or  $t2 - t1$  opinion change are regressed on treatment condition.

14. The Kruskal-Wallis  $\chi^2$  is a nonparametric analogue to ANOVA that does not require a normality assumption.

15. Looking just at  $t2$  opinions, significant differences across treatment conditions are also present (con:  $\chi^2(6) = 21.60, p = 0.00$ ; pro:  $\chi^2(6) = 39.07, p = 0.00$ ).



**Figure 3. Opinion Changes.** Figure displays difference-in-differences estimates (and associated standard errors) of treatment effects, separated by opponents (gray) or supporters (black), less the mean change in control-group opinion. Reading left to right, statistics displayed are:  $-0.23$  (0.07),  $0.44$  (0.16),  $0.07$  (0.13),  $-0.04$  (0.09);  $-0.17$  (0.10),  $0.38$  (0.08),  $0.14$  (0.08),  $-0.18$  (0.13);  $-0.14$  (0.10),  $-0.27$  (0.15),  $-0.05$  (0.11),  $-0.43$  (0.11).

The results for the con conditions (right set of bars) are somewhat different. High-importance respondents, regardless of *t1* opinion, became slightly less supportive (reflecting the information in their environment). Low-importance opponents moved very little (consistent with behavior in the other information environments), but low-importance supporters became significantly—indeed, dramatically—less supportive.<sup>16</sup> This change was not expected but may reflect the slightly right-skewed *t1* opinion distribution: there were very few individuals offering scores of 6 or 7 (i.e., very supportive of outcome-based compensation), suggesting that on this particular issue individuals held relatively moderate and possibly ambivalent opinions that, lacking importance, were easily swayed by con information. This also bolsters the evidence for opponents: regardless of environment, those with high-importance con *t1* opinions become consistently (indeed, indistinguishably) more opposed after reading quite different mixes of information in each of the three environments.

The size of these effects is also quite large. Searching for information when an issue is personally important has the potential to move opinion a substantial amount. By far the largest effect is among supporters in the high-importance pro environment, who on average moved 22 percent of the way up the opinion scale. This is particularly interesting because their comparable

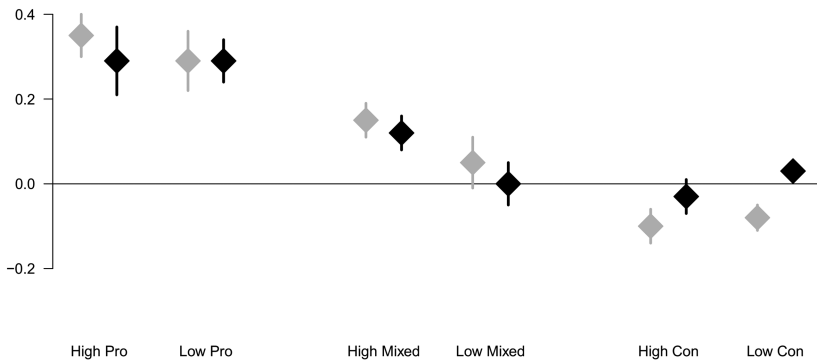
16. While this movement in the direction of the environment was expected by hypothesis 4b, it runs contrary to the pattern of opinion moderation in the other low-importance conditions.

peers, who were identical except for having been primed to have low attitude importance, appear to have not changed their attitudes at all in response to the same information environment. Furthermore, despite the subtle variations across the pro, mixed, and con environments, one striking feature of [figure 3](#) is the similarity of the effects of prior attitudes and strength across the three environments. If the environment alone explained opinion dynamics, we would expect the left, center, and right portions of the figure to look quite different. Instead, they look fairly similar, which provides visual evidence that attitude importance is critical for understanding how choice might lead to polarization.

