Ballot Box Representation:
Spatial Voting and the Effects of Information in Direct Democracy Elections*

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Abstract

In states and localities with direct democracy, citizens can advance their policy interests without the aid of elected officials. Research documenting citizens' lack of political knowledge raises questions about their ability to do so. We conduct three studies during real-world direct democracy elections to determine whether citizens choose alternatives (the ballot proposal or status quo) that are closest to their ideological positions and whether political information helps them do so. Using original surveys, our first two studies estimate citizens' ideological positions and show that citizens regularly choose alternatives that are closest to these positions. Using a survey experiment, our third study indicates that political information (party cues, policy information, and spatial maps) further improves such spatial voting. These results demonstrate citizens' capacity to advance their policy interests in direct democracy elections and identify conditions under which political information strengthens the relationship between citizens' policy interests and choices about ballot propositions.

The extent to which citizens' preferences are represented in the activities of government is a central question in the study of democratic politics. The occurrence of regular elections offers citizens opportunities to staff local, state, and federal offices with representatives who share their policy interests. In states and localities with direct democracy, citizens can also advance their policy interests by supporting ballot propositions that reflect these interests and opposing those that do not. Today, the 70 percent of Americans who live in such jurisdictions are asked to decide important issues facing state and local governments, including revenue measures for funding government programs; controversial social policies like the death penalty, abortion, and same-sex marriage; institutional reforms that impact the rights and responsibilities of public officials and citizens; and public works projects costing billions of dollars.

The regular occurrence of such opportunities, however, does not guarantee that the outcomes of elections will reflect citizens' policy interests. As Downs (1957) emphasized, citizens have weak incentives to acquire information that would help them make informed political decisions. These incentives are particularly weak in direct democracy elections, where citizens might see little benefit to investing in information about ballot propositions when they can simply allow a tolerable status quo (one that public officials have declined to change) to continue. Moreover, ballot propositions frequently involve complex issues and the costs of becoming informed can be high. Previous research indicates that citizens are often confused about the substance of ballot propositions and know less about them than they do about candidates (Bowler and Donovan 1998; Cronin 1989; Magleby 1984; Cain and Miller 2001). These well-documented deficiencies in citizens' knowledge about ballot propositions raise questions about their ability to advance their policy interests in direct democracy elections.

We argue that citizens are able to choose ballot proposition alternatives that reflect their policy interests. Like other scholars (Romer and Rosenthal 1978; Lupia 1992), we describe citizens' choices in direct democracy elections with a simple spatial model in which the alternatives (the ballot proposal and status quo) are compared against citizens' ideal positions. Unlike these scholars, we theorize that citizens' preferences for these alternatives are generated from a low-dimensional policy space that summarizes their positions across many issues. That is, rather than identify an ideal policy for every issue-specific space a ballot proposition might fall under, citizens evaluate ballot propositions based on their own ideological position along a *single* low-dimensional policy space. Our theory implies that statewide ballot propositions will map into a low-dimensional space and that this space is the same one used to evaluate other policies considered by state government. In our theory, citizens compare ballot proposition alternatives and choose the one closest to their own ideological position in this space.

We examine whether citizens are capable of choosing ballot proposition alternatives that best reflect their policy interests, and whether political information helps them to do so, by conducting three studies during real-world direct democracy elections. In the first two studies, we test our theory by conducting observational analyses of citizens' decisions about California ballot propositions under active consideration in November 2016 and 2020. To this end, we administered original surveys shortly before these elections asking respondents to express their opinions about policies that divided the state's lawmakers, as well as propositions that would appear on the ballot. This enables us to create objective estimates of respondents' ideological positions (ideal points) on the same scale as the ballot propositions themselves. Thus, we are able to assess the extent to which respondents choose alternatives in real-world direct democracy elections that are closest to their own ideological position.

In the third study, we examine the effects of political information by administering another survey with an embedded experiment using a separate sample of respondents. These respondents answered a subset of the policy questions used in the first study, which enables us to independently estimate their ideological positions and those of five 2016 ballot propositions on the same scale. We then randomly assigned these respondents to receive different types of political information before expressing their opinions about the five propositions. Specifically, respondents receive either 1) the Democratic and Republican parties' official positions on the ballot propositions (party cues), 2) policy information about the likely consequences of passing each proposition, 3) spatial maps that provide "complete information" about respondents' own ideological position and those of the ballot propositions, or 4) no additional information. With this experimental design, we examine two widely disseminated types of information (party cues and policy information) and compare their effects not only to a control group, but also to a real-world analogue of the complete information conditions of spatial voting models (spatial maps). This allows us to assess whether and when political information improves respondents' ability to choose alternatives in direct democracy elections that best reflect their policy interests.

Our first two studies demonstrate that respondents' choices about ballot propositions can be accurately predicted from their positions on the same liberal-conservative dimension that divides state lawmakers. A one-dimensional spatial model correctly predicts 81.21 percent of respondents' choices on 10 ballot propositions. Our third study shows that party cues and policy information improve respondents' ability to advance their policy interests in direct democracy elections. Both types of information increase the percentage of respondents who choose the alternative closest to their own ideological position, relative to the control group. These effects are similar in size and significance to those of spatial maps. Our analyses also uncover variation

in the strength of individual propositions' connections to the ideological dimension. We consider four explanations for this variation and show that information is helpful when citizens are confused about the substance of ballot propositions. Together, these results shed light on citizens' capacity to advance their policy interests in direct democracy settings and offer experimental evidence of the efficacy of political information in improving their ability to do so.

Spatial Voting in Direct Democracy Elections

Citizens in representative democracies are charged with vital responsibilities, the most important of which is choosing public officials and, in direct democracy settings, public policies via elections. However, if citizens are unable to identify candidates who share their policy interests and/or make decisions about ballot propositions that faithfully reflect these interests, then it is unlikely that election outcomes will represent citizens' preferences. A growing body of research indicates that citizens can choose candidates whose ideological positions are closest to their own (i.e., engage in spatial voting) in presidential, congressional, and nonpartisan local elections (Bafumi and Herron 2010; Jessee 2012; Shor and Rogowski 2016; Boudreau, Elmendorf, and MacKenzie 2019).

It is less clear whether citizens are capable of advancing their policy interests in direct democracy elections. On the one hand, the well-documented finding that citizens know little about the substance of ballot propositions raises questions about their ability to do so (Bowler and Donovan 1998; Cronin 1989; Magleby 1984; Cain and Miller 2001). On the other hand, theoretical and empirical studies suggest that citizens may perform better than critics expect. As Lupia and McCubbins (1998) explain, citizens need not know many details about the choice at hand if they have access to knowledgeable and trustworthy information providers. Empirically, Lupia (1994) shows that uninformed citizens who knew an information shortcut (the insurance

industry's positions) made choices about five ballot propositions involving insurance regulations that resembled those of well-informed citizens. Multiple studies also find that citizens' preferences about ballot propositions are related to their partisanship, self-reported ideology, and other characteristics (Magleby 1984; Gerber and Lupia 1995; Bowler and Donovan 1998). More recently, scholars show that citizens are capable of making sense of conflicting issues on the ballot (Hugh-Jones 2010) and articulating reasons for their choices (Kriesi 2005). Further, Boudreau and MacKenzie (2014) find that citizens who were given information about the likely consequences of ballot propositions used this information objectively, even when exposed to conflicting endorsements from their party.

While scholars have paid ample attention to citizens' choices about ballot propositions, to our knowledge no previous study directly tests whether citizens choose alternatives that are closest to their ideological positions (i.e., engage in spatial voting) in direct democracy elections. Theoretical models of direct democracy elections predict that citizens compare ballot proposition alternatives (the ballot proposal and status quo) and choose the one closest to their ideal policy (Romer and Rosenthal 1978; Lupia 1992). However, these models assume policy spaces specific to particular ballot propositions (e.g., single-peaked preferences over public school spending; Romer and Rosenthal 1978). Further, empirical studies that examine whether citizens behave as these models predict are lacking, largely due to the difficulty of developing comparable measures of citizens' ideological positions and those of ballot propositions.

