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HEURISTICS, HETEROGENEITY AND GREEN CHOICES: VOTING ON CALIFORNIA'S PROPOSITION 23

Ballot initiatives and referendums have a lengthy history and over the past two decades they have become increasingly popular ways for deciding a variety of important political issues.[1] Research on voting behavior in these events has focused on two broad classes of predictors—perceptions of the costs and benefits of the alternatives under consideration and the impact of heuristics or cues people employ to help them make their ballot decisions.[2] Regarding the latter, some analysts have hypothesized that the effects of heuristics are heterogeneous, being larger for people with lower levels of political knowledge. However, there are reasons to hypothesize that the impact of heuristics actually may be greater among more knowledgeable individuals. This paper investigates these alternatives using survey data on voting in an important recent ballot initiative in California. Rival hypotheses of interest are tested using statistical methods appropriate for studying interaction effects in nonlinear models.

In the sections that follow, we first discuss theoretical perspectives that have been used in previous research to explain voting on initiative and referendum propositions. After briefly describing relationships between preferences on California's Proposition 23 and potentially important explanatory variables, we specify and estimate a multivariate model of voting on the proposition that enables us to test competing hypotheses about how varying levels of political knowledge condition the effects of candidate image heuristics while controlling for other theoretically significant predictor variables. The conclusion summarizes major findings and discusses implications for understanding how voters make important political choices.

Theoretical Perspectives

One major theoretical perspective on initiative and referendum voting is that citizens assess the merits of the case and vote in favor of a proposal when they expect that the benefits of

adopting it outweigh the costs (e.g., Johnston et al, 1996; Clarke, Kornberg and Stewart, 2004; see also Alvarez and Kiewiet, 2009).[3] However, if voters think costs exceed benefits or they are unsure, then they vote no. In this regard, uncertainty about the consequences of adopting a proposal to change the status quo is often used to explain a major stylized fact about such proposals, namely that they often are defeated (see LeDuc, 2003). The claim is that, when in doubt, voters discount possible benefits and say "no." This latter hypothesis is consistent with widely cited research showing that in a wide variety of situations decision-makers have asymmetric loss functions which prompt them to weigh costs more heavily than benefits (e.g., Kahneman, 2011; Kahneman, Slovic and Tversky, 1982; Thaler, 1993; 1994).

A second major theoretical perspective on initiative and referendum voting involves the idea that in situations of high stakes and abundant uncertainty people rely on *heuristic devices* of various kinds. Since pioneering work by Simon (1955; 1957), decision-making using heuristics has been associated with broader theories of bounded rationality. The latter may have served to color assessments of this approach by implying that the use of heuristics involves an inferior decision strategy when compared to the familiar optimizing models of rational choice theory. Indeed, Simon's term "satisficing" implies something less than global optimization (Conlisk, 1996). Simon addressed these concerns by observing that the classical, optimizing model requires knowledge of all available alternatives, consequences and probabilities. It is a world without surprises (Gigerenzer and Gaissmeier 2011: 452; see also Gigerenzer, Hertwig and Pachur, 2011).

Simon's analysis is consistent with that of Savage (1954), a major figure in the development of Bayesian decision theory. As noted by Gigerenzer and Gaissmeier, Savage differentiated between the perfect knowledge found in "small worlds" versus "large worlds," where relevant information is either unknown, or must be estimated with uncertainty from small

samples. Thus, and critically, "one can no longer assume that "rational" models automatically provide the correct answer. Even small deviations from model conditions can lead to disaster when applied to the large world…" (Gigerenzer and Gaissmeier 2011: 453). In anticipating arguments below, it reasonable to conclude that more knowledgeable and sophisticated people recognize the difference between "small world" and "large world" situations and are act accordingly.