These results invite two possible explanations: people either engage in attitude-congruent selective exposure and/or evaluate whatever information they encounter in an attitude-reinforcing fashion. As a reminder, hypothesis 3 expected that those with high-importance attitudes would choose disproportionately attitude-congruent information. Overall, individuals read 8.59 (SE = 0.20) articles during their 15 minutes in the search environment, or just about one article every two minutes. And, attitude importance—despite the expectation that it would increase information-seeking—appears to have had little effect on behavior (contrary to hypothesis 3). Indeed, it had no effect on the balance of pro and con articles read across the conditions. [Figure 4](#) shows this pattern of search behavior. Individuals in pro environments read more pro than con articles, those in mixed environments read more pro than con (though the balance between the two was closer), and those in con environments read about the same number of pro and con articles (with opponents reading more con articles).

The lack of differences in search behavior between those with different *t1* attitudes means that the patterns of opinion polarization (among high-importance individuals) and opinion moderation (among low-importance individuals) is due to biases in *evaluation*, not biases in *search behavior*. And, the behavioral results in study 2 perfectly replicate those of study 1. While the effects on opinions were dramatic despite few differences in participants' search behavior, effects on individuals' certainty about their opinions provide further evidence of motivated reasoning. In aggregate, the sample showed no significant over-time changes in attitude certainty during the course of the experiment ( $\bar{x} = -0.02$ , SE = 0.02). But changes in certainty over time differed dramatically among those with high- and low-importance attitudes. Those manipulated to have high importance became significantly more certain about their opinions ( $\bar{x} = 0.28$ , SE = 0.03) even as they reached opposite opinions from the same information, while those manipulated to have low importance became significantly less certain about their more moderate opinions ( $\bar{x} = -0.15$ , SE = 0.03) and this difference is clearly significant ( $p = 0.00$ ). Interestingly, when manipulated to have high importance, changes in certainty did not differ between opponents and supporters (see [figure 5](#)). By contrast, under low importance, opponents became much less certain of





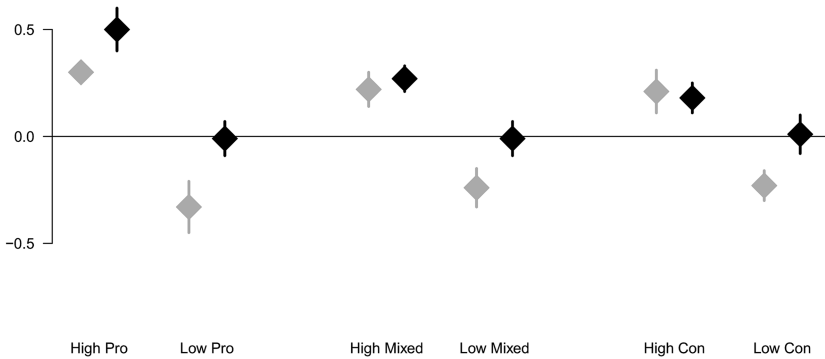
**Figure 4. Balance of Pro and Con Articles Read.** Figure displays the mean difference in proportions (and associated standard error) of pro and con articles read (pro% – con% of all articles read) for each treatment condition, separated by opponents (gray) and supporters (black). Statistics displayed are: 0.33 (0.05), 0.31 (0.09), 0.28 (0.06), 0.30 (0.07), 0.15 (0.04), 0.11 (0.04), 0.05 (0.06), 0.00 (0.05), -0.10 (0.04), -0.04 (0.02), -0.09 (0.03), 0.03 (0.02).

their opinions and supporters showed little change in certainty regardless of environment.

## Discussion

The late 20th and early 21st centuries have been marked by their abundance of choice. The opportunity for media choice is often seen as a positive shift away from the homogeneous offerings of mid-century political media (Mutz and Young 2011). Yet Botti and Iyengar (2006) write that “the presumption that people are never worse off, and usually better off, as a result of making their own choices may not necessarily be true” (35). The results presented here suggest that information choice, at least among those with personally important opinions, does not appear to make those individuals or democracy better off. Freedom to choose one’s political news seemed to many scholars of the 1980s a much needed component of democratic health, but the abundance of choice that has emerged in the “post-broadcast” present is now being seen as democratically problematic (Sunstein 2002). This paper has shown that the implications of choice are highly conditional.