There are also no experimental studies that examine how different types of political information affect spatial voting in direct democracy elections. Observational research assesses the effects of political information by relying on citizens' observed levels of political knowledge or comparing the decisions of uninformed citizens who know an information shortcut to well-

informed citizens. These observational comparisons assume that "well-informed voters make the best possible decisions" (Lupia 1994, p. 72) and that uninformed and well-informed citizens have identical policy interests. If either of these assumptions is untrue, it is not clear that political information will improve citizens' capacity to advance their policy interests in direct democracy settings. Further, without the random assignment of political information, respondents in these studies might differ in ways other than possessing information (e.g., political interest, education) that could explain observed differences in their choices (Arceneaux and Kolodny 2009). Of course, many studies do randomly assign political information (Bullock 2011; Arceneaux 2008; Nicholson 2011), but they typically do not examine spatial voting as the outcome of interest (see Sniderman and Stiglitz 2012 and Boudreau, Elmendorf, and MacKenzie 2019 for exceptions in candidate elections).

We contribute to research on spatial voting, direct democracy elections, and the effects of political information in several ways. First, we develop objective, comparable measures of citizens' ideological positions and those of ballot propositions. Specifically, we conduct original surveys that ask respondents to express their opinions about the same policy issues that divide state lawmakers, as well as their views about ballot propositions under active consideration. We use this information to estimate ideal points for respondents and cut points for the ballot propositions, which allows us to determine which alternative (the ballot proposal or status quo) is closest to respondents' ideological positions.

Second, we extend research on political representation by applying spatial voting theory to direct democracy elections. Whereas existing theoretical models assume the existence of policy spaces specific to particular ballot propositions (Romer and Rosenthal 1978; Lupia 1992), we argue that most issues at stake in direct democracy elections map into a low-dimensional

space. Our theory offers reason to expect that citizens' decisions about ballot propositions can be accurately predicted from their positions on the same liberal-conservative dimension that divides state lawmakers. We provide empirical tests of this and other implications of our theory using survey data we collected during real-world direct democracy elections.

Third, we use experiments to examine how political information affects spatial voting on ballot propositions. We examine the effects of two types of information (party cues and policy information) that are widely disseminated in direct democracy elections. We compare the effects of party cues and policy information to a control group and to a "complete information" baseline (spatial maps). Using our objective measures of respondents' ideological positions and those of the ballot propositions, we assess whether these types of information enhance spatial voting.

Theory and Hypotheses

Over the past 30 years, methodological innovations that enable scholars to measure the ideology of candidates, citizens, and others have transformed the study of political representation. These methods draw heavily on Converse (1964), who defined a belief system as "a configuration of ideas and attitudes in which the elements are bound together by some form of constraint or functional interdependence" (p. 206). Ideology captures this notion of constraint and implies that an individual's positions across many issues can be predicted from his or her position on a small number of dimensions – the basic space. Enelow and Hinich (1984) further elaborated the notion of constraint by explaining how individuals' positions in this low-dimensional basic space map onto the high-dimensional "action" space encompassing all contemporary political issues and government policies (see Poole 2005, 1-18). As Downs (1957) explains, individuals use ideologies to focus on the differences between alternatives, using this "short cut … to save himself the cost of being informed on a wider range of issues" (p. 98).

But while Converse (1964) provides a well-articulated theory of constraint, his study and much subsequent research questions whether most citizens hold stable ideological positions (Zaller and Feldman 1992; Fiorina, Abrams, and Pope 2004; Hill and Tausanovitch 2015; Kinder and Kalmoe 2017). Nonetheless, an equally large body of research argues that citizens do hold meaningful ideological positions. Citizens' ideological positions are predictive of their partisanship (Sniderman and Stiglitz 2012), evaluations of candidates (Carmines and Stimson 1980) and vote choices in a variety of electoral contexts (Jessee 2012; Shor and Rogowski 2016; Boudreau, Elmendorf and MacKenzie 2019). When appropriately measured, citizens' issue positions are strongly related to their choices even after accounting for partisanship (Ansolabehere et al. 2008; Jessee 2012). Indeed, recent studies suggest that increasing polarization among elites can strengthen ideological constraint among citizens by communicating what issue positions partisans should hold (Barber and Pope 2019). Whether derived from their core values, economic circumstances, partisan or other group attachments, there is ample evidence that citizens have a sense of what goes with what – a necessary condition of most spatial voting models.

Direct democracy elections are a natural environment for applying spatial voting models. The universe of ballot propositions is high-dimensional, encompassing many different government policies. It makes sense that citizens would rely on the same low-dimensional evaluative or ideological dimension(s) to inform their opinions on ballot propositions. While ballot propositions differ from the simple ideas and attitudes that characterize individuals' belief systems (in that they involve contests between concrete, often multi-faceted proposals for change and the status quo), the mapping from the ideological dimension(s) to alternatives in direct democracy elections is more straightforward than in candidate elections. This is because

candidates are evaluated on many criteria (e.g., past performance, likability, race/ethnicity) that are unrelated to their policy positions.

Nonetheless, spatial models of direct democracy elections frequently assume issue-specific spaces where citizens have ideal policy positions. Romer and Rosenthal (1978), for example, cite packages of local public school spending and expenditure proposals for new bridges as dimensions over which citizens have single-peaked preferences. Lupia (1992, p. 392) similarly imagines a "finite continuum of possible policy alternatives" over which citizens have symmetric and single-peaked utility functions. A world where citizens have well-defined preferences over each issue-specific space, while theoretically useful, is unrealistic. In the 2018 general election in California, citizens were asked to decide 11 ballot propositions; in the November 2016 election in San Francisco, citizens decided 25 local measures. Given the mounting evidence that the ideologies of legislators, candidates, and citizens are low-dimensional, the policy space that theoretical models of direct democracy elections ought to be concerned with is the evaluative, or ideological one.

We theorize that rather than evaluate ballot propositions based on issue-specific policy preferences, citizens' opinions are generated from their positions in a *single* low-dimensional basic space.[1] This distinction preserves the assumption that citizens are policy-seeking in direct democracy elections (they prefer alternatives closer to their own ideal policy), but focuses attention on ideology as the key to advancing their policy interests in the various issue-specific spaces occupied by ballot propositions. In this simple spatial voting model, citizens compare

[1] Our theory does not preclude voters from having the detailed preferences described in formal models on some issues, though we believe few have such preferences across all issues.

ballot proposition alternatives (the ballot proposal and status quo) and choose the one closest to their own ideological position. Replacing issue-specific policy spaces with an evaluative space of one or two dimensions is more than a distinction without a difference. It implies, for example, that statewide ballot propositions will map into a low-dimensional space and that this space is the same as the one used to evaluate other policies and activities carried out by state government. It means that measures of citizens' positions in the evaluative space should enable scholars to accurately predict citizens' preferences about ballot propositions:

> **Hypothesis 1:** If citizens generate their opinions about ballot propositions from their positions in a low-dimensional basic space, then we will observe a strong relationship between citizens' ideological positions and their decisions about ballot propositions.

We test this hypothesis by examining citizens' preferences for individual ballot propositions and, more directly, by assessing how well citizens' ideological positions predict their decisions across multiple ballot propositions.[2] To the extent that we observe this predicted relationship, it indicates that citizens engage in spatial voting in direct democracy elections.

A potential barrier to spatial voting in direct democracy elections is the weak incentives citizens have to acquire information about ballot propositions. Citizens, for example, may possess incomplete information about the relative proximity of ballot proposition alternatives to

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[2] Examining the accuracy of the spatial model across multiple issues offers a closer analogy to spatial voting in candidate elections. In these settings, candidates' ideal points summarize their views on many issues. Citizens who favor a candidate can, nonetheless, disagree with her on some issues. Similarly, we expect citizens' positions on some ballot propositions to be at odds with the model even as their ideal points correctly predict their positions on most propositions.

their own ideological positions. If this is the case, they will be uncertain about how their own policy interests relate to their choices in direct democracy elections. Previous research identifies different types of political information that might help citizens advance their policy interests in direct democracy elections. Here, we focus on two widely available sources of information, party cues and policy information, that might substitute for more detailed information and a third, spatial maps, that provides the information needed for perfect spatial voting (i.e., able to place the ballot proposal and status quo relative to their own ideological position).

Party cues are among the most widely available types of information in direct democracy elections. The Democratic and Republican parties regularly contribute to the campaigns for or against particular ballot propositions and advertise their positions. Because the parties 1) are perceived as knowledgeable about political matters and 2) have well-known ideological reputations, their endorsements can help citizens determine where their own interests lie (Lupia and McCubbins 1998; Sniderman and Stiglitz 2012). Not surprisingly, the two parties take opposing positions on most ballot propositions. Thus, their endorsements provide signals about the relative ideological positions of the ballot proposal and status quo alternatives (e.g., the Democratic Party's endorsement of a proposed cigarette tax implies that the ballot proposition seeks to move policy to the left of the status quo). More generally, a party's support for (opposition to) a ballot proposition communicates to citizens that the proposed policy change (status quo) is among the set of policies preferred by party members and consistent with its ideological reputation. Our second prediction reflects this logic about the effects of party cues:

> **Hypothesis 2:** Citizens who receive party cues are more likely to choose ballot proposition alternatives that are closest to their own ideological position than citizens who do not receive this information.