Gigerenzer and his associates have been leading voices in making the case that simplifying heuristic devices may be superior to optimizing models of decision making and that, in fact, individuals rely heavily on heuristics when making a wide variety of decisions. Gigerenzer (2008) argues that: (a) optimization is often impossible because of computational intractability or is less robust, i.e.; subject to substantial measurement error; (b) individuals with greater cognitive capacity are not less likely to employ relatively simple heuristics when compared to those with lesser cognitive ability. More information and intensive computation is not always better. There are many situations where making good decisions requires ignoring some available information. This argument is consistent with Savage's image of "large worlds" which are fraught with uncertainty and where probabilistic reasoning is pervasive.

Political decisions confronting individuals in contemporary settings are ideally suited to Gigerenzer's "fast and frugal" decision-making heuristics. Given the opaque nature of complex issues such as climate change and possible mitigating strategies and solutions, the uncertain nature of attendant political-economic trade-offs and serious difficulties involved in assessing the veracity of competing claims, a classical optimizing approach is likely not possible.

Individuals with greater cognitive abilities may be at least as likely to use heuristics as those with lesser cognitive abilities. Although there is not a one-to-one correspondence between cognitive capacity and political knowledge and sophistication, there is very likely a strong

linkage. And, political choices may be especially amenable to such a linkage. When voters, or citizens in general, use heuristic strategies, they have to know where and when to look for useful cues. The more knowledgeable a person is, the more readily s/he can make a determination, which might be a "best guess," as to where to seek, and how to use, relevant information. More knowledgeable individuals realize they do not and cannot know everything and recognize the probabilistic and error-prone nature of the information they obtain. In contrast, citizens with little knowledge of the complexities of politics and policy are more likely to engage in indiscriminate and undisciplined information searches. The less knowledgeable, not knowing what they do not know, are likely to engage in efforts that are wasteful of scarce resources and conducive to problematic decisions.

The present paper focuses on citizen decision-making in important political initiatives and referendums. Faced with making a choice on an initiative or referendum proposal, and lacking reliable information about the consequences of alternative courses of action or the cognitive resources to process that information effectively, voters employ cues provided by various groups and individuals. As noted above, Gigerenzer et al. describe these cues as "fast and frugal heuristics," i.e., cues that are used by voters who typically are unable to behave in accordance with the precepts of classic micro-economic rationality.[4] One such heuristic is provided by images of party leaders or candidates who are proponents or opponents of an initiative or referendum proposal. Voters use information about the proposition's "friends and foes" in combination with information about these individuals and groups to decide how to cast their ballots.[5]

Elaborating this hypothesis, some scholars have conjectured that the effects of candidate and party leader images are *heterogeneous*, being stronger among people with lower levels of political knowledge (e.g., Bartle, 2005: Gomez and Wilson, 2001, 2006; Mondak, 1993; see also

Converse, 1964; Delli Carpini and Keeter, 1997; Zaller, 1992). It is argued that, in contrast to uninformed voters who are attracted by slick, but vacuous, portrayals of leaders and candidates, knowledgeable individuals assess the pros and cons of initiative and referendum proposals. Discounting possibly misleading cues provided by leader and candidate images and relying more heavily on information about the policy alternatives on offer, knowledgeable voters concentrate on the merits of the case.

However, there is an alternative possibility. Consistent with findings that people often fail to behave in accordance with the strictures of micro-economic rationality when making political choices (e.g., Lupia and McCubbins, 1998; Lupia, McCubbins and Popkin, 2000; Sniderman, Brody and Tetlock, 1991), it can be hypothesized that politically knowledgeable voters are actually more likely than less knowledgeable persons to utilize readily accessible cues such as those provided by leader and candidate images.[6] There are two reasons why this might be the case. First, as argued above, knowledgeable people may be more likely than less knowledgeable persons to recognize that they cannot possibly assemble and process the information necessary to assess the consequences of the adoption, or failure to adopt, particular resolutions in accordance with the canons of classic procedural rationality. Knowledgeable individuals react by relying on an alternative decision-making strategy.

There is yet another, simpler, possibility. According to this account, more knowledgeable voters have a higher probability of using leader and candidate heuristics because they are more likely to have information about where leaders and candidates stand on ballot propositions under consideration.[7] Even if *all* voters are equally likely to try to use heuristics, more knowledgeable people are most apt to be successful, even if they operate on a random "top of the head" basis (Zaller, 1992; see also Converse, 1964). Using a random selection procedure, knowledgeable voters are more likely to find a relevant cue than are their less knowledgeable fellow citizens.

