



Roadmaps to Representation: An Experimental Study of How Voter Education Tools Affect Citizen Decision Making

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Abstract

Efforts to educate citizens about the candidates and issues at stake in elections are widespread. These include distributing voter guides describing candidates' policy views and interactive tools conveying similar information. Do these voter education tools help voters identify candidates who share their policy views? We address this question by conducting survey experiments that randomly assign a nonpartisan voter guide, political party endorsements, a spatial map showing voters their own and the candidates' ideological positions, or both a spatial map and party endorsements. We find that each type of information strengthens the relationship between voters' policy views and those of the candidates they choose. These effects are largest for uninformed voters. When spatial maps and party endorsements send conflicting signals, many voters choose candidates with more similar policy views, against their party's recommendation. These results contribute to debates about citizen competence and demonstrate the efficacy of practical efforts to inform electorates.

Keywords Voter guide · Party cues · Survey experiment · Ideology · Local elections · Citizen competence

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From the early days of the Republic, efforts to raise the quality of democratic elections and improve government performance have focused on increasing citizens' access to information. In 1822, James Madison opined that "popular government without popular information, or the means of acquiring it, is but a prologue to a farce or a tragedy; or perhaps both." Long before Converse (1964) and others were sounding the alarm about voter ignorance, civic organizations were pioneering ways to inform mass electorates. In 1920, for example, the League of Women Voters was founded to advocate for equal suffrage and increase citizens' ability to participate in government. In 1957, the League established its Voters Education Fund to promote research on policy issues and fund voter education projects.

Tools for voter education have taken many forms, including debates, workshops, newsletters, and nonpartisan voter guides. Some of these, such as ballot pamphlets, have been adopted by governments. Voter education efforts have also incorporated new technologies. In 1988, for example, Project Vote Smart introduced a toll-free Voter Research Hotline. Citizens could call and speak to a researcher who would look up answers to questions about candidates. In the 1990s, Project Vote Smart began publishing scorecards of politicians' issue positions on the Internet. In 2010, it rolled out its Vote Easy resource, allowing voters to answer a few questions about their policy views and then see a list of candidates who share those views.

While few question the legitimacy of such efforts to inform mass electorates, the success of these tools at increasing voters' information about candidates and issues has received little empirical scrutiny. Thus, it is unclear whether widely-used tools, such as voter guides and interactive resources like Vote Easy, can turn citizens into the informed participants envisioned by civic organizations. Moreover, previous research leaves open whether these tools work for all citizens, or primarily benefit those with already high levels of political knowledge or interest.

We address these questions by conducting original surveys of candidates and voters in a real-world election. These surveys enable us to create comparable measures of candidates' and voters' policy views. In our voter survey, we embed experiments that randomly assign: (1) a nonpartisan voter guide describing the candidates' policy views, (2) political party endorsements (i.e., party cues), (3) a spatial map that, like Vote Easy, allows voters to compare their own ideological position to those of the candidates in real time, or (4) political party endorsements and a spatial map. We also include a control group in which no information about the candidates is provided. We assess the effects that these voter education tools have on spatial voting—the propensity of voters to choose the candidate whose ideological position is closest to their own.

By randomly assigning voters to receive voter education tools in a real-world election setting, and including a control group in which no information is provided, we overcome several limitations of previous research. First, despite the voluminous literature on how information affects voters' decisions, scholars have paid little attention to voter guides and spatial maps—two voter education tools frequently used in real-world elections. Second, previous research rarely combines party cues with other types of information (for a discussion, see Bullock 2011; Boudreau and MacKenzie 2014) and reaches conflicting conclusions about whether information benefits the most or least informed. Third, we examine the effects of voter education

tools on citizens' ability to identify candidates who share their policy views, extending efforts to test spatial voting theory in real-world elections and identify factors that affect this outcome.

We find that these tools can increase voters' ability to identify candidates who share their policy views. Their effects are largest among voters with low levels of knowledge about politics. Indeed, each type of information helps close the gap between low- and high-knowledge voters' decisions. That we find this effect for voter guides suggests that low-knowledge voters can learn what they need to know when given "encyclopedic" information (Lupia 1994). Randomizing encyclopedic information in the form of a voter guide also provides a useful baseline for evaluating party cues and spatial maps, two information "shortcuts."¹ We find that party cues and spatial maps can substitute for encyclopedic voter guides. However, when party cues and spatial maps are packaged together, their effects depend on the alignment between voters' partisanship and policy views. For voters whose policy views and partisanship are aligned (i.e., ideological positions closer to a candidate endorsed by their party), packaging party cues and spatial maps together does not improve their already high levels of spatial voting. In contrast, many voters whose policy views and partisanship are at odds (i.e., ideological positions further from a candidate endorsed by their party) choose the candidate closest to them rather than follow their party's recommendation. Together, these results contribute to scholarly debates about citizen competence and offer reason to hope that practical efforts to develop voter education tools can improve representation and the decisions of uninformed voters.

Citizen Competence, Information Shortcuts, and Spatial Voting

Decades of public opinion research demonstrate that voters lack encyclopedic (Lupia 1994) information about politics (Campbell et al. 1960; Delli Carpini and Keeter 1996). That is, they are typically unaware of basic facts about politics and lack detailed information about candidates' policy positions. Such voter ignorance reflects the weak incentives most voters have for acquiring information that would enable them to detect differences among candidates and choose those who best represent their policy views (Downs 1957). The consequences of voter ignorance are clear: If voters' choices are unrelated to their policy views, there is little reason to expect voters' policy preferences to direct government activity.

Fortunately, the political environment provides information shortcuts that might substitute for encyclopedic information and help voters to make informed political decisions. These shortcuts include party cues (Bullock 2011; Nicholson 2011; Arceneaux 2008), endorsements (Lupia 1994; Boudreau 2009; Arceneaux and Kolodny 2009), and political experts in voters' social networks (Ahn et al. 2014). Scholars

¹ Like Lupia (1994), we distinguish extensive fact-based information (encyclopedic) about candidates' policy views from recommendations of knowledgeable information providers (shortcuts) that are easily acquired and allow voters to infer the consequences of their choices.

use experiments to study these types of political information and show that they can change voters' decisions, relative to voters who do not receive the information.

But while many studies show that political information influences voters' decisions, several unanswered questions remain. One is whether information "improves" voters' decisions. This issue remains unsettled because it is unclear how to define and measure improvement in voters' decisions. For some scholars, improvement occurs when uninformed voters' decisions better resemble those of informed voters (Lupia 1994; Bartels 1996). For others, improvement occurs when voters' decisions become more consistent with their core values and principles (Converse 1964; Zaller 1992; Petersen et al. 2010). Other scholars define improvement as being more likely to choose the "correct" candidate (e.g., the one with the most favorable evaluation, given the information that the voter considered; Lau and Redlawsk 2001). Still others consider voters to improve their decisions when they choose the objective, welfare-improving alternative. To achieve such objective measures of improvement, however, these studies examine voters' performance on ostensibly non-political tasks like predicting coin toss outcomes (Lupia and McCubbins 1998) or solving math problems (Boudreau 2009).