Another type of information that is frequently disseminated in direct democracy elections is policy information. Policy information, which we conceive of as clarifying the substantive content and likely consequences of a ballot proposition, is often circulated by nonpartisan experts seeking to educate policymakers and citizens. In states like California, government agencies analyze proposed ballot propositions and report their findings to the public. We contend that such information can help citizens determine the direction of the proposed change in policy relative to the status quo and, as such, improve their ability to relate ballot proposal and status quo alternatives to their own position along the ideological dimension. When such policy information comes from a nonpartisan expert source, citizens are likely to trust its characterization of a proposition's substantive content and likely consequences.

> **Hypothesis 3:** Citizens who receive policy information from a credible source are more likely to choose ballot proposition alternatives that are closest to their own ideological position than citizens who do not receive this information.

Spatial maps, which are based on legislators', candidates', and/or citizens' responses to a set of roll calls or policy questions, offer a visual summary of these actors' positions along the ideological dimension(s). They are increasingly disseminated by civic organizations to educate voters about the candidates whose policy views are closest to their own (Garzia, Trechsel, and De Angelis 2017; Boudreau, Elmendorf, and MacKenzie 2018). In direct democracy elections, spatial maps can similarly convey which alternative (the ballot proposal or status quo) is closest to citizens' own ideological position. To the extent that citizens can interpret such spatial maps, they can strengthen spatial voting in direct democracy elections. Such citizens have "complete information" about the positions of ballot proposition alternatives, relative to their own ideological position:

Hypothesis 4: Citizens who receive spatial maps depicting their own ideological position and that of individual ballot propositions are more likely to choose ballot proposition alternatives that are closest to their own ideological position than citizens who do not receive this information.

Our focus on ideology as the linchpin for policy-seeking behavior in direct democracy elections raises questions about how well particular ballot propositions will map into the low-dimensional space that informs citizens' choices and whether this mapping will condition the effects of information. While we predict that most ballot propositions will map into the same space used to evaluate other policies considered by state government, the strength of this relationship will vary across issues. That is, while some ballot propositions address policy issues that are likely to be strongly related to the liberal-conservative evaluative dimension (e.g., the environment, gun control), others involve highly technical, esoteric policies that might be weakly related or unrelated to this dimension (e.g., bonds, fees). Given the ideological content that party cues, policy information, and spatial maps convey, we expect these types of information to be most effective on propositions that have the strongest relationships with the evaluative dimension.

Study 1: Spatial Voting in Five 2016 Direct Democracy Elections

Our first study examines whether citizens choose ballot proposition alternatives that are closest to their own ideological position in real-world direct democracy elections. We begin by estimating citizens' ideological positions on the same scale as five ballot propositions contested in 2016 in California. To this end, we first scaled roll call votes taken by members of the California Assembly between 2013 and 2016. These analyses indicated that a dominant first (liberal-conservative) dimension explains a large share of members' votes. We selected 34 votes

that ranked high in their ability to discriminate California legislators along the liberal-conservative dimension and designed survey questions to elicit citizens' opinions on them.

Next, we measured citizen ideology on the same liberal-conservative dimension that explains voting in the California Assembly. To do so, we recruited 3,040 Californians from the Survey Sampling International (SSI) panel.[3] SSI is a survey research firm that recruits samples of adults via the Internet. We administered our survey online using Qualtrics software from August 5 to August 11, 2016, three months before the 2016 general election. We asked respondents to express their opinions about the 34 policy proposals that successfully distinguish the ideological positions of California legislators. Table A1 in the Supporting Information (SI) briefly summarizes the 34 policy questions and respondents' answers. Based on their responses, we were able to determine each respondent's position along the dominant liberal-conservative ideological dimension.

To determine the ideological positions of the ballot propositions, we also asked respondents to express their opinions about a random subset of five propositions under active consideration.[4] These included 1) a referendum on California's law that prohibits grocery stores from providing single-use plastic bags, as well as initiatives that would 2) require background

[3] Our three samples resemble California's population in several ways, including gender, age, and partisanship. As with most opt-in Internet samples, our samples are more highly educated than the general population. Our samples more closely resemble likely voters, which is the population whose abilities are most relevant (see the SI).

[4] To minimize fatigue, respondents were asked a random subset of 23 to 26 of the 34 policy questions and 2 to 3 of the five ballot proposition questions.

checks before individuals can purchase ammunition, 3) increase the cigarette tax by $2 per pack, 4) allow inmates convicted of nonviolent crimes to be given early parole consideration, and 5) require a two-thirds vote in the state legislature to change how the fees that hospitals pay to Medi-Cal (California's heath care program for low-income patients) are used. We chose these propositions because they represent a range of important issues facing the state. These propositions, as well as respondents' opinions, are summarized in Table 1.

Respondents' opinions about the ballot propositions, as well as their responses to the 34 policy questions, enable us to identify a cut point for each proposition. In a one-dimensional spatial model, a ballot proposition's cut point is the point equidistant between the ballot proposal and status quo in a policy space. It separates citizens with ideal points closer to the ballot proposal from those with ideal points closer to the status quo. In Figure 1, for example, the vertical line shows the cut point of a hypothetical ballot proposition that seeks to move policy to

Table 1. 2016 Ballot Propositions with Respondents' Answers and Classification Metrics

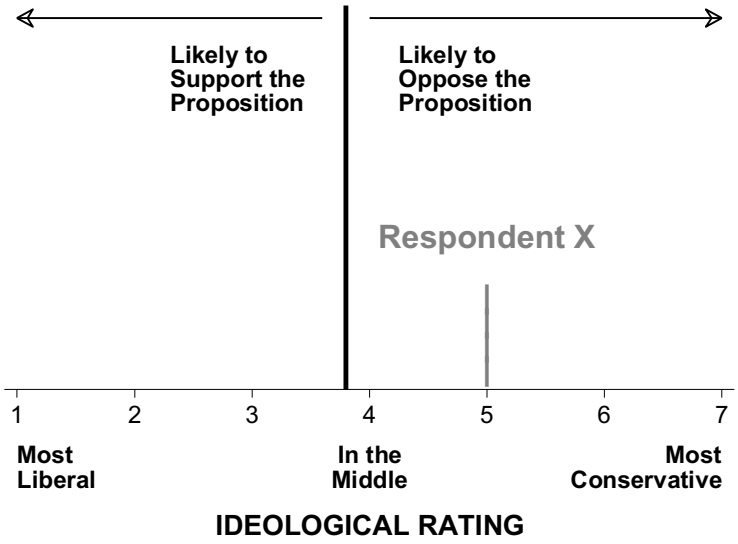
Ballot Proposition	Respondents Y-N-DK (%)	Item Parameters γ_j	α_j	Correct Classif. (%)	PRE
Prop. 52. Permanently extend state fee on private hospitals and require a 2/3 vote in the legislature or statewide vote to change it	66-12-22	-0.791	-0.930	84.80	.009
Prop. 56. Increase cigarette tax by $2 per pack to fund healthcare and tobacco use prevention	77-18-5	-0.944	-0.762	83.13	.101
Prop. 57. Allow inmates convicted of non-violent crimes to receive parole hearing upon completing their primary sentence and let prison officials award credits toward early release for good behavior	71-20-9	-0.932	-0.743	80.07	.055
Prop. 63. Require background checks for ammunition purchases and prohibit ownership of large-capacity magazines	81-15-4	-1.345	-0.997	88.57	.260
Prop. 67. Support state law prohibiting single-use plastic bags and requiring retailers to charge 10 cents for paper bags	63-32-5	-1.540	-0.204	79.52	.373
Total				83.19	.198

γ_j and α_j are policy proposal parameters in equation (1). Proportional reduction in error (PRE) for each ballot proposition is calculated as (Minority votes - Classification errors) / Minority votes. For all ballot propositions, the aggregate proportional reduction in error is $\Sigma^n_{j=1}$(Minority votes$_j$ - Classification errors$_j$) / $\Sigma^n_{j=1}$Minority votes$_j$.

the left of the status quo. Respondents with ideological positions to the left of the line are, according to the model, likely to support this proposition. Respondents with ideological positions to the right of the line, like Respondent X, are likely to oppose it. Respondents with ideological positions close to or exactly the same as the ballot proposition's cut point are equally likely to support or oppose it. Together, our measures of respondents' ideological positions and

the cut point for each ballot proposition enable us to assess whether and to what extent respondents' opinions about the ballot propositions accord with their policy interests.