Moreover, given the high salience of party leaders and candidates in most political campaigns, there is a substantial probability that a cue selected at random will involve some aspect of leader or candidate images. Below, we investigate these competing hypotheses about the interactive effects of candidate images and political knowledge in multivariate analyses of the determinants of voting on California's Proposition 23.

The Climate of Opinion and Voting on Proposition 23

On November 2nd, 2010, the California electorate was invited to vote on a statewide initiative on climate change legislation. Proposed in the midst of the most serious economic downturn since the Great Depression of the 1930s with statewide joblessness in double digits, Proposition 23[8] would have suspended "implementation of air pollution control law (AB 32 - The Global Warning Solutions Act) requiring major sources of emissions to report and reduce greenhouse gas emissions that cause global warning, until unemployment drops to 5.5% or less for full year."[9] Although early polls suggested that the proposal might pass, it was defeated by a substantial 62% to 38% margin.

We first use survey data to describe factors relevant for understanding why Californians voted as they did on Proposition 23. The survey data were gathered in a representative national pre- and post-election internet survey with a California oversample conducted for the authors by YouGov/Polimetrix.[10] The California sample includes 1102 respondents.[11] Figure 1 shows Californian's opinions concerning the general importance of climate change.[12] Responses vary widely: 22% rated climate change as “not important,” the lowest possible score, and 17% rated it as “very important,” the highest possible score. Other views were dispersed across the scale—41% rated climate change in the 0-4 range of importance and 49% gave scores in the 6-10 range. Similarly, when asked about tradeoffs between environmental protection and economic growth, Californians were widely dispersed across an 11-point scale ranging from 0 (protect

environment) to 10 (promote growth), with somewhat more (48% v. 40%) being on the pro-growth side of the scale (see Figure 2). Clearly, there was no consensus about whether environment or economy deserved top priority. In addition, it noteworthy that a Cap-and-Trade principle was incorporated in the 2006 climate change legislation (AB 32) Proposition 23 would have suspended. Substantial numbers of the survey respondents voiced opposition to Cap-and-Trade—the idea was opposed 43% to 35%, with fully 37% expressing "strongly unfavorable" opinions and only 17% stating that they were "strongly favorable" (data not shown).[13]

(Figures 1 and 2 about here)

California senatorial candidates took clear and widely publicized stands on Prop 23, with Republican, Carly Fiorina, endorsing the measure and Democrat, Barbara Boxer, voicing firm opposition. In the gubernatorial race, Democrat Jerry Brown was openly opposed, but Republican Meg Whitman tried to garner support from both proponents and opponents of the proposition, by seeking to straddle the issue. Although Whitman stated she would vote no on Prop 23, she also said that she would suspend AB 32.[14] Figure 3 illustrates that the senatorial candidates' images were powerfully correlated with voting.[15] Only 8% of those who strongly disliked Fiorina voted for the proposal, but among those who strongly liked her, 76% supported the proposal. The relationship between Boxer's image and Prop 23 voting is a mirror image—86% of those who strongly disliked her voted for the proposal, as compared to 9% of those who felt the opposite. Despite Whitman's ambiguity, there are strong correlations between gubernatorial candidate images[16] and Prop 23 voting. The percentage voting yes increased from 11% to 75% as attitudes towards her moved from very negative to very positive. Similarly, the percentage voting yes decreased from 82% among persons with highly negative images of Brown to only 16% among those with very positive images of him.

(Figure 3 about here)

In the next section, we specify two multivariate models of factors affecting Prop 23 voting to determine if candidate images were influential when other theoretically interesting and statistically significant explanatory variables are controlled. The first model provides a baseline for assessing the effects of several predictor variables on the probability of voting for or against Prop 23.[17] The second model specifies explicit interaction effects and is designed to test the two competing hypotheses articulated above concerning how candidate images interact with political knowledge to influence the choices voters make.