A second question that remains unsettled is whether political information is most effective at improving the decisions of informed or uninformed voters. On the one hand, some scholars argue that using political information requires a level of political sophistication that uninformed voters lack. As a result, they suggest that such information mostly benefits informed voters (Sniderman et al. 1991; Lau and Redlawsk 2001). In contrast, others show that political information enables uninformed voters to make choices that resemble those of more informed voters, alleviating concerns about the quality of these voters' decisions (Lupia 1994; Kuklinski et al. 2001; Boudreau 2009). However, none of these studies randomly assign political information in a real-world setting and examine its effects on voters' decisions.²

A third unanswered question is what effects voter guides and other voter education tools in particular have on voters' decisions. The inattention to voter guides is unfortunate because such tools have long sought to provide the encyclopedic information believed necessary for informed decision making. Since as far back as the Progressive Era, voter guides have been distributed by governments, newspapers, and civic organizations to inform voters about candidates and ballot measures, as well as how to register and vote in elections. Yet, we know little about how they affect voters' decisions and whether information shortcuts can substitute for the policy-related content they provide.³ Indeed, few studies randomly assign voter guides (for exceptions, see Boudreau et al. 2015b; Mummolo and Peterson 2017).⁴

² Kuklinski et al. (2001) and Boudreau (2009) experimentally manipulate information in surveys or in laboratory settings. Lupia (1994) examines whether voters who know an information shortcut make different choices than voters who do not in a real-world direct democracy election.

³ Other studies examine voter guides' effects on turnout (Bedolla and Michelson 2012), ballot initiative outcomes (Rogers and Middleton 2015), or candidate evaluations (Lodge et al. 1995).

⁴ Previously, we examined the effects of a randomly-assigned voter guide relative to a control group receiving no information. Here, we build on that design by comparing the effects of two information shortcuts—party endorsements and spatial maps (both separately and together)—with the voter guide.

We contribute to debates about whether and when information improves voters' decisions in several ways. First, we develop an objective measure of "improvement" that allows us to compare informed and uninformed voters' decisions in a real-world election. Specifically, we examine whether different types of information help these voters to choose candidates whose ideological positions are closest to their own, as spatial voting theory predicts (Black 1948; Downs 1957; Enelow and Hinich 1984). Such close alignment in the views of representatives and constituents has longstanding normative appeal (see Bafumi and Herron 2010). Empirically, it is an attractive definition because it offers a straightforward measurement strategy (i.e., compare the policy views of candidates and voters) that requires no prescriptive statements about what views voters or candidates ought to hold. We develop comparable measures of candidates' and voters' ideological positions by conducting original surveys that ask candidates and voters to report their policy positions on the same issues (see Jessee 2010; Bafumi and Herron 2010; Shor and Rogowski 2016; Boudreau et al. 2015a, b).

Second, we use experiments to examine how different types of political information affect spatial voting. Most studies of spatial voting do not examine how political information affects this outcome. The few studies that do so are observational and either compare the extent of spatial voting among voters with different levels of political information (Jessee 2010; Shor and Rogowski 2016) or examine whether voters who know an information shortcut make choices that are comparable to those of more knowledgeable voters (Lupia 1994; see Sniderman and Stiglitz 2012 for an exception). The disadvantage of such observational studies lies in their inability to randomly assign political information. Without random assignment, voters might differ in ways other than their possession of information (e.g., political interest, education) that could explain observed differences in their choices (see Arceneaux and Kolodny 2009).

Finally, we experimentally manipulate both encyclopedic information and information shortcuts and examine their effects on spatial voting among informed and uninformed voters. We randomly assign these voters to receive a voter guide listing each candidate's policy positions and examine whether such information helps them to choose candidates whose policy views resemble their own. We then assess the effects of two information shortcuts (party cues and an interactive spatial map) against this encyclopedic information baseline. This enables us to examine whether traditional voter guides work for uninformed voters and whether and when information shortcuts substitute for the detailed policy-related content such voter guides provide.

Footnote 4 (continued)

We assess the effects of information on: (1) informed versus uninformed voters and (2) voters whose policy views and partisanship are aligned versus at odds.

Theory and Hypotheses

Spatial voting theory posits that candidates take positions in an ideological space and that voters choose the candidate who is closest to their own ideological position (Black 1948; Downs 1957; Enelow and Hinich 1984). Thus, spatial voting theory predicts a close alignment between voters' policy views and those of the candidates they choose. Two assumptions underlying this result are that voters are policy-seeking (i.e., they prefer candidates with views similar to their own) and that they possess accurate information about the candidates' ideological positions. While most scholars consider the first assumption unproblematic, the second has been questioned on both theoretical and empirical grounds. Recognizing that many voters lack perfect information about candidates' ideological positions, scholars have extended the basic spatial model to incorporate different types of information that might help voters to select ideologically-similar candidates (McKelvey and Ordeshook 1986; Grofman and Norrander 1990).

One type of political information that might help voters identify candidates with similar ideological positions is a voter guide. Voter guides differ from other political information that scholars study in a couple of ways. First, they seldom advocate for particular candidates or issue positions. Instead, they provide information about candidates' policy views and backgrounds, typically in a format that allows voters to compare the candidates (e.g., a table listing each candidate's views on a set of policies). Second, rather than enable voters to get by with less information, voter guides provide a "concentrated dose" of policy-related content (Mummolo and Peterson 2017), thereby reducing the costs of acquiring encyclopedic information about candidates' policy views (Boudreau et al. 2015b). In principal, voter guides provide the information about candidates' policy views that spatial models assume voters possess, but empirical studies suggest they lack. Our first prediction reflects this expectation:

Hypothesis 1 Voter guides that contain encyclopedic information about candidates' policy views will strengthen the relationship between voters' ideological positions and those of the candidates they choose.

One appealing feature of voter guides from the standpoint of civic organizations is that the information they contain is unlikely to be overridden by non-ideological considerations. Voter guides typically do not recommend which candidate to support and any non-ideological information they provide (e.g., candidate statements) is unlikely to shift large segments of voters. Thus, we do not expect voter guides to induce non-ideological shifts toward particular candidates. Indeed, by enabling voters to base their choices on candidates' policy views, voter guides might reduce any such bias (e.g., stemming from differences in financial support).