Figure 1. Spatial Map with Respondent Ideal Point and Ballot Proposition Cut Point



Data Analysis

To estimate respondents' ideological positions and the ballot proposition cut points, we scaled respondents' answers to the 34 policy and five ballot proposition questions together using the item-response model developed by Clinton, Jackman and Rivers (2004).[5] The model assumes that each respondent *i*'s utility from a policy proposal's yea and nay outcomes (ζ_j and ψ_j) declines with its squared distance from the respondent's ideal point, $\mathbf{x}_i$. The statistical model implied by this Euclidean spatial voting model is equivalent to the following two-parameter item-response model used in education testing applications (see Jackman 2001, 228-229):

[5] We used the pscl package and IDEAL function in R to estimate a one-dimensional model with uninformative priors for all model parameters with 200,000 iterations after discarding the first 10,000 and thinning by 100. The first dimension correctly classifies 79.70 percent of responses.

$$y^*_{ij} = U_i(\zeta_j) - U_i(\psi_j) = \gamma_j \mathbf{x}_i - \alpha_j + \varepsilon_{ij} \quad (1)$$

where $y_{ij} = 1$ if $y^*_{ij} > 0$ and 0 otherwise. The additional assumption, $\varepsilon_{ij} \sim N(0, 1)$, implies a probit model with respondents' ideal points, $\mathbf{x}_i$, and policy proposal parameters, γ_j and α_j, as predictors to be estimated. Because the policy proposal parameters, γ_j and α_j, are functions of the positions of the yea and nay alternatives, ζ_j and ψ_j, the probit model recovers cut points (the set of points equidistant from ζ_j and ψ_j) for the policy proposals rather than the positions of the alternatives. Stated differently, in addition to estimating respondents' ideal points, the model offers an estimate of the positions of the five ballot propositions' and 34 policy questions' cut points (the point dividing a proposal's likely supporters and opponents) on the same scale.

While most studies of spatial voting focus on measuring candidate and citizen ideal points, we also examine the policy proposal parameters. The item *difficulty* parameter, α_j, is related to a policy proposal's general level of support. Holding ideology constant, higher values of α_j reduce the probability that a respondent will support the proposal. The item *discrimination* parameter, γ_j, indicates how strongly a proposal distinguishes respondents along the different dimensions of the ideological space (Jackman 2001). In a one-dimensional model, γ_j measures the extent to which a respondent's ideal point, x_i, translates into support for policy proposal *j*. Large and significant γ_j indicate that support for the proposal *j* and ideology are strongly related.

To further investigate the influence of citizens' ideological positions on their choices about ballot propositions, we also estimated models of support for each proposition using respondents' ideal points and partisanship as predictors. To ensure that our measure of respondents' ideology is independent of their opinions about ballot propositions, we re-estimated respondents' ideal points by scaling only their answers to the 34 policy questions. Our dependent variables in these models indicate whether a respondent "strongly supports,"

"somewhat supports," "somewhat opposes," or "strongly opposes" a ballot proposition (rescaled to range from 0 [least supportive] to 1 [most supportive]). For ease of presentation, we estimate a separate OLS model for each proposition and plot first differences (changing ideology and partisanship from their 25th [relatively liberal/Democratic] to 75th [relatively conservative/Republican] percentile values). Given that the five 2016 ballot propositions we examine sought to move policy to the left, we expect to observe large negative first differences.

Results

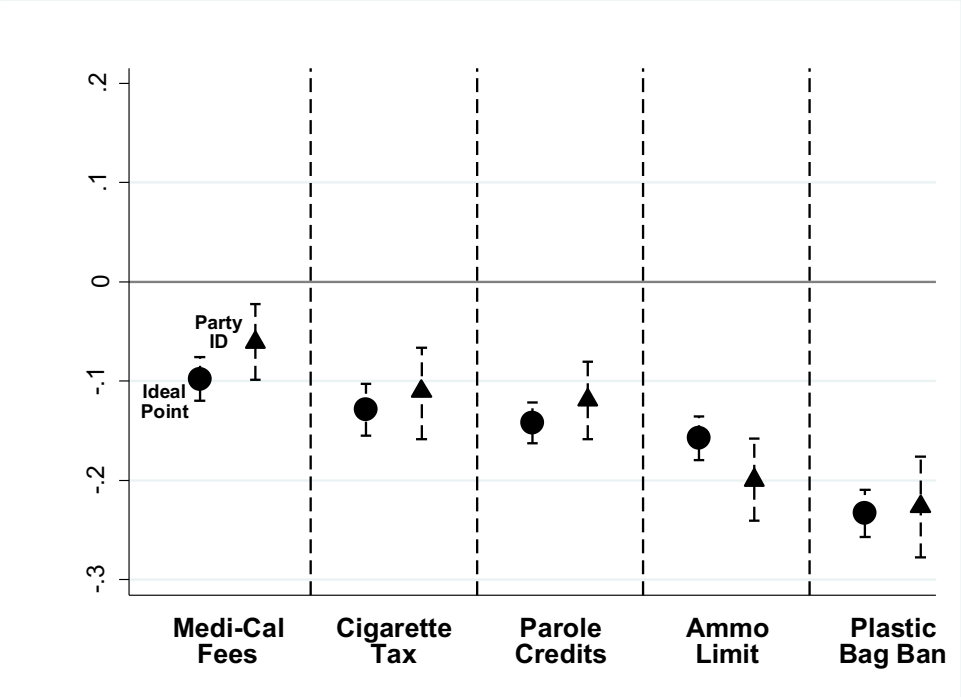
Our results provide evidence of significant spatial voting in direct democracy elections. Table 1 contains the difficulty and discrimination parameters for the five 2016 ballot propositions. Each of these discrimination parameters, γ_j, is significantly different from zero, which indicates that all are substantively related to the liberal-conservative ideological dimension. There are differences in the strength of this relationship, however, with the ammunition limits and plastic bag ban propositions having values of -1.345 and -1.540, respectively, and the Medi-Cal fees proposition having a value of -0.791. Each of the discrimination parameters, γ_j, is also significantly different from zero for the 34 policy questions that respondents answered (see Table A1 in the SI). This indicates that the same policy disputes that divide state lawmakers along liberal-conservative lines also divide our respondents.

With both the policy questions and ballot propositions related to the liberal-conservative dimension, we have a solid basis for expecting spatial voting in these elections. The success of the one-dimensional spatial model in predicting respondents' ballot proposition choices underscores this point. A one-dimensional spatial model correctly classifies 82.75 percent of respondents' choices on the five ballot propositions. Table 1 reports the proportional reduction in error (PRE) for each proposition and the aggregate proportional reduction in error (APRE) for

all five propositions. A one-dimensional model reduces classification errors by 19.8 percent above the commonly-used benchmark of the minority vote (i.e., predicting that all respondents take the majority position on each proposition, thereby making classification errors equal to the number of respondents taking the minority position).

Consistent with our first hypothesis, respondents' ideal points have large effects on their support for the five ballot propositions. Figure 2 plots first differences from our models of support. The right-hand panel, for example, indicates that changing a respondents' ideal point from its 25th (relatively liberal) to 75th (relatively conservative) percentile value reduces support for the plastic bag ban referendum by 0.23. The critical interval excludes zero, indicating a significant difference. The effects of ideology on the other propositions are also significant. We observe the smallest effects for the Medi-Cal fees proposition, which Table 1 indicates is weakly related to the liberal-conservative dimension. The effects of ideology are comparable to those for respondents' partisanship, widely considered the most important determinant of vote choice.

Figure 2. Effects of Ideology and Partisanship on Support for 2016 Ballot Propositions



Circles (triangles) are predicted first differences [with 95 percent critical intervals] of the effects of ideology and partisanship on support for each ballot proposition, generated from the models in Tables A2 and A3 of the SI.