Multivariate Models of Voting on Proposition 23

Consonant with the theoretical perspectives on initiative and referendum voting discussed above, the two models incorporate variables tapping beliefs about the merits of the case, i.e., beliefs about whether a proposal, if passed, would produce what the voter considers to be a desirable outcome from a cost-benefit perspective. Specifically, we hypothesize that people with pro-environmental views would vote no, as would those who evaluate the economy positively. In contrast, people less strongly concerned about the environment and those judging the economy negatively would be likely to vote yes. We measure environmental attitudes using a factor score variable that summarizes information concerning attitudes towards Cap-and-Trade legislation, willingness to pay higher taxes to protect the environment, the importance ascribed to climate change and self-placement on a proposed trade-off between environmental protection and economic growth.[18] A second factor score variable summarizes information regarding national and personal economic evaluations over retrospective and prospective time horizons.[19]

The second category of explanatory variables contains heuristics voters might use as cues for making political choices. As discussed above, analysts often have argued that partisanship, liberal-conservative ideological positions and candidate images are cues that people use when deciding how to cast their ballots. Given arguments advanced by competing groups during the

Prop 23 campaign, we anticipate that Democratic identifiers and self-identified liberals would be more likely to vote against the proposition, whereas Republican partisans and conservatives would be more likely to vote in favor of it.[20] Regarding candidate images, noting that Republican Senate candidate Carly Fiorina strongly endorsed Prop 23 during the campaign and her Democratic rival, Barbara Boxer, strongly opposed it, we hypothesize that people with a relatively favorable image of Fiorina as compared to Boxer would tend to vote in favor, and those favoring Boxer over Fiorina would tend to vote against it. The situation for gubernatorial candidates is less clear-cut because of Whitman's equivocation, rejecting Prop 23 while endorsing suspension of AB 32. However, we expect individuals with relatively favorable images of her would likely vote yes, and those with relatively favorable images of Jerry Brown likely would vote no.[21]

There are other possibly relevant heuristics as well. One concerns voters' reactions to President Barack Obama. Although Obama was not on the ballot in 2010 mid-term congressional elections, his widely publicized endorsement of Cap-and-Trade legislation and his advocacy of measures to promote environmentally friendly solutions to America's energy and economic problems had clearly identified him as favoring green policy alternatives. Accordingly, images of Obama were a potentially influential heuristic available as voters sought cues about what to do about Proposition 23. People with favorable images of the President[22] should have been inclined to vote no and those with unfavorable images should have been disposed to vote yes.

We also consider the effects of the campaigns mounted by the political parties and their candidates. When parties contact voters, they attempt to mobilize support not only for themselves but also for their positions on major policy initiatives such as Prop 23. Accordingly, people contacted by Republicans should be more likely to vote yes, whereas those contacted by Democrats would be more likely to vote no.[23] In addition, risk acceptance-risk aversion may be

relevant, with the latter group voting no to avoid threats that might arise if the *status quo* was overturned.[24]

Finally, socio-demographic characteristics may be relevant to both the cost-benefit and heuristic perspectives. For example, by proposing to delay implementation of AB 32 until unemployment was below 5.5% for four consecutive quarters, Prop 23 invited voters to think in terms of a trade-off involving taking action to combat climate change and the need to jump start California's flagging economy. In this regard, unemployed people might be swayed by their personal adversity in the labor market to support the proposition. Other economically vulnerable groups such as racial and ethnic minorities, women and young people, and those with lower incomes and educational levels,[25] might react similarly.