Political party endorsements (i.e., party cues) are a second type of information that might help voters to choose candidates with similar ideological positions. Downs (1957) argues that party cues can substitute for knowledge about candidates' policy positions and help voters to choose candidates whose ideological positions

resemble their own. Subsequent research identifies conditions under which such enhanced spatial voting is likely to occur (Sniderman and Stiglitz 2012). These conditions include: 1) meaningful ideological differences between the candidates, 2) political parties with well-known ideological reputations, and 3) ideologically “correct” signals from the parties about which candidate to support (i.e., the Democratic [Republican] Party endorses the more liberal [conservative] candidate). When these conditions are met, we expect party cues to send strong signals about candidates’ ideological positions:

Hypothesis 2 Party cues will strengthen the relationship between voters’ ideological positions and those of the candidates they choose.

In contrast to nonpartisan voter guides, party cues send both ideological and non-ideological signals. Partisanship is an important form of social identity (Green et al. 2002). The tendency to evaluate in-group members positively and out-group members negatively can lead voters to support candidates endorsed by their political party, irrespective of their policy views (Campbell et al. 1960). Unlike voter guides, party cues provide an explicit recommendation about which candidate to support. We, therefore, expect party cues to increase voters’ support for candidates endorsed by their own party.

Interactive voter education tools offer a third, heretofore unexamined, type of information that may help voters to choose candidates with similar ideological positions. Whereas traditional voter guides present information in a table that allows voters to compare the candidates’ policy views side-by-side, some organizations use Internet-based technology to automate the task of identifying the candidate closest to the voter’s own ideological position. One example is Project Vote Smart’s Vote Easy voter education tool. Vote Easy allows voters to answer a few questions about their policy views and then see a list of candidates who share those views. Such tools are analogous to the spatial maps (i.e., plots of voters’ and candidates’ ideological locations) that scholars use to model political decision making. Unlike traditional voter guides, voters need not absorb much policy-related content when using spatial maps. They also do not need to identify differences between their own and each candidate’s policy views to determine which candidate’s position is closest. Rather, they need only answer a few questions about their own views and then consult a follow-up screen that shows them the candidates’ relative ideological proximity. In this way, spatial maps combine the benefits of encyclopedic voter guides with the ease of information shortcuts. Like traditional voter guides, we expect them to enhance spatial voting:

Hypothesis 3 Spatial maps (i.e., interactive voter education tools) will strengthen the relationship between voters’ ideological positions and those of the candidates they choose.

As with traditional voter guides, we do not expect spatial maps to induce non-ideological shifts toward certain candidates. Comparing spatial maps with traditional

voter guides allows us to determine whether the former's simplicity and interactivity helps voters use them effectively.

Previous research offers less guidance as to whether information most benefits informed or uninformed voters. Sniderman et al. (1991), for example, argue that information primarily benefits those with enough contextual knowledge to recognize its implications. In contrast, Lupia (1994) and Boudreau (2009) find that information benefits those least likely to have it (i.e., the uninformed) and can reduce differences in uninformed and informed voters' decisions. For a couple of reasons, we suspect that the effects of traditional voter guides will be largest among uninformed voters. First, uninformed voters have less knowledge about candidates' policy views. By clearly presenting such information, voter guides should help uninformed voters to identify candidates with more similar ideological positions. Second, uninformed voters have less access to other information about candidates and, as a result, are more likely to rely on the information contained in voter guides. These considerations lead to the following prediction:

Hypothesis 4 Uninformed voters will exhibit larger increases in spatial voting in response to voter guides, relative to informed voters.

With respect to party cues, both informed and uninformed voters are likely aware of the ideological differences between the political parties, given their well-known reputations for supporting different candidates and policies (Sniderman and Stiglitz 2012). However, the parties' endorsements of particular candidates are unlikely to be new information for informed voters. Informed voters might also have other knowledge about the candidates (e.g., their issue positions, political experiences) that they can draw upon. In contrast, uninformed voters likely lack knowledge about the parties' endorsements, as well as other information about the candidates that might influence their decisions. This yields the following prediction:

Hypothesis 5 Uninformed voters will exhibit larger increases in spatial voting and larger changes in support for their party's endorsed candidates in response to party cues, relative to informed voters.

Compared to traditional voter guides, spatial maps simplify the comparison that voters must make between their own and the candidates' policy views. Given that uninformed voters are more in need of and more likely to rely on information about the candidates' policy views, and that spatial maps provide a "shortcut" to such information, we predict the following:

Hypothesis 6 Uninformed voters will exhibit larger increases in spatial voting in response to spatial maps, relative to informed voters.

Whether spatial voting improves in response to party cues and spatial maps shortcuts relative to the effects of providing encyclopedic information in a traditional voter guide is an empirical question we examine. A potential benefit of traditional

voter guides is that they provide a common set of facts about the candidates' policy views. Rather than assume that some (high-knowledge) voters possess these facts while others (low-knowledge) do not, we randomly assign such policy-related content. Since assignment of the voter guide is unrelated to factors that might predict political knowledge and outcomes, the behavior of those receiving the voter guide provides a useful baseline for assessing party cues and spatial maps.

Finally, because voters in the real world may be exposed to multiple information shortcuts, we also examine how voters respond when they receive both party cues and spatial maps. The effects of combining these shortcuts should depend on the alignment between voters' own partisanship and policy views. For voters whose partisanship and policy views are aligned, the party cues and spatial maps will suggest the same candidate choice. That is, the candidate who is closest to these voters' ideological position is also the one that their party endorses. We expect the effects of combining these shortcuts to be equal to or greater than when they are presented separately.

For voters whose partisanship and policy views are at odds, the party cues and spatial maps suggest different choices. That is, their party endorses the candidate further from their ideological position. Previous research offers competing predictions about how voters will respond to such conflicting signals. Some studies suggest that voters follow party cues at the expense of policy information (Rahn 1993; Cohen 2003). Others show that they consider such information even when it conflicts with their party's position (Bullock 2011; Boudreau and MacKenzie 2014). Chong and Druckman (2007) find that conflicting signals cancel out, resulting in decisions that are no different than when no information is provided.

A Test of Political Information: Supervisorial Elections in San Francisco

We test these expectations by conducting survey experiments during the 2012 supervisorial elections in San Francisco. This setting is well suited to this purpose for several reasons. First, San Francisco resembles many American big cities demographically and in its overwhelmingly Democratic electorate (see the Online Appendix [OA]). One consequence of the latter is that its elections frequently feature candidates who are all Democrats. Despite this partisan homogeneity, the city's political elite is divided between so-called "progressives" (the local left) and "moderates" (the local right). Progressives advocate higher taxes on local businesses, limits on development, and cash grants to the homeless. Moderates typically favor tax breaks for businesses, new development, and limits on aggressive panhandling. These meaningful policy differences, in the absence of partisan differences, enable us to disentangle the effects of voters' ideology and partisanship on their responses to different types of information.