Arriving at those results depended upon two underutilized features of experimental design: panel data and moves away from the “captive audience” assumption (Hovland 1959; Druckman, Fein, and Leeper 2012). Mass polarization is fundamentally a question of over-time dynamics of individuals’



**Figure 5. Changes in Attitude Certainty.** Figure displays difference-in-differences estimates of treatment effects (and associated standard errors): i.e., changes in attitude certainty from  $t_1$  to  $t_2$  within each treatment condition, separated by opponents (gray) and supporters (black), less the mean change in control-group certainty. Statistics displayed are: 0.31 (0.05), 0.48 (0.10), -0.33 (0.12), -0.04 (0.09); 0.22 (0.08), 0.25 (0.06), -0.24 (0.09), 0.00 (0.08); and 0.18 (0.11), 0.22 (0.07), -0.23 (0.07), 0.01 (0.09).

opinions, so panel data are the only way to understand its causes and effects.<sup>17</sup> A lack of studies involving actual information choice is even more problematic. Mass polarization and its downstream effects on democratic health are too important to be examined only with old tools. The research presented here corrects these deficits and moves beyond extant work through panel data, large information choice environments, and careful manipulation of a key causal variable—attitude importance—that has been ignored in past work. Study 1 showed that highly biased environments can shape opinions in aggregate, but raised questions about why opinions moved the way they did. Study 2 revealed that opinion dynamics depend to a large extent on evaluations of information in one’s environment, which seem to be largely determined by one’s prior attitudes rather than bias in the environment. Attitude importance biased evaluations of information, regardless of participants’ environments or their actual information search behavior.

Yet these results also suggest that caution should be used when extrapolating from evidence of selective exposure to information (e.g., [Stroud 2011](#); [Garrett, Carnahan, and Lynch 2013](#)) to polarizing effects of those choices. Demonstration only of selective exposure—if it is demonstration

17. Yet panels can also reveal limitations of findings—a third panel wave for study 1 reveals that the opinion-changing effects of information choice may be short-lived. A figure in the online [appendix](#) shows that opinions largely returned to baseline levels one week after the  $t_2$  session, consistent with extant evidence on the durability of framing effects ([Lecheler and de Vreese 2011](#)). Of course, these results do not reflect the process by which individuals repeatedly search for information.

at all (see [Sears and Freedman 1967](#))—does little to substantiate the existence or causes of opinion changes because the strength of the public's opinions appears to affect polarization far more than the information they choose or happen to receive. Intriguingly, while the contents of the distinct environments shaped what information participants in these experiments chose, those with different prior opinions chose remarkably similar information. Thus, how people *evaluate* information is most critical for understanding these dynamics; what information individuals actually choose seems rather less important. Attitude strength and its effects on information processing seem to lie at the core of mass polarization, while the contents of the information environment and the choices people make matter far less.

## Appendix. Study 2 Opinion Data

Condition (n)	t1		t2		t2 – t1		t2 (salary %)	
High pro (46)	3.65	(0.20)	3.52	(0.20)	–0.13	(0.20)	5.22	(0.20)
Low pro (37)	3.66	(0.19)	3.46	(0.19)	–0.20	(0.19)	4.43	(0.19)
High mixed (49)	3.53	(0.21)	3.59	(0.21)	0.06	(0.21)	4.22	(0.21)
Low mixed (36)	3.81	(0.20)	3.39	(0.20)	–0.42	(0.20)	4.28	(0.20)
High con (46)	3.72	(0.21)	3.07	(0.21)	–0.65	(0.21)	3.85	(0.21)
Low con (49)	3.57	(0.20)	2.98	(0.20)	–0.59	(0.20)	2.88	(0.20)
Control (37)	3.70	(0.25)	3.46	(0.25)	–0.24	(0.25)	3.73	(0.25)

NOTE.—Cell entries are treatment-group means, with standard errors in parentheses, on the original variable scales (7 points for the first three columns and 11 points for the last column).

## Supplementary Data

Supplementary data are freely available online at <http://poq.oxfordjournals.org/>.

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