To summarize, the model of voting on Prop 23 (without interaction terms) is:

$$\Pr(\text{Vote}=1) = \Phi(\beta_0 + B_1\text{ENVIR} + B_2\text{ECON} + B_3\text{LIBCON} + B_4\text{SCAND} + B_5\text{GCAND} + B_6\text{OBAMA} + B_{7\text{-}9}\text{PID} + B_{10\text{-}11}\text{CAMP} + B_{12\text{-}14}\text{RISK} + B_{15}\text{UNEMP} + B_{16\text{-}23}\text{DEMOS}) \quad (1)$$

In this model, the dependent variable is Pr(Vote=1), the probability that a voter will cast a yes ballot in favor of Prop 23. The predictor variables are: ENVIR = environmental attitudes; ECON = economic evaluations; LIBCON = liberal-conservative beliefs; SCAND = relative senatorial candidate images; GCAND = relative gubernatorial candidate images; OBAMA = Obama image; PID = party identification; CAMP = contact by Democratic or Republican parties; RISK = risk orientations; UNEMP = employment status; DEMOS = socio-demographic characteristics (age, education, gender, income, race/ethnicity); $B_{1\text{-}23}$ = coefficients to be estimated. Since voting on Prop 23 is measured as a dichotomy (vote no = 0, vote yes = 1), a binomial probit link function (Long and Freese, 2014) is specified.[26]

The model's overall fit is satisfactory—the McKelvey R^2 is .72, and fully 87.7% of the voters are correctly classified (Model A, Table 1).[27] Regarding specific predictors, several

variables operate as hypothesized. Pro-environmental attitudes and liberal ideological beliefs have the hypothesized negative effects on the probability of voting yes whereas negative evaluations of economic conditions encourage a yes vote. Senatorial candidate images also behave as anticipated, with people more favorably disposed towards Carly Fiorina than Barbara Boxer being more likely to vote yes, and those favorable towards Boxer rather than Fiorina being prone to vote no.[28] However, relative dispositions towards the gubernatorial candidates (Brown and Whitman) are not statistically significant. Voters' image of President Obama and their party identification also fail to exert significant effects.

(Table 1 about here)

As for other predictors, party contacting works as advertised—net of other considerations, people contacted by the Republicans are more likely to vote yes whereas those contacted by the Democrats are more likely to vote no. Risk orientations also behave as expected, with risk averse people being more apt to endorse the *status quo* by voting no. And, although employment status, level of formal education and annual family income are not statistically significant, young people, women, Hispanics and those in the "other" ethnic category are more likely to vote yes than are older people, men, and whites.

Since the parameters in Model A are estimated using a nonlinear (probit) link function, the magnitude of the effect of any predictor variable on the probability of voting yes depends upon the values of other predictors (Long and Freese, 2014). To provide intuition about the substantive importance of statistically significant predictors, we construct a scenario where all predictors are set at their means in the case of continuous variables, and at 0 in the case of dichotomous variables. Then, we vary each significant predictor in turn from its lowest to its highest value and compute the difference in the probability of voting yes.[29] The results indicate that environmental attitudes have a predictably impressive impact on voting on Prop 23. As these

attitudes move from highly negative (anti-environment) to highly positive (pro-environment), the probability of voting yes falls by fully .81 points on the 0-1 probability scale. Liberal-conservative beliefs also have impressive effects, with strong liberals being .41 points less likely to vote yes than strong conservatives. Comparative senatorial candidate images and economic evaluations also had sizable effects. As voters' images of the senatorial candidates move from strongly pro-Boxer to strongly pro-Fiorina or economic evaluations move from highly positive to highly negative, the probability of voting yes increases by .27 points. Other predictors are less powerful.[30]

Viewed generally, these results are consonant with the hypotheses that perceived costs and benefits and various heuristics both exert sizable effects on initiative and referendum voting. Given the subject of Prop 23, attitudes towards the environment are expected to have—and do have—strong effects. The fact that the Prop 23 vote was conducted in a context of economic hardship and explicitly pitted employment growth against environmental protection gives economic evaluations a cost-benefit tenor as well. Although the effects of economic evaluations are not as large as those associated with environmental attitudes, economic judgments have a substantial impact. Several heuristics matter too—the two strongest involve general liberal-conservative beliefs and voters' images of the senatorial candidates taking opposing stands on Prop 23. In the next section, we investigate competing hypotheses about interactions between candidate images and political knowledge.