San Francisco offers another advantage that enhances our ability to measure candidates' policy views. Prior to Election Day, many local political clubs, interest groups, and newspapers distribute questionnaires to candidates for local offices as a prelude to making endorsements. It is considered bad form to not answer a group's

questionnaire, even if a candidate knows he or she has little chance of winning the group's endorsement. We persuaded a local newspaper to include 43 yes/no policy questions that we wrote on their candidate questionnaire. Nearly all candidates running for supervisor in 2012 answered these questions. San Francisco also has an active chapter of the League of Women Voters. We collaborated with the local League of Women Voters and a local newspaper, the *San Francisco Public Press*, to design and distribute a nonpartisan voter guide that summarizes, in table format, the positions of all candidates running for supervisor on the policy questions we wrote.

We focused our efforts on the District 1 election for the Board of Supervisors (the city's legislative body), one of six supervisorial races contested that year. District 1 covers the city's northwest area and is predominantly comprised of middle-class white and Asian-American residents. The District 1 race featured two serious candidates, both Democrats, with quite different local policy views. The incumbent, Eric Mar, was a progressive viewed by many to be out of step with his relatively moderate district. The challenger, David Lee, was a moderate who was backed by the city's business and real estate lobbies, and the police and firefighter unions.

Several aspects of the District 1 race confer additional advantages for our study. The two candidates staked out distinct ideological positions and secured party endorsements that might signal their local policy views. Mar, the left-leaning candidate, was endorsed by the Democratic Party; Lee was effectively endorsed by the Republican Party.⁵ In these respects, the District 1 race resembles most state and national races, and many local contests. In addition, both candidates were Chinese-American men, so there is little reason to expect voters' ethnic or gender-based preferences and prejudices to overwhelm policy considerations. Finally, the campaigns were well-funded, giving both candidates ample opportunity to communicate their policy positions to voters. David Lee reported expenditures of \$245,757. Third parties spent an additional \$673,960 supporting him or attacking Mar. Mar's campaign spent \$187,409, and third parties separately invested \$164,625 promoting him or attacking Lee.

Study Design

Like other scholars studying spatial voting in real-world settings (Jessee 2010; Bafumi and Herron 2010; Shor and Rogowski 2016), we need to estimate candidates' and voters' ideological positions on the same scale. Unlike these scholars, we must estimate ideal points for candidates with no previous legislative experience and little coverage of their local policy views. Thus, we developed an original survey of candidates featuring 43 yes/no questions we wrote based on divided roll calls by the San Francisco Board of Supervisors and other issues that were in the news. The survey of candidates was distributed via a candidate questionnaire sponsored by the *San Francisco Public Press*. Our analysis of roll call voting by the Board and

⁵ The Republican Party's webpage recommended "not Eric Mar" as a means of endorsing Lee without setting him up for a backlash from an overwhelmingly Democratic electorate.

Table 1 Policy questions with supervisorial candidates' and voters' answers

Policy proposal	Candidates		Voters Y-N-DK (%)
	Eric Mar	David Lee	
	Yes	Yes	
Yes	Yes	63-24-13	
Yes	No	6-85-9	
No	Yes	57-23-20	
No	No	56-29-15	
No	Yes	62-30-8	
Yes	Yes	78-16-6	
Yes	Yes	51-42-7	
No	Yes	42-38-20	
Yes	Yes	68-26-6	
Yes	No	44-44-12	
No	Yes	44-26-30	
No	No	12-74-14	
No	Yes	33-48-19	
Yes	No	45-45-10	

SAN FRANCISCO VOTES 2012

A NON PARTISAN GUIDE TO THE BOARD OF SUPERVISORS CANDIDATES
IN THE NOVEMBER 6, 2012, CONSOLIDATED GENERAL ELECTION

A collaboration of the San Francisco Public Press, League of Women Voters San Francisco and faculty at the University of California
Design by Justin Allen [www.justinallen.us] | For the unabridged text of the survey questions, visit www.sfpublishpress.org/election2012

DISTRICT 1

SURVEY OF CANDIDATE POSITIONS
ON LOCAL ISSUES

* BLANK SPACES INDICATE THE CANDIDATE DECLINED TO ANSWER

	DAVID LEE	ERIC MAR	SHERMAN R. D'SILVA
Permit 8 Washington Street project (high-rise condominium replacing private tennis club) to move forward	Yes	Yes	Yes
Support the Mid-Market payroll tax exemption granted to Twitter and other businesses	Yes	Yes	Yes
Change rent control to protect only low-income and middle-class tenants who cannot afford market-rate rents	No	No	No
Eliminate ranked-choice voting and return to the prior system of runoff elections	Yes	No	No
Enact city income tax, with higher rates for those earning more than \$500,000 per year	No	Yes	No
Support the proposed "condo lottery bypass" program (pay a fee to get past the limit on condo conversions)	Yes	No	Yes
End the Care Not Cash program and return to cash grants to homeless	No	Yes	No
Replace current school assignment system with one based on student proximity to neighborhood schools	Yes	No	Yes
Should all youth ride Muni for free, or only those from low-income families?	Low-income	All	Low-income
City should comply with criminal suspect immigration detainee requests by the federal government	Yes	No	Yes
The city prohibits sitting or lying on a sidewalk with certain exceptions. Do you support this policy?	Yes	No	Yes
Ban chain stores on Geary Boulevard between 14th and 28th Avenues	No	Yes	No
Prohibit individuals from loitering outside nightclubs	Yes	No	Yes
Police and firefighters should pay more than other employees to the pension fund to make up for larger benefits	No	Yes	Yes
Make AT&T undergo full environmental review before installing digital TV and Internet boxes	No	Yes	Don't know
Allow Board of Supervisors to amend or repeal certain ballot measures approved by voters, after a period of years	Yes	No	No
Allow non-citizen residents to vote for members of the Board of Education	No	Yes	Don't know
Support the proposal to raise the city's hotel tax by 2%	No	Yes	No
Impose fees on new residential construction to help pay for public transportation	No	Yes	No
Authorize planning commission staff to deny discretionary review requests	Yes	No	Yes
Support the Parkmerced Development Agreement as passed by the Board of Supervisors	Yes	No	Yes

Fig. 1 Voter guide treatment

responses to the candidate surveys indicate that a single dimension explains a large share of supervisors' and candidates' policy views (see the OA). In an online survey conducted 2 weeks before Election Day, we elicited voters' responses to a subset of the policy questions from the candidate questionnaire. Table 1 summarizes these questions and the candidates' and voters' answers.

To recruit voters, we mailed letters to 5000 District 1 residents selected at random from the city's list of registered voters.⁶ The letter invited recipients to take an online survey developed by researchers at the University of California, Davis in exchange for a \$5 Amazon gift card and chance to win a free iPad. We used Qualtrics to administer the survey. We received 609 completed surveys, 424 of which included the treatment/control groups relevant to this study.⁷ Our sample's demographic characteristics resemble District 1's voting and general populations in many respects (see the OA).