Study 2: Spatial Voting in Five 2020 Direct Democracy Elections

Our second study replicates Study 1 by estimating citizens' ideological positions on the same scale as five new ballot propositions contested in 2020 in California. As in Study 1, we first scaled roll call votes taken by members of the California Assembly, this time between 2017 and 2020. We selected 20 votes that ranked high in their ability to discriminate California legislators along a dominant liberal-conservative dimension. We then recruited 645 Californians from the Lucid panel and asked these respondents to express their opinions about the 20 policy proposals, which we used to determine their position along the dominant liberal-conservative dimension. Like SSI, Lucid is a survey research firm that recruits samples of adults via the

Internet. We administered our survey online using Qualtrics software from October 2 to October 22, 2020, one month before the 2020 general election.

We also asked respondents to express their opinions about five 2020 ballot propositions. These included 1) a referendum on California's law that would replace money bail with a system for pretrial release based on public safety, as well as initiatives that would 2) tax commercial properties based on current market value rather than purchase price, 3) authorize felony sentences for certain crimes currently defined as misdemeanors and restrict eligibility for a state parole program for non-violent offenders, 4) define app-based drivers as "independent contractors" and restrict local regulation of them, and 5) allow local governments to establish rent control on properties over 15 years old. Table 2 describes these propositions, as well as respondents' opinions.

Data Analysis and Results

We use the same procedures described for Study 1 to estimate respondents' ideological positions and cut points for the 2020 ballot propositions on the same scale. Our model also estimates item parameters for the 20 policy proposals and five propositions. Table 2 contains the item parameters for the five 2020 ballot propositions. Four of the discrimination parameters are significantly different from zero. As in Study 1, we find significant variation in the relationship of the ballot propositions with the liberal-conservative dimension. Three propositions (split roll tax, rent control, bail reform) are strongly related to this dimension while two others (felony charges, app-based drivers) appear disconnected. All of the discrimination parameters for the 20 policy proposals are also significantly different from zero (see Table A4 in the SI), reaffirming that the same policy disputes that divide state lawmakers also divide respondents.

Table 2. 2020 Ballot Propositions with Respondents' Answers and Classification Metrics

Ballot Proposition	Respondents Y-N-DK (%)	Item Parameters γ_j	Item Parameters α_j	Correct Classif. (%)	PRE
Prop. 15. Tax commercial and industrial properties based on current market value rather than their purchase price	58-27-15	-0.839	-0.087	73.73	.193
Prop. 20. Authorize felony sentences for certain offenses and restrict eligibility for state parole program for non-violent offenders	55-31-14	-0.294	-0.323	69.17	.000
Prop. 22. Define app-based drivers as "independent contractors" and restrict local regulation of them	62-26-12	-0.165	-0.553	74.05	.025
Prop. 23. Allow local governments to establish rent control on properties over 15 years old	59-28-13	-1.035	-0.075	75.38	.220
Prop. 25. Replace money bail with a system for pretrial release based on public safety and flight risk	56-28-16	-1.318	0.106	80.00	.402
Total				74.43	.175

γ_j and α_j are policy proposal parameters in equation (1). Proportional reduction in error (PRE) for each ballot proposition is calculated as (Minority votes - Classification errors) / Minority votes. For all ballot propositions, the aggregate proportional reduction in error is $\Sigma^{n}_{j=1}$(Minority votes$_j$ - Classification errors$_j$) / $\Sigma^{n}_{j=1}$Minority votes$_j$.

The predictive validity of the spatial model offers further evidence for hypothesis 1. Overall, a one-dimensional spatial model correctly classifies 75.06 percent of respondents' positions on the five 2020 ballot propositions. Table 2 reports the PRE for each proposition and the APRE for all five propositions. The APRE is similar to what we observe in 2016; that is, a one-dimensional model reduces classification errors by 17.5 percent over and above the minority vote benchmark.

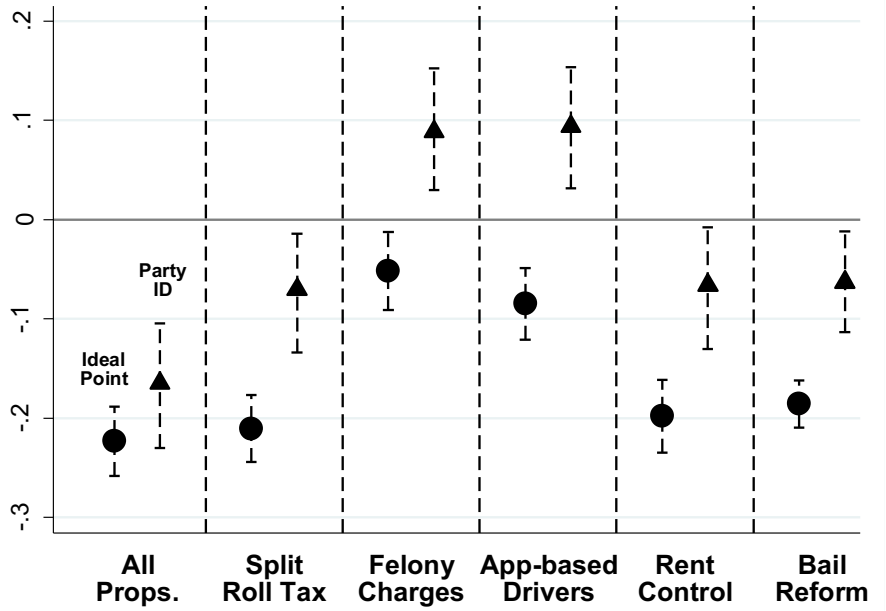
As in Study 1, we estimated models of respondents' support for each 2020 ballot proposition with ideology and partisanship as predictors. Because respondents expressed opinions about all five propositions, we were also able to pool these responses and use factor

analysis to calculate an overall support score. Ansolabehere et al. (2008) show that combining multiple survey items into a scale factor or simple average reduces measurement error at the rate of 1/no. items – or 20 percent in our study. We re-estimated respondents' ideal points by scaling only their answers to the 20 policy questions and rescaled their support for the ballot propositions, separately and combined, to range from 0 (least supportive) to 1 (most supportive).

Figure 3 plots first differences for the five 2020 ballot propositions. As in Study 1, ideology is a significant predictor of support for the five propositions (separately and combined), with effects comparable to respondents' partisanship. We observe the largest effects of ideology on respondents' support for the three propositions that Table 2 indicates are strongly related to the liberal-conservative dimension. Ideology has modest effects on support for the app-based drivers and felony charges propositions. Nonetheless, the pattern of first differences resembles what we observe in Study 1. The left panel of Figure 3 plots first differences for both ideology and partisanship on the five-item support score. Changing ideology from its 25th (relatively liberal) to 75th (relatively conservative) percentile value reduces support by 0.17, a large and statistically significant difference.[6]

[6] Consistent with Ansolabehere et al. (2008), we do not observe much variation in the effects of ideology across different subgroups of respondents (e.g., by political knowledge, education, strength of partisanship; see the SI).

Figure 3. Effects of Ideology and Partisanship on Support for 2020 Ballot Propositions



Circles (triangles) are predicted first differences [with 95 percent critical intervals] of the effects of ideology and partisanship on support for all five propositions and each proposition individually, generated from the models in Tables A5 and A6 of the SI.

Collectively, these results from two studies conducted four years apart and examining 10 ballot propositions that vary in substance, complexity, and salience, provide the strongest evidence to date that citizens can advance their policy interests in direct democracy elections. To be sure, we find variation in the strength of the relationship between citizens' ideological positions and their opinions about ballot propositions. While our theory is agnostic as to why some propositions are strongly related to the liberal-conservative dimension while others are not, one explanation we can rule out is that citizens' decision-making reflects more than one ideological dimension. In the SI, we show that adding dimensions to our spatial model does not improve our ability to predict citizens' choices about the 10 ballot propositions. In what follows, we show how experimental studies can shed light on why some ballot propositions appear

disconnected from the liberal-conservative dimension and whether political information can aid citizens' decision-making about them.

Study 3: The Effects of Political Information on Spatial Voting

In light of the significant spatial voting we observed in Study 1, we conducted a follow-up survey with an embedded experiment to test our hypotheses about how political information affects this outcome. Specifically, we recruited an additional 998 Californians, none of whom participated in Study 1, from the SSI panel. We administered this survey online using Qualtrics from October 1 to October 8, 2016, one month before the 2016 general election. To place these respondents' ideological positions on the same scale as the five ballot propositions from Study 1, we asked them 18 of the 34 policy questions that respondents in Study 1 answered. Based on their answers, we were able to estimate their ideal points. Figure 1 provides an example of one such ideal point (for "Respondent X") on a hypothetical ballot proposition. As this example illustrates, knowing which side of the cut point a respondent falls on enables us to determine what the ideologically "correct" choice is for the respondent on the proposition.