Candidate Image Heuristics and Political Knowledge

The preceding analysis documents that the images of senatorial candidates Carly Fiorina and Barbara Boxer had substantial effects on voting on Proposition 23. As discussed above, similar results have been reported in earlier research, with some analysts conjecturing that the effects of candidate images are stronger among less politically knowledgeable voters. However,

we hypothesize that the effects of candidate heuristics may be stronger among more knowledgeable individuals. Such voters are arguably more likely to recognize their decision-making limitations, to have images of the candidates, and to know candidates' positions on an initiative or referendum proposal under consideration.[31]

We test these competing hypotheses by re-specifying the Prop 23 vote model to include a political knowledge variable plus a multiplicative interaction term involving this variable and the Fiorina-Boxer comparative candidate image variable.[32] If the traditional hypothesis is correct, then this interaction variable will have a negative effect on Prop 23 voting. However, if the alternative hypothesis is correct, the interaction variable will have a positive effect.

Testing these rival interaction-effect hypotheses is not straightforward. In recent years, analysts have become increasingly aware of the need for care when drawing inferences about interaction effects in multivariate models.[33] To date, this literature has focused heavily on interpreting interaction effects in *linear* regression models. However, Norton et al. (Ai and Norton, 2003; Norton, Wang and Ai, 2004; see also Brambor, Clark and Golder, 2006; Berry, DeMeritt and Esarey, 2010) caution that additional complexities arise when one specifies interaction effects in *non-linear* models such as the binomial probit model of interest here. Consider an interaction effect in a binomial probit model involving two predictor variables:

$$E(y \mid X1, X2, X) = \Phi(B_1X1 + B_2X2 + B_{12}X1X2 + XB) = \Phi(u) \qquad (2)$$

where: E(y|X1,X2,X) = conditional mean of dependent variable Y, Φ = the cumulative normal distribution, X1 and X2 are predictor variables interacted as the product X1*X2 and X*B* represents the effects of other predictor variables in the model.[34]

Following the analogy with what is done with linear models, one might be tempted to interpret the marginal effect for X1X2 as the derivative of Φ(u) with respect to the interaction effect (XIX2), i.e.,

$$\frac{\partial \Phi(u)}{\partial (X1X2)} = B_{12}\Phi'(u) \qquad (3)$$

However, the interaction effect in this nonlinear model is actually the cross-derivative with respect to X1 and X2. Thus, if X1 and X2 are continuous variables, as is the case in the probit specification of the Prop 23 voting model, the interaction effect is:

$$\frac{\partial^2 \Phi(u)}{\partial X1 \partial X2} = B_{12}\Phi'(u) + (B_1 + B_{12}X2)(B_2 + B_{12}X1)\Phi''(u) \qquad (4)$$

Ai and Norton (2003: 124) note four important implications: (i) if B_{12} is zero, the interaction effect is not necessarily zero; (ii) the statistical significance of the interaction effect is not a simple t-test on B_{12} but rather varies across cases (here Prop 23 voters); (iii) the interaction effect is conditional on the full set of predictor variables in the model; (iv) the sign of the interaction effect is not necessarily the sign on B_{12} but rather can vary depending on the values of other covariates in the model. Here, we employ these ideas to study interaction effects between candidate image heuristics and political knowledge in a binomial probit model of voting on Prop 23. As noted, the model of interest (Model B) is identical to Model A except that we add a political knowledge variable and a multiplicative term for relative Senatorial candidate image x level of political knowledge.[35]

Model B's parameter estimates show the values of the coefficients for most of the predictor variables that appeared in Model A are largely unchanged (see Table 1).[36] The smaller AIC value for Model B in comparison with Model A indicates that Model B has a superior fit.[37] In addition, the coefficient for the comparative Senatorial candidate image x political knowledge multiplicative term in Model B is positive (.033) and statistically significant ($p < .001$). However, there is considerable variation in the nature of this interaction effect across the electorate, with the effect being positive for 525 voters and negative for 327 voters. Tests of

statistical significance ($p \leq .05$) for these effects are displayed in Figure 4 which plots the Z scores for the interaction effects against the probability of voting yes.[38] Given competing hypotheses that the comparative leader heuristic x political knowledge interaction effects could be either positive or negative, these significance tests are *two-tailed* (critical values of Z = +/- 1.96, p = .05). The shaded portions of Figure 4 show which voters have statistically significant positive interaction effects and which voters have significant negative interaction effects.