To test our hypotheses about the effects of political information, we randomly assigned respondents to either a control group or one of four treatment groups. All respondents were asked to express their preference for Lee or Mar, regardless of whom they intended to vote or actually voted for (our sample included vote-by-mail voters). This question took the following form: "How about Eric Mar or David Lee? Do you prefer Mar over Lee or Lee over Mar?"

⁶ 202 of these letters were "returned to sender" by the Post Office.

⁷ The other 185 surveys were for a separate study. The number of observations in our analyses is 344 after excluding those who fail to indicate a party or a preference between Lee and Mar.

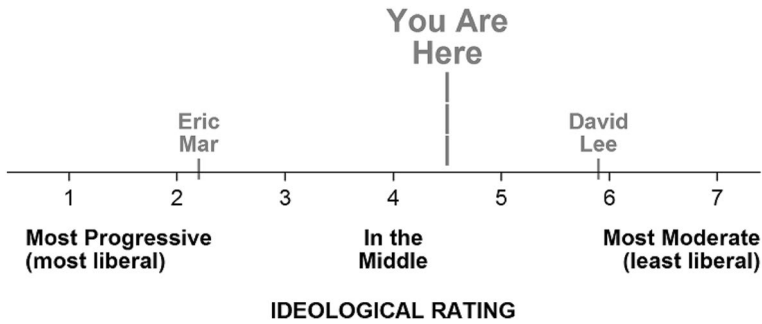


Fig. 2 Spatial map treatment

Respondents assigned to the control group answered this question without additional information about the candidates. Those assigned to the voter guide treatment group were given an opportunity to view the voter guide we developed with the League of Women Voters and the *San Francisco Public Press*. Figure 1 displays the screen respondents in this treatment group saw just before they were asked to express their preference between Mar and Lee. High levels of compliance and random assignment give us confidence that our study avoids selection issues with voter guide consumption raised by previous research (Mummolo and Peterson 2017).⁸ The advantage of our approach is that effectively all voters in this treatment group receive a concentrated dose of policy-related content. Further, by randomly assigning encyclopedic information about candidates' policy views, we establish an important baseline against which the effects of party cues and spatial map shortcuts can be compared.

Respondents assigned to the party cues treatment group were told which candidates the Democratic and Republican parties endorsed. Specifically, respondents were asked: "How about Eric Mar or David Lee? (Mar is endorsed by the Democratic Party; Lee is endorsed by the Republican Party.) Do you prefer Mar over Lee or Lee over Mar?" A survey of local experts we conducted indicates that the local Democratic and Republican parties have distinct ideological reputations (see the OA). Our estimates of the candidates' ideological positions place Mar well to the left of Lee. Thus, the parties' endorsements in District 1 correctly signal these differences in the candidates' policy views. In this way, the District 1 race satisfies the minimal conditions for observing enhanced spatial voting in response to party cues.

Respondents assigned to the spatial map treatment group were shown a visual representation of their own ideological position relative to those of Mar and Lee. To create these spatial maps, we selected eight of our policy questions and created 64 "voter profiles," one for every possible combination of yes/no answers to these questions (e.g., eight "yes," eight "no," "yes" to the first four and "no" to the last

⁸ 52% of respondents reported spending "1–5 minutes" viewing the guide, while another 36% spent longer. 95% found the voter guide to be "somewhat" or "very helpful."

four questions, etc.). We obtained an estimated ideal point for each profile by scaling the 64 profiles along with the survey responses of candidates running in 2012 and a large group of voters who answered these questions in 2011.⁹ We then drew 64 spatial maps that depict the estimated ideal points of Mar, Lee, and each profile. Respondents were shown the spatial map that corresponds to their answers to the eight policy questions (see the OA). Figure 2 provides an example of a spatial map that a respondent in this treatment group viewed just before expressing a preference between Mar and Lee.

Respondents assigned to the party + map treatment group receive both types of information. That is, respondents were told which candidates the Democratic and Republican parties endorsed, and were shown a spatial map depicting their own ideological position relative to those of the candidates. Depending on whether or not voters' policy views are aligned with their own party's endorsement, the party cues and spatial map can either provide reinforcing or conflicting signals about which candidate to choose. We take advantage of this natural variation in the signals that voters receive to assess whether the effects of party cues and/or a spatial map depend on the alignment of voters' policy views and partisanship.

Methods and Data Analysis

To test our hypotheses about the effects of political information, we estimate probit models of respondents' candidate preferences. The dependent variable, *Vote Lee*, takes the value 1 if a respondent prefers Lee over Mar, and zero otherwise. We first estimate a model with two dummy variables: one that combines respondents assigned to our four treatment groups (*Any Info*) and one that indicates assignment to the control group. This model assesses whether voter education tools, in general, can influence voters' preferences. To examine the effects of these tools individually, we then estimate a model with separate dummy variables for each treatment group and the control group.¹⁰ Because we include predictors for the control and treatment groups in both models, we omit a constant term. The independent variable, *Ideology*, is an estimate of the respondent's ideal point. Large positive (negative) values indicate the respondent's policy views are relatively right-leaning (left-leaning). To test our hypotheses, we interact *Ideology* with the dummy variables indicating group assignment.¹¹

To estimate ideal points for candidates and respondents, we use the item-response model developed by Clinton, Jackman, and Rivers (2004). Specifically, we combine the 15 policy questions respondents answered (see Table 1) with the other 28 questions from the *San Francisco Public Press* candidate survey and 22 other yes/no

⁹ Bridging the profiles with these candidate and voter responses enhances the precision of the estimated ideal points, making it more likely that they reflect respondents' true policy views.

¹⁰ See the OA for randomization checks and models that include control variables.

¹¹ We also omit *Ideology*, as the variable *Control * Ideology* is coded to take the value of the respondent's ideal point for respondents in the control group and zero otherwise.

questions gathered from publicly available candidate questionnaires distributed during the 2012 campaign.¹² In bridging candidate and voter responses to our 15 policy questions with candidate responses to these other questions, we improve the precision of our estimates and make it more likely that our ideal point estimates accurately reflect candidates' and voters' policy views (Shor and Rogowski 2016).

To test our predictions about the effects of political information on informed and uninformed voters, we estimate additional models that include interactions with respondents' levels of local political knowledge. We classify respondents as high- or low-knowledge based on their answers to four fact-based questions about San Francisco politics and government. Respondents who correctly answered two or more questions (the median) are defined as high-knowledge, while respondents who correctly answered fewer than this are low-knowledge.¹³ To simplify the presentation of our results, we convert the coefficients in our models to predicted probabilities and first differences. We test our hypotheses by comparing predicted probabilities of support and first differences for *Ideology* in each treatment group to the control group and, for respondents receiving party cues and/or spatial maps, to the voter guide treatment group.