We then randomly assigned respondents to either a control group or one of three treatment groups. All respondents were asked to express their opinions about the five 2016 ballot propositions. In the control group, respondents receive only the brief description of each proposition that respondents in Study 1 received. For example, on the parole credits ballot proposition, control group respondents read the following:

> This November, Californians will be asked to vote on a ballot measure that would allow inmates convicted of nonviolent crimes to be given parole consideration upon completion of their primary sentence. Currently, many prisoners receive both a primary sentence for a crime and "enhancements" or extra time if there are multiple victims or if they

> previously were in prison. This measure would allow prison officials to award credits toward early release to prisoners who demonstrate good behavior, efforts to rehabilitate themselves, or participate in prison education programs.

Respondents were then asked whether they strongly support, somewhat support, somewhat oppose, or strongly oppose the proposition, or whether they don't know. The passages for the other ballot propositions are structured similarly (see the SI).

In the "party cues" treatment group, respondents also received the Democratic and Republican parties' official positions on each ballot proposition. On the parole credits proposition, for example, respondents were told, "The Democratic Party supports this measure. The Republican Party opposes it." In this example, the party cues indicate that the proposition would move the status quo in a more liberal direction (because of the Democratic Party's support).

In the "policy information" treatment group, respondents received information about the likely consequences of passing each ballot proposition. This information clarifies the direction of the proposed policy change, relative to the status quo. The policy information we provided is based on actual arguments that were made at the time and is drawn from materials produced by California's nonpartisan Legislative Analyst's Office (which estimates the fiscal and other impacts of ballot propositions). For example, on the parole credits ballot proposition, respondents in this treatment group received the following information:

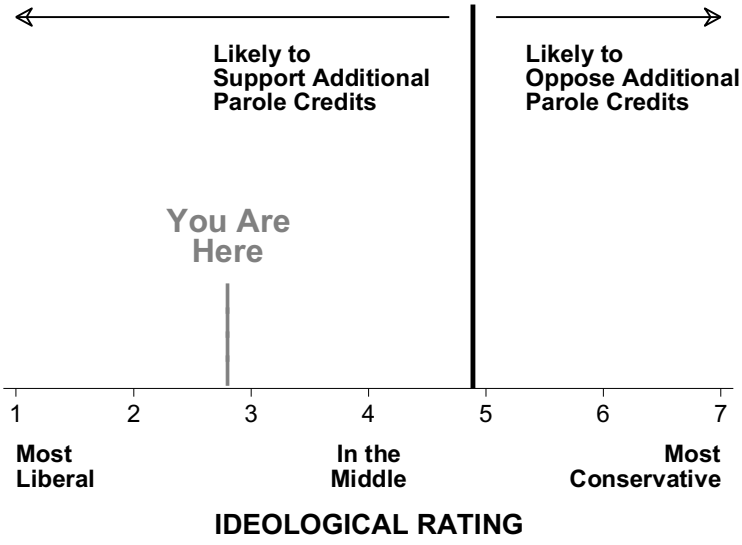
> This initiative would help reduce significant overcrowding problems in state prisons by increasing the number of non-violent inmates eligible for parole consideration. California's nonpartisan Legislative Analyst's Office estimates that this initiative could save the state tens of millions of dollars each year in correctional and other costs.

In this example, the policy information indicates that the early parole measure would move the status quo in a more liberal direction (because it would reduce correctional costs and allow more inmates to be eligible for early release). The policy information for the other four propositions is structured similarly and also truthfully attributed to the Legislative Analyst's Office.

Respondents assigned to the "spatial map" treatment group were shown a visual depiction of their own ideological position relative to each ballot proposition's cut point. That is, respondents learn whether they should support or oppose each measure based on their actual ideological position. To create these spatial maps, we selected nine of the policy questions that respondents in Study 3 answered and created 512 "citizen profiles," one for every combination of yes/no answers to these questions (e.g., nine "yes," nine "no," "yes" to the first five and "no" to the last four questions, etc.). We obtained an estimated ideal point for each profile by scaling the 512 profiles along with the survey responses of Study 1 respondents.[7] We then drew spatial maps that depict the estimated ideal point for each profile, as well as the cut point for each ballot proposition. Respondents were shown the spatial map that corresponds to their answers to the nine policy questions. Figure 4 provides an example of a spatial map that a respondent in this group viewed just before expressing an opinion about the parole credits ballot proposition.

[7] Bridging the profiles with respondents from Study 1 enhances the precision of the estimated ideal points, making it more likely that they reflect respondents' true policy interests. To assist respondents' interpretation of the spatial maps, we converted the cut points and ideal points to a 1-7 scale and added "most liberal," "in the middle," and "most conservative" labels.

Figure 4. Spatial Map Treatment



Data Analysis

To measure Study 3 respondents' ideological positions on the same scale as the ballot proposition cut points, we scaled their responses to the 18 policy questions that they answered together with Study 1 respondents' answers to the 34 policy and five ballot proposition questions. This yielded estimated ideal points for respondents in Study 3 and new cut points for the five ballot propositions. Importantly, Study 3 respondents' opinions about the ballot propositions did not influence our estimates of their ideal points or the ballot proposition cut points. This ensures that our measure of these respondents' ideal points and the positions of the five ballot propositions remain independent of the political information manipulated in our experiments. It also reduces the accuracy of respondents' estimated ideal points (by ignoring their opinions about ballot propositions), thus biasing us against finding effects for information.

To assess whether respondents' choices about ballot propositions are consistent with spatial voting theory (i.e., preferring the alternative closest to one's ideal point), we calculated the distance between each respondent's estimated ideal point and the cut point for each ballot

proposition. Recall that the cut point is the position at which a respondent is indifferent between the ballot proposal and status quo. In our one-dimensional spatial model, each ballot proposition's cut point is given by the ratio (see Clinton and Jackman 2009):

$$\tau_j = (\zeta_j + \psi_j) / 2 = \alpha_j / \gamma_j \quad (2)$$

For each ballot measure, subtracting the cut point from the estimated ideal point, i.e., $(x_i - \tau_j)$, provides a measure of how far away the cut point is from respondents' ideal policy positions. Because $\gamma_j < 0$ (the position of the ballot proposal is to the left of the status quo) for all five ballot propositions listed in Table 1, the spatial model predicts that a respondent will support the ballot proposition when this distance is negative. When the distance is positive, the model predicts a respondent will oppose the proposition.

To capture this intuition, our dependent variable, $Vote\_Spatial_{ij}$, is coded as 1 when $(x_i - \tau_j) < 0$ and the respondent strongly or somewhat supports the proposition or when $(x_i - \tau_j) > 0$ and the respondent strongly or somewhat opposes the proposition, and zero otherwise. We calculated the percentage of opinions in each treatment group and the control group that are consistent with spatial voting theory. We conducted difference-of-means tests to examine whether more respondents choose the ballot proposition alternative closest to their ideal point when they receive party cues, policy information, or spatial maps, relative to the control group. We also examined how well party cues and policy information approximate the "complete information" baseline that spatial maps provide. We report the results of these analyses having pooled responses to the five proposition questions and then separately for each proposition.