(Figure 4 about here)

The distribution of Z scores shows that a large number (270) of cases are positive and statistically significant. In contrast, only a small number (7) are negative and statistically significant. Thus, fully 97.5% of the statistically significant interaction effects are positive and only 2.5% are negative. These two groups constitute 31.3% and 0.8%, respectively, of the total sample of Prop 23 voters (N = 862). The remaining Z scores (for 67.9% of the sample) are not statistically significant. The relatively large number of significant positive interaction effects is consistent with the hypothesis that, compared to their less knowledgeable fellow citizens, politically knowledgeable people tend to place more, not less, emphasis on candidate heuristics when deciding how to cast their ballots.

The concave shape of the plot of interaction effect Z-scores against the probability of voting yes in Figure 4 also is informative. This pattern illustrates that candidate image x political knowledge interaction effects tend to be statistically insignificant when the overall probabilities of voting yes are either very small or very large. In contrast, the size of the interaction effect tends to increase as the likelihood of voting yes or no approaches .5.[39] Regressing the size of the interaction effect on the probability of voting yes folded at .5 shows that this relationship is very strong—the (folded) probability can explain fully 86% of the variance (Figure 5). Substantively, this relationship is consistent with the idea that as various forces influencing a voter's decision on

Prop 23 become more evenly balanced, there is heightened uncertainty about what a voter will do. In this context of *ceteris paribus* uncertainty, the interaction between candidate image heuristics and political knowledge exerts its greatest force.

(Figure 5 about here)

Conclusion: Heuristics, Heterogeneity and Political Choice

One important dimension of the multifaceted debate on climate change has focused on the economic consequences of measures designed to mitigate the threat of global warming. Some political jurisdictions, including California, have taken action to curtail greenhouse gases, using the Cap-and-Trade concept for policy guidance. Opponents have argued that these policies will have seriously deleterious economic effects. When Californians went to the polls in November 2010, Proposition 23 gave them a voice in this debate—if they wished, they could vote to suspend AB 32, a climate change bill passed by the state legislature in 2006. Given California's economic difficulties, some observers thought that voters might conclude that the bill was an unaffordable jobs killer. However, Proposition 23 was defeated by a sizable margin. Hard times notwithstanding, a majority of voters were not ready to abandon AB 32.

As hypothesized in previous studies, the analyses presented above testify that cost-benefit judgments and various heuristics significantly influenced how Californians cast their ballots. People who were impressed by the dangers posed by climate change strongly tended to vote no and those who were unimpressed strongly tended to vote yes. Economic evaluations were relevant too and, again, the effects were strong and straightforward. People who judged economic conditions negatively were more likely to support Prop 23 than were those who were more sanguine about the economy's current condition and future prospects. General liberal-conservative beliefs and risk aversion mattered as well—people identifying themselves as liberals and those who were highly risk averse were more likely to vote no than were self-

identified conservatives and risk acceptant individuals. And, although images of gubernatorial candidates and President Obama were not influential, voters' reactions to the Senatorial candidates, Carly Fiorina and Barbara Boxer, had sizable effects. Fiorina enthusiastically endorsed Prop 23 and people who were more favorably impressed by her than Boxer tended to vote yes. Contrariwise, Boxer opposed the proposition and people who were more favorably disposed towards her than her opponent were likely to vote no.

The analyses also shed light on how candidate heuristics influence political choice among voters with varying levels of political knowledge. Contradicting the hypothesis that more knowledgeable people accord less weight to candidate images, multivariate analyses indicate that the effects of Senatorial candidate images tended to be greater among more knowledgeable voters. These interaction effects increased in strength as the overall set of forces prompting a yes versus a no vote became more evenly balanced. The latter finding suggests that candidate image cues are apt to be emphasized by knowledgeable voters when they encounter what is otherwise a difficult decision.