Finally, we examine the effects of party cues and spatial maps for respondents whose policy views and partisanship are aligned versus at odds. In the party + map treatment group, some respondents discover that their party has endorsed the candidate whose policy views are most similar to their own (e.g., Democrats with ideal points closer to Eric Mar, the progressive), while others learn that their party has endorsed the candidate whose policy views are further away from their own (e.g., Democrats with ideal points closer to David Lee, the moderate). The former receive reinforcing signals about which candidate to choose, while the latter receive conflicting signals. For these analyses, our dependent variable, *Vote Spatial*, takes the value 1 if the respondent chooses the candidate whose ideological position is closer, and 0 otherwise. We use difference-of-means tests to analyze the extent of spatial voting with these different signals.

Results

Our results show that voter education tools can enhance spatial voting in real-world election settings. Both encyclopedic voter guides and party cue and spatial map shortcuts strengthen the relationship between respondents' and their preferred candidate's ideological positions. The effects of information are largest for respondents with low levels of knowledge about politics, thereby closing the gap in the decisions of low- and high-knowledge respondents. For respondents whose policy views are at

¹² We used the `pscl` package in R to analyze candidate and voter responses to 65 policy questions. We estimated a one-dimensional model with uninformative priors for all model parameters. The first dimension correctly classifies 75.1% of candidate and voter responses. Adding a second dimension did not improve the model (see the OA for details).

¹³ See the OA for models with an alternative measure of political knowledge.

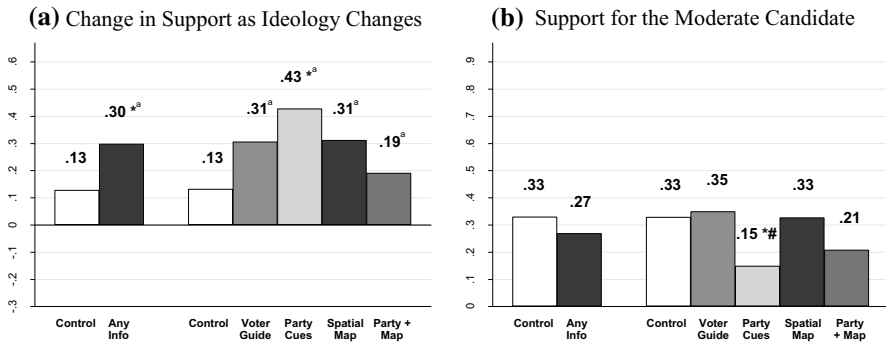


Fig. 3 The effect of information on support for the moderate candidate, David Lee. Numbers are predicted probabilities and first differences of support for David Lee from the model in Table A3. ^aEffect of Ideology within group is significant ($p < 0.05$, one-tailed). ^{*}Difference with control is significant ($p < 0.05$, one-tailed). [#]Difference with voter guide is significant ($p < 0.05$, one-tailed). $N = 344$; control $N = 63$; any info $N = 281$; voter guide $N = 72$; party cues $N = 61$; spatial map $N = 77$; party + map $N = 71$

odds with their partisanship, we find that partisanship can be a barrier to spatial voting. Nonetheless, when these respondents receive both party cues and spatial maps, they respond to the spatial map instead of their party's recommendation.

The Effects of Political Information

The large effects of voter education tools are apparent in Fig. 3, which plots predicted probabilities and first differences from our models of respondents' candidate preferences (see Table A3 in the OA). Figure 3a plots the effects of changing *Ideology* from the 25th to 75th percentile (from a "progressive" or left-leaning to a "moderate" or right-leaning respondent) within the control and treatment groups. The bars on the left side of Fig. 3a compare the change in support among control group respondents and those assigned to any of our treatment groups (Any Info). In the control group, changing *Ideology* from the 25th to 75th percentile increases the probability of preferring Lee, the moderate candidate, by 0.13. For those receiving any information, the same change in *Ideology* increases support for Lee by 0.30. This effect of *Ideology* is significantly greater than for control group respondents. Thus, more moderate voters are more likely to choose the moderate candidate when given a voter education tool.

The bars on the right side of Fig. 3a compare the effects of *Ideology* across the treatment and control groups. In the voter guide treatment group, for example, changing *Ideology* from the 25th to 75th percentile increases the probability of preferring Lee by 0.31. This effect of *Ideology* is larger than in the control group (0.13), although the difference is not significant. Consistent with our hypotheses, both party cues and spatial maps have large effects on spatial voting. In the party cues treatment group, the same change in *Ideology* increases support for Lee by 0.43. This is a significant increase, relative to the control group. Within the spatial map treatment group, the same change increases support for Lee by 0.31, a meaningful increase relative to the control group. That the levels of spatial voting in these two groups

Table 2 Proportion of respondents supporting the moderate candidate

	Control	Any info	Voter guide	Party cues	Spatial map	Party + map
Support	0.38	0.42	0.50	0.39	0.48	0.31
<i>N</i>	63	281	72	61	77	71

Numbers are mean levels of support for David Lee. Difference of means tests show no significant differences between treatment and control at the 0.05 level (one-tailed). Total $N=344$

are similar to what we observe among those receiving the voter guide suggests that these shortcuts can substitute for encyclopedic information. Interestingly, we find that combining party cues and spatial maps has minimal effects, relative to the control group. Below, we examine whether combining these shortcuts might pull different types of respondents in different directions.

Consistent with our hypotheses, the voter education tools we examined did not induce non-ideological shifts toward particular candidates. Figure 3b shows the baseline probability of preferring Lee—(i.e., among respondents with ideal points equidistant between Mar and Lee)—within the control and treatment groups. In the control group, the probability of supporting Lee is 0.33. Among those receiving any information, support is 0.27, which is not a significant difference.¹⁴ As the bars on the right side of Fig. 3b indicate, only party cues affect support.¹⁵ Support for Lee (0.15) is significantly lower in the party cue treatment group, reflecting the Democratic Party's endorsement of Eric Mar. The lack of large shifts in support in response to voter education tools is further illustrated by Table 2, which reports the raw proportion who support Lee in each group. We find no significant differences between treatment and control groups. The large increases in spatial voting and small differences in overall support underscore the importance of accounting for voters' heterogeneous reactions to voter education tools. Responses to voter guides, party cues, and spatial maps will depend on voters' ideology and, at times, partisanship. As different voters move in different directions, aggregate changes in support can be minimal even as the link between voters' policy views and candidate preferences is strengthened.