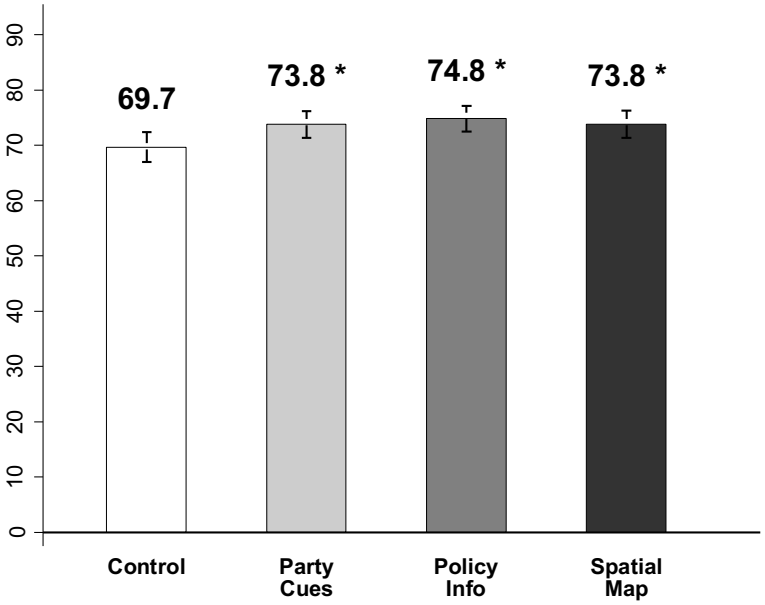
Results

Our results indicate that political information significantly strengthens spatial voting in the direct democracy elections we examine. The large effects of political information are

apparent in Figure 5, which plots the percentage of respondents in each group who choose the alternative closest to their ideal point on the five ballot propositions and, hence, behave consistent with a one-dimensional spatial model. In the control group, 69.7 percent of respondents choose the alternative closest to their own ideal point. In the party cues treatment group, 73.8 percent of respondents do so.[8] The difference between these groups is statistically significant and supports our hypothesis about the effects of party cues. Importantly, the effects of party cues are comparable to those of spatial maps. Indeed, 73.8 percent of respondents in the spatial map treatment group choose the ballot proposition alternative closest to their own ideal point. This is a significant increase relative to the control group, but not significantly different from the party cues treatment group. In this way, our results indicate that a widely publicized "information shortcut" can substitute for detailed information about the positions of the ballot proposal and status quo, relative to their own ideological position.

[8] Because respondents in Study 3 answered fewer policy questions and we constrained our estimates of their ideal points so that they were unaffected by their views on pending ballot propositions, these percentages likely understate the extent of spatial voting. Similarly, $Vote\_Spatial_{ij}$ takes the value 0 for "don't know" responses. These decisions explain why the percentages in Figure 3 are lower than those in Table 1 for respondents in Study 1.

Figure 5. Spatial Voting by Control and Treatment Groups



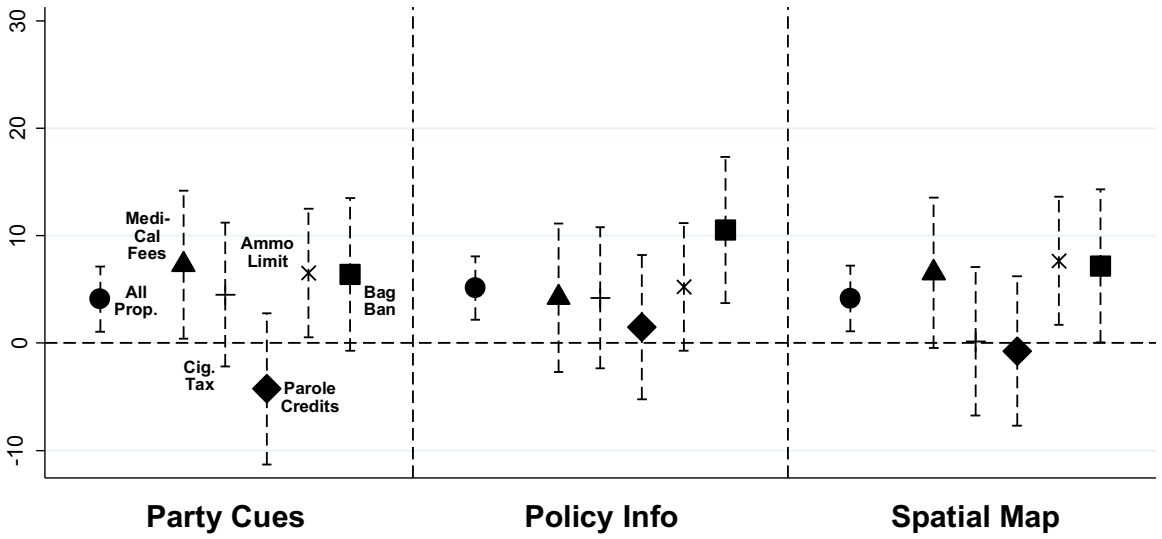
Numbers are percentages of respondents who chose the alternative closest to their own ideal point (see Table A10 of the SI). * difference with control is significant ($p < 0.05$, one-tailed). # difference with spatial map is significant ($p < 0.05$, one-tailed).

Consistent with our third hypothesis, we find that policy information also significantly strengthens spatial voting. As shown in Figure 5, 74.8 percent of respondents in the policy information treatment group choose the ballot proposition alternative closest to their own ideal point. This is a significant increase in spatial voting relative to the control group. It is also comparable to the effects of party cues and spatial maps. This demonstrates that respondents are able to connect substantive information about ballot proposals and the status quo policies they seek to replace to their policy interests. It also indicates that real-world efforts to disseminate policy information (in California, a summary of each proposition's fiscal effects appears on the ballot) can meaningfully increase spatial voting.

As expected, the extent to which spatial maps, party cues, and policy information improve spatial voting varies across the five propositions. Figure 6 plots the differences between

the treatment and control groups in the percentage of respondents whose choices are consistent with the spatial model. As shown by the "X" and "square" symbols, all three types of information significantly increase the percentage of respondents who choose the alternative closest to their ideal point on two propositions (ammunition limits and plastic bag ban) that Table 1 suggests have the strongest relationships with the liberal-conservative dimension. For example, 7.2 percent more respondents choose the alternative closest to their own ideological position on the plastic bag ban referendum when they receive spatial maps, relative to the control group. Party cues and policy information have comparable effects on this proposition (increases of 6.4 and 10.5 percent, respectively).

Figure 6. Average Treatment Effects for 2016 Ballot Propositions



Symbols are differences [with 90 percent confidence intervals] in proportion of respondents who chose the alternative closest to their own ideal point for all five propositions and each proposition individually, generated from Table A10 of the SI.

In contrast, Figure 6 shows that spatial maps, party cues, and policy information do not significantly increase the percentage of respondents who choose the alternative closest to their ideal point (relative to the control group) on the cigarette tax and parole credits propositions, which are less strongly related to the left-right dimension. However, both party cues and spatial maps increase spatial voting for the Medi-Cal fees proposition. This is surprising as this proposition was mostly unrelated to the ideological dimension. In what follows, we assess potential explanations for the variation we observe in the extent to which the ballot propositions are related to the liberal-conservative dimension and in the effects of political information.

Explaining Variation in Spatial Voting and the Effects of Political Information

A ballot proposition's weak connection to the ideological dimension might result from multiple causes. One possibility we considered earlier is that some issues invoke additional ideological dimensions. Another possible cause is confusion about a proposition's substance.

Alternatively, a proposition's popularity could transcend ideological divisions or its complexity resist ideological characterization. To determine which explanation, if any, best describes the 2016 and 2020 propositions with the weakest relationships with the liberal-conservative dimension, we conducted analyses of the effects of adding a second and third ideological dimension, the amount of time respondents take to express their opinions, their propensity to respond "don't know," and the extent to which they "strongly" support or oppose the propositions. The top panel of Table 3 briefly states our expectations about what we should observe in these analyses for high-dimensional, confusing, popular, and non-ideological ballot propositions, respectively.

The bottom panel of Table 3 summarizes the results of our analyses of the three propositions with weak relationships to the liberal-conservative dimension. Answers to the 2016 Medi-Cal fees question are consistent with respondents being confused about the substance of this proposition. We observe, for example, significantly more "don't know" answers, weaker attitudes among those expressing an opinion, and longer response times. On this proposition, both party cues and policy information strengthen spatial voting, which indicates that political information can help clarify the substance of confusing ballot propositions. In contrast, the 2020 app-based drivers proposition appears to be a case of an issue's popularity transcending liberal-conservative divisions. We observe fewer "don't know" answers, stronger attitudes, and shorter response times. In the SI, we show that party cues do not improve spatial voting on this proposition. The felony charges proposition on the other hand does not exactly match either category, perhaps befitting a proposition whose technical complexity resists ideological characterization. These admittedly anecdotal cases suggest that political information can help

citizens resolve their confusion about certain propositions, but are unlikely to improve spatial voting in other circumstances.