Historically, most studies of voting in initiatives, referendums and general elections have assumed homogeneous electorates. Despite findings stretching back to Converse's (1964) much cited research indicating that political belief systems in mass publics vary significantly in content and structure, the assumption that forces driving political choice have the same weight for all voters remains widespread.[40] But the assumption is not ubiquitous—in recent years it has been challenged by researchers who hypothesize that the use and impact of heuristics varies across electorates. Consistent with this heterogeneity conjecture, present analyses indicate that knowledgeable voters tend to make more—not less—use of heuristics when faced with potentially important decisions such as the one posed by a ballot initiative to suspend climate change legislation in a period of economic distress. In addition, the statistical evidence suggests

that the impact of candidate heuristics is greatest among voters who are most uncertain about how to cast their ballot. The interactive effects of candidate image heuristics and political knowledge warrant additional inquiry by scholars interested in the psychology of political choice in direct democracy and general election settings.

More generally, the present study illustrates the potential theoretical and practical significance of the "fast and frugal" heuristic theory developed by Gigerenzer and others. Applied here to studying the determinants of voting on an important ballot initiative, these theoretical ideas may be very useful for understanding decision-making not only in direct democracy contexts but also to choice behavior in the larger set of political arenas where information costs are substantial and people are subjected to an array of competing and conflicting messages.

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Figure 1. Ratings of the Importance of Climate Change

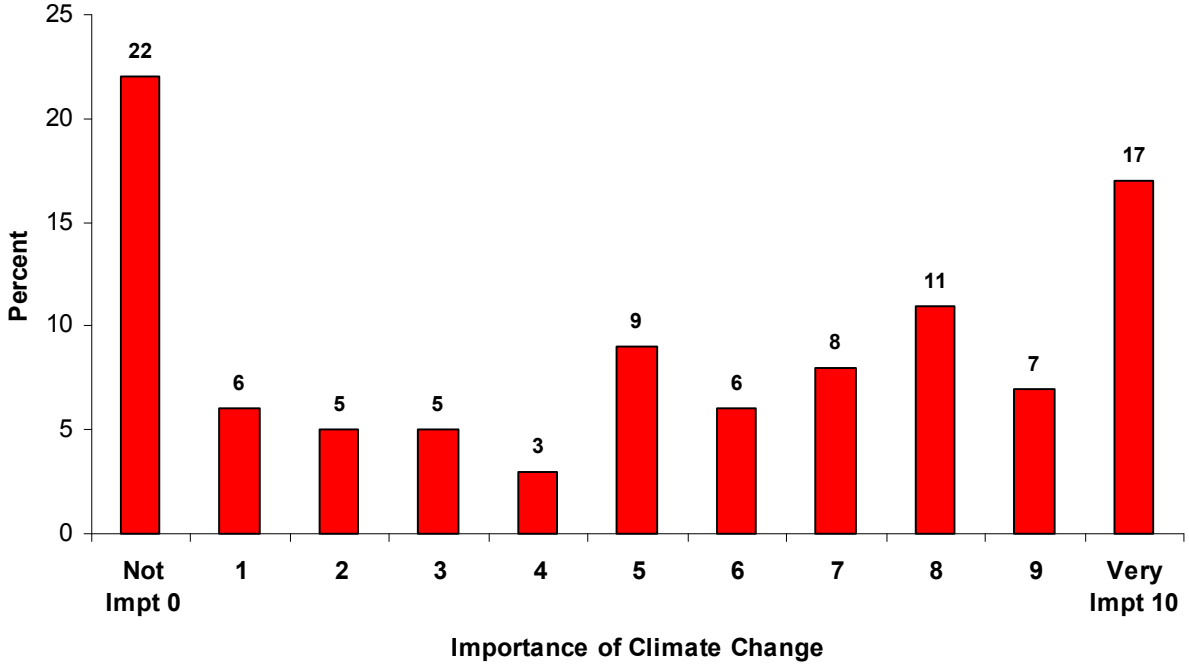

Figure 2. Trade-Off Between Environmental Protection and Economic Growth