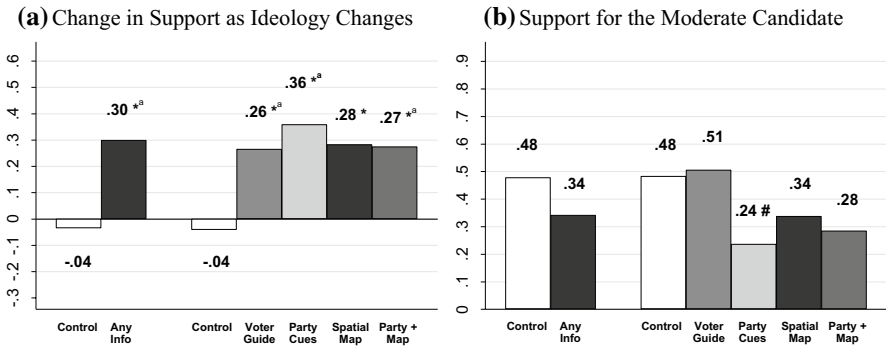
How Political Information Affects Low- and High-Knowledge Voters

Our analyses support our hypotheses about the different effects of political information on low- and high-knowledge respondents. As Fig. 4, which plots predicted probabilities and first differences from our models of low- and high-knowledge respondents' candidate preferences (see Table A5 in the OA) shows, voter education tools enhance spatial voting among low-knowledge respondents while having minimal

¹⁴ A naïve spatial model with no partisan bias would predict that among respondents with ideal points equidistant between Mar and Lee, support for Lee would be 0.50. We observe support levels significantly below 0.50, suggesting some bias in favor of Mar, the incumbent.

¹⁵ We observe this effect despite the fact that our model includes Republicans and Independents. In the OA, we show that this effect is magnified when we exclude these respondents.

Low Knowledge



High Knowledge

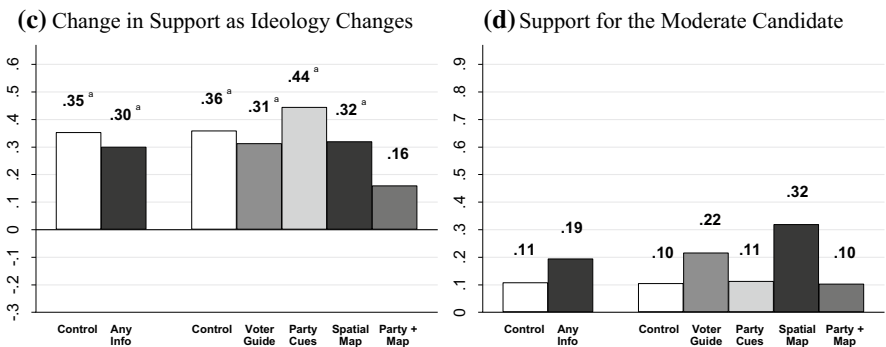


Fig. 4 The effect of information on support, by political knowledge. Numbers are predicted probabilities and first differences of support for David Lee generated from the model in Table A5. ^aEffect of Ideology within group is significant ($p < 0.05$, one-tailed). ^{*}Difference with control is significant ($p < 0.05$, one-tailed). [#]Difference with voter guide is significant ($p < 0.05$, one-tailed). $N = 344$. In **a** and **b** (**c** and **d**), control $N = 30$ (33), any info $N = 137$ (144), voter guide $N = 35$ (37), party cues $N = 29$ (32), spatial map $N = 35$ (42), and party + map $N = 38$ (33)

effects on high-knowledge respondents. Figure 4a plots the effects of changing *Ideology* from the 25th to 75th percentile for low-knowledge respondents. In the control group, this change has no effect on support for Lee. In contrast, the same change in *Ideology* increases the probability of supporting Lee by 0.30 among those receiving information. The difference in these first differences is significant.

As the bars on the right side of Fig. 4a indicate, the voter guide, party cues, and spatial map all enhance spatial voting among low-knowledge respondents. Within the voter guide treatment group, changing *Ideology* from the 25th to 75th percentile increases support for Lee by 0.26. Within the party cues and spatial map treatment groups, the same change increases support for Lee by 0.36 and 0.28, respectively. When these two shortcuts are packaged together in the party + map treatment group, we also find a large increase in support for Lee (0.27). For all four treatment groups, the increase relative to low-knowledge respondents in the control group is significant. The similar levels of spatial voting in response to the encyclopedic voter guide

on the one hand, and the party cues and spatial map shortcuts on the other, suggest two things. First, both shortcuts provide low-knowledge respondents with effective substitutes for the policy-related content offered in the voter guide. Second, despite being easier to use, neither shortcut appears to enhance spatial voting above and beyond the effects of the voter guide.

In contrast, our treatments had minimal effects on high-knowledge respondents. One reason is the stronger spatial voting we observe among these respondents in the control group. As Fig. 4c shows, unlike low-knowledge respondents, changing *Ideology* from the 25th to 75th percentile significantly increases support for Lee among high-knowledge respondents in the control group (0.35). The voter guide, party cues, and spatial maps do not strengthen this relationship. These minimal effects among high-knowledge and large increases among low-knowledge respondents mean that all three voter education tools help close the gap between these subgroups' preferences. Consistent with our hypotheses, voter education tools induce larger increases in spatial voting among low- than high-knowledge respondents.¹⁶

We also find that party cues induce non-ideological shifts toward Eric Mar, the candidate endorsed by the Democratic Party, among low-knowledge respondents, but not among high-knowledge respondents. Voter guides and spatial maps, in contrast, do not significantly shift support for particular candidates among either subgroup. Figure 4b shows the baseline probability of preferring Lee in the control and treatment groups for low-knowledge respondents. In the control group, the probability of supporting Lee is 0.48. Support for Lee is lower in the party cues (0.24) and party + map (0.28) treatment groups. In contrast, party cues do not influence support among high-knowledge respondents. Figure 4d plots the baseline probability of preferring Lee for these respondents. Support for Lee does not significantly change in the treatment groups, relative to the control group. The absence of effects could reflect pretreatment (the information was not new) or these respondents' already low levels of support for Lee.

Party Versus Policy Views

Although party cues and spatial maps both strengthen spatial voting, our results above indicate that their effects are weaker when they are combined, particularly among high-knowledge respondents. One possible explanation for this is that the party + map treatment works differently for respondents whose policy views and partisanship are aligned versus conflicting. To assess whether the alignment of voters' policy views and partisanship might affect their responses to voter education tools, we separated Democratic and Republican respondents with aligned versus conflicting policy views and partisanship. Figure 5a shows the proportion who vote spatially (i.e., choose the candidate whose ideological position is

¹⁶ Specifically, the effect of receiving a voter education tool on the effect of *Ideology* among low-knowledge respondents is 0.39 higher than among high-knowledge respondents ($p < 0.05$). The difference in the effects of the voter guide (0.35), spatial map (0.36), and party + map (0.51) is also significant ($p < 0.10$) and the difference in the effect of party cues (0.31) nearly so.