Table 3. Expectations and Results for Propositions with Weak Relationships with the Liberal-Conservative Dimension

Reason for Weak Relationship	Effect of 2nd, 3rd Dims.	Response Time	Don't Knows	Attitude Strength	Effect of … on Correct Spatial Vote	
					Policy Info	Party Cues
Proposition is High-Dimensional	Significant effects	Not different	Not different	Not different	Not significant	Not significant
Proposition is Confusing	Not significant	Longer	More	Weaker	Increase	Increase
Proposition has Universal Support	Not significant	Shorter	Fewer	Stronger	Not significant	Not significant
Proposition is Non-Ideological	Not significant	Not different	Not different	Weaker	Not significant	Not significant
Propositions with Weak Discrimination Parameter						
Medi-Cal Fees	Not significant	Longer	More	Weaker	Increase	Increase
Felony Charges	Not significant	Longer	Not different	Weaker	N/A	Decrease
App-based Drivers	Not significant	Shorter	Fewer	Stronger	N/A	Not significant

Bottom half summarizes analyses of respondents' answers about the three propositions with weak relationships with the liberal-conservative dimension. See the SI for variable definitions, model descriptions and detailed results.

Conclusion

Our results provide three new types of evidence for citizens' ability to advance their policy interests in direct democracy elections. First, our surveys of Californians making choices about 10 ballot propositions across four years revealed significant spatial voting. We compiled detailed measures of ideology by asking citizens over four dozen policy questions that divided state lawmakers along a dominant liberal-conservative dimension. Using a one-dimensional spatial model, we found that citizens' own ideological positions accurately predict 81.21 percent of their choices about the 10 ballot propositions. Second, our experimental analyses of citizens'

choices on these same ballot propositions indicate that party cues and policy information substitute for more detailed information (spatial maps) and strengthen spatial voting. Third, the few ballot propositions that are weakly related to the ideological dimension are those that are particularly confusing or overwhelmingly popular. On those that are confusing, political information can help citizens to connect their policy interests to their decisions.

These results have important implications. For scholars, they demonstrate the benefit of focusing on ideology as the key to understanding how citizens advance their policy interests in direct democracy settings. Our theory, which holds that preferences about contemporary political issues and government policies are generated from citizens' positions in a low-dimensional evaluative space, can inform future studies of citizens' decisions about ballot propositions in several ways. First, this theory furthers empirical studies of the quality of citizens' decisions by facilitating individual-level measures of "improvement" in citizens' decisions – as opposed to relying on group-level comparisons of informed and uninformed citizens. Second, it offers a more thorough explanation of how and when political information will be helpful, i.e., information that clarifies the relative positions of the ballot proposal and status quo can enable citizens to make decisions that are consistent with their policy interests. Third, it raises questions about how citizens form such evaluative dimensions in the first place.

Our study also has implications for practical efforts to inform citizens about their choices in direct democracy elections. For example, the improved spatial voting we observe in response to policy information highlights the salutary effects of state laws that provide for nonpartisan expert evaluation of pending ballot propositions and the communication of those findings to citizens. In addition to policy information, the success of the spatial maps we provided offer a heretofore unstudied tool for helping citizens bring their policy interests to bear in direct

democracy elections. Such interactive spatial maps are often provided on the Internet by civic groups and public agencies for citizens seeking information about candidates in advance of Election Day (Garzia, Trechsel, and De Angelis 2017). Our study demonstrates that such efforts could be extended to direct democracy elections with potentially powerful results. Finally, the methods we describe above could be used to identify ballot propositions that are likely to be especially confusing to voters (e.g., ones that do not map well into the liberal-conservative dimension). This might inform legal challenges to particular ballot propositions, the drafting of ballot proposition titles and descriptions, or voter education efforts to ameliorate misinformation.

References

Ansolabehere, Stephen, Jonathan Rodden, James M. Snyder, Jr. 2008. "The Strength of Issues." *American Political Science Review* 102(2): 215-232.

Arceneaux, Kevin. 2008. "Can Partisan Cues Diminish Democratic Accountability?" *Political Behavior* 30: 139-160.

Arceneaux, Kevin and Robin Kolodny. 2009. "Educating the Least Informed." *American Journal of Political Science* 53(4): 755-770.

Bafumi, Joseph, and Michael C. Herron. 2010. "Leapfrog Representation and Extremism." *American Political Science Review* 104(3): 519-542.

Barber, Michael, and Jeremy C. Pope. 2019. "Does Party Trump Ideology? Disentangling Party and Ideology in America." *American Political Science Review* 113(1): 38-54.

Boudreau, Cheryl, Christopher S. Elmendorf, and Scott A. MacKenzie. 2018. "Roadmaps to Representation." *Political Behavior*.

Boudreau, Cheryl, Christopher S. Elmendorf, and Scott A. MacKenzie. 2019. "Racial or Spatial Voting?" *American Journal of Political Science* 63(1): 5-20.

Bowler, Shaun, and Todd Donovan. 1998. *Demanding Choices*. University of Michigan Press.

Bullock, John. 2011. "Elite Influence on Public Opinion in an Informed Electorate." *American Political Science Review* 105(3): 496-515.

Cain, Bruce E., and Kenneth P. Miller. 2001. "The Populist Legacy." In *Dangerous Democracy*. Larry J. Sabato et al., eds. Lanham: Rowman and Littlefield.

Carmines, Edward G., and James A. Stimson. 1980. "The Two Faces of Issue Voting." *American Political Science Review* 74: 78-91.

Clinton, Joshua D., and Simon Jackman. 2009. "To Simulate or NOMINATE." *Legislative Studies Quarterly* 34(4): 593-621.

Clinton, Joshua D., Simon Jackman, and Douglas Rivers. 2004. "The Statistical Analysis of Roll Call Data." *American Political Science Review* 98: 355-370.

Converse, Philip E. 1964. "The Nature of Belief Systems in Mass Publics." In *Ideology and Discontent*. David E. Apter, Ed. New York: Free Press.

Cronin, Thomas E. 1989. *Direct Democracy.* Cambridge: Harvard University Press.

Downs, Anthony. 1957. *An Economic Theory of Democracy*. New York: HarperCollins.

Enelow, James M. and Melvin J. Hinich. 1984. *The Spatial Theory of Voting*. Cambridge: Cambridge University Press.

Fiorina, Morris P., Samuel J. Abrams, and Jeremy C. Pope. 2004. *Culture War?* New York: Pearson.

Garzia, Diego, Alexander H. Trechsel, and Andrea De Angelis. 2017. "Voting Advice Applications and Electoral Participation." *Political Communication* 34: 424–443.

Gerber, Elisabeth R., and Arthur Lupia. 1995. "Campaign Competition and Policy Responsiveness in Direct Legislation Elections." *Political Behavior* 17(3): 287-306.

Hill, Seth J. and Chris Tausanovitch. 2015. "A Disconnect in Representation?" *Journal of Politics* 77(4): 1058-75.

Hugh-Jones, David. 2010. "Sophisticated Voting on Competing Ballot Measures." *British Journal of Political Science* 40(2): 399-418.

Jackman, Simon. 2001. "Multidimensional Analysis of Roll Call Data via Bayesian Simulation." *Political Analysis* 9(3): 227-241.

Jessee, Stephen A. 2012. *Ideology and Spatial Voting in American Elections*. New York: Cambridge University Press.

Kinder, Donald R., and Nathan P. Kalmoe. 2017. *Neither Liberal Nor Conservative*. Chicago: University of Chicago Press.

Kriesi, Hanspeter. 2005. *Direct Democratic Choice*. Landham, MD: Lexington Books.

Lupia, Arthur. 1992. "Busy Voters, Agenda Control, and the Power of Information." *American Political Science Review* 86(2): 390-403.

Lupia, Arthur. 1994. "Shortcuts versus Encyclopedias." *American Political Science Review* 88: 63-76.

Lupia, Arthur and Mathew D. McCubbins. 1998. *The Democratic Dilemma.* Cambridge: Cambridge University Press.

Magleby, David B. 1984. *Direct Legislation*. Baltimore: Johns Hopkins University Press.

Nicholson, Stephen P. 2011. "Dominating Cues and the Limits of Elite Influence." *Journal of Politics* 73(4): 1165-1177.

Poole, Keith T. 2005. *Spatial Models of Parliamentary Voting*. Cambridge University Press.

Romer, Thomas, and Howard Rosenthal. 1978. "Political Resource Allocation, Controlled Agendas, and the Status Quo." *Public Choice* 33: 27-44.

Shor, Boris and Jon C. Rogowski. 2016. "Ideology and the US Congressional Vote." *Political Science Research and Methods*.

Sniderman, Paul M. and Edward H. Stiglitz. 2012. *The Reputational Premium*. Princeton: Princeton University Press.

Zaller, John, and Stanley Feldman. 1992. "A Simple Theory of the Survey Response." *American Journal of Political Science* 36(3): 579-616.