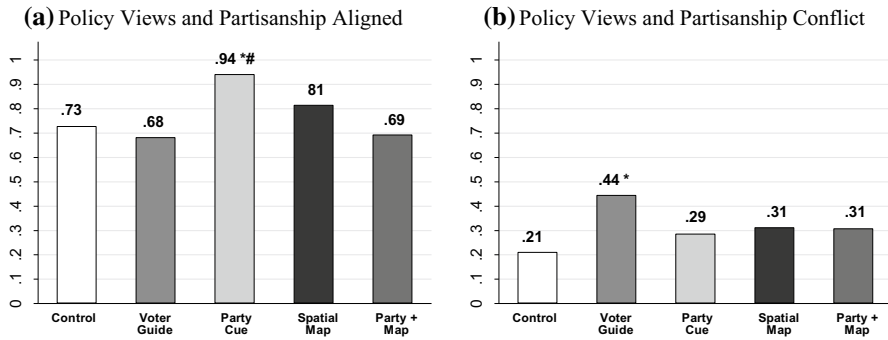


Fig. 5 Effect of information on spatial voting by alignment of party and policy views. Numbers are proportions of respondents supporting the more proximate candidate. *Difference with control is significant ($p < 0.05$, one-tailed). #Difference with voter guide is significant ($p < 0.05$, one-tailed). $N = 316$. In **a** (**b**), control $N = 22$ (38), voter guide $N = 22$ (45), party cues $N = 17$ (35), spatial map $N = 27$ (45), and party + map $N = 26$ (39)

closer) within each group among respondents whose policy views are aligned with their partisanship. These respondents exhibit high levels of spatial voting even in the control group (0.73). Both party cues (0.94) and spatial maps (0.81) enhance spatial voting, though only the effect of party cues is significant. In the party + map treatment group, these respondents receive reinforcing signals from their party and the spatial map. Nonetheless, spatial voting is neither higher nor lower (0.69) than in the control group. Given the already high level of spatial voting in the control group, it is not surprising that information has limited effects on these respondents.

We find different effects among respondents whose policy views conflict with their partisanship. Figure 5b shows the proportion of these respondents who vote spatially. Overall, these respondents are much less likely to choose the candidate whose ideological position is closer to their own. For these respondents, partisanship is a barrier to spatial voting. Nonetheless, we observe higher levels of spatial voting in the voter guide (0.44) and spatial map (0.31) treatment groups, though only the effect of the voter guide is significant relative to the control group (0.21). In the party + map treatment group, respondents receive conflicting signals from their party and the spatial map. Our results suggest that many respondents followed the spatial map instead of their party. Indeed, if these respondents had followed their party, then they should exhibit lower levels of spatial voting relative to the control because their party endorsed the candidate further from their own ideological position. However, we find that the level of spatial voting (0.31) is the same as in the spatial map treatment group and greater, though not significantly so, than in the control group. Respondents also appear to ignore their party's endorsement when it is presented by itself, as they also exhibit higher levels of spatial voting in the party cues treatment group.

Conclusion

Our results indicate that voter education tools can improve voters' ability to identify candidates who share their policy views. Absent information, we observe a large gap between low- and high-knowledge voters' candidate choices, with low-knowledge voters' choices mostly unrelated to ideology. This highlights the need for voter education tools to help voters bring their policy views to bear in these elections. We show that both encyclopedic voter guides and party cues and spatial map shortcuts close this gap.

That a nonpartisan voter guide enhances spatial voting is noteworthy. Designed to mirror traditional voter guides in the U.S. and Voter Advice Applications in Europe (Garzia et al. 2013), our voter guide armed voters with encyclopedic information. Our survey suggests many voters would welcome such information, and the enhanced spatial voting we observe indicates that even low-knowledge voters can use it effectively. We also find that two shortcuts—party cues and spatial maps—can substitute for encyclopedic information. The benefits of party cues are clear. Providing them is easier than compiling information about candidates' policy views. Voters also find party cues to be credible and easy to use. However, party cues send non-ideological signals as well. In contrast, spatial maps increase spatial voting without inducing non-ideological shifts toward particular candidates, an appealing feature for civic organizations seeking to improve citizen competence without dictating outcomes. Like Project Vote Smart's Vote Easy resource, the spatial maps let voters compare in real time their own and candidates' policy views. In randomly assigning spatial maps, we subject to empirical scrutiny what spatial models often assume—that voters can locate themselves and candidates in a low-dimensional policy space.

In addition to these practical lessons, our study has implications for two theories in political psychology: dual process models and the theory of motivated reasoning. Whereas dual process models predict that citizens will not spend the time and effort to process political information systematically (Eagly and Chaiken 1993), our results indicate that respondents do process and respond to the encyclopedic voter guide. Indeed, this more difficult to digest source of information is just as effective as the spatial map shortcut. It is possible that the combination of a credible source (e.g., League of Women Voters) and a real-world setting (an election with real consequences) motivated respondents to process and respond to the voter guide in our study.

Further, whereas the theory of motivated reasoning suggests that citizens will discount or ignore substantive information that conflicts with their party's position (Taber and Lodge 2006), our results suggest that some voters may follow the spatial map instead of their party when these two sources conflict. Together, these findings indicate that citizens can objectively process encyclopedic information and suggest potential limits to the motivated reasoning that often biases political decisions. The lack of biased responses might reflect the local, non-partisan election setting we study, where the choice of candidates is viewed as less relevant for national issues that implicate deep partisan and ideological commitments (Kahan 2013).

We believe our study—the first to experimentally manipulate encyclopedic voter guides and party cues and spatial map shortcuts, and assess their effects on spatial voting—provides an initial look rather than the last word on the efficacy of these tools. While similarities between San Francisco and other American big cities imply that our results might travel to other local settings (see the OA), their generalizability is an open question. We suspect that in settings like ours where candidates are less well-known and party labels are less informative (e.g., primaries, elections for state and local offices), voter education tools can similarly improve citizen competence. In settings where candidates' partisanship and policy views are better known (e.g., presidential, Senate, and mayoral elections), the impact of voter education tools might be limited.

In addition to examining voter education tools in these settings, future work can improve our understanding of how they influence decision making in at least three ways. First, contrary to Sniderman et al. (1991), we find that low-knowledge voters do benefit from encyclopedic information like our voter guide. We find similar effects for party cues and spatial map shortcuts. Given the large disparities in their level of spatial voting, it is reassuring that voter education tools help close the gap in low- and high-knowledge voters' behavior. The minimal impact on high-knowledge voters, nonetheless, warrants attention. It is possible that the information conveyed by our voter education tools was not new to these voters. Alternatively, these voters might be less willing to rely on information conveyed by voter education tools or resist their implications. In other words, even if we concede that high-knowledge voters have greater capacity to use information, their willingness to do so cannot be assumed. Finally, it is worth investigating whether low-knowledge voters can be induced to consume voter guides or spatial maps under more natural conditions. Otherwise, it is not clear that civic organizations' efforts to inform mass electorates will reach those voters likely to benefit the most.

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Compliance with Ethical Standards

Ethical Approval All procedures involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in this study.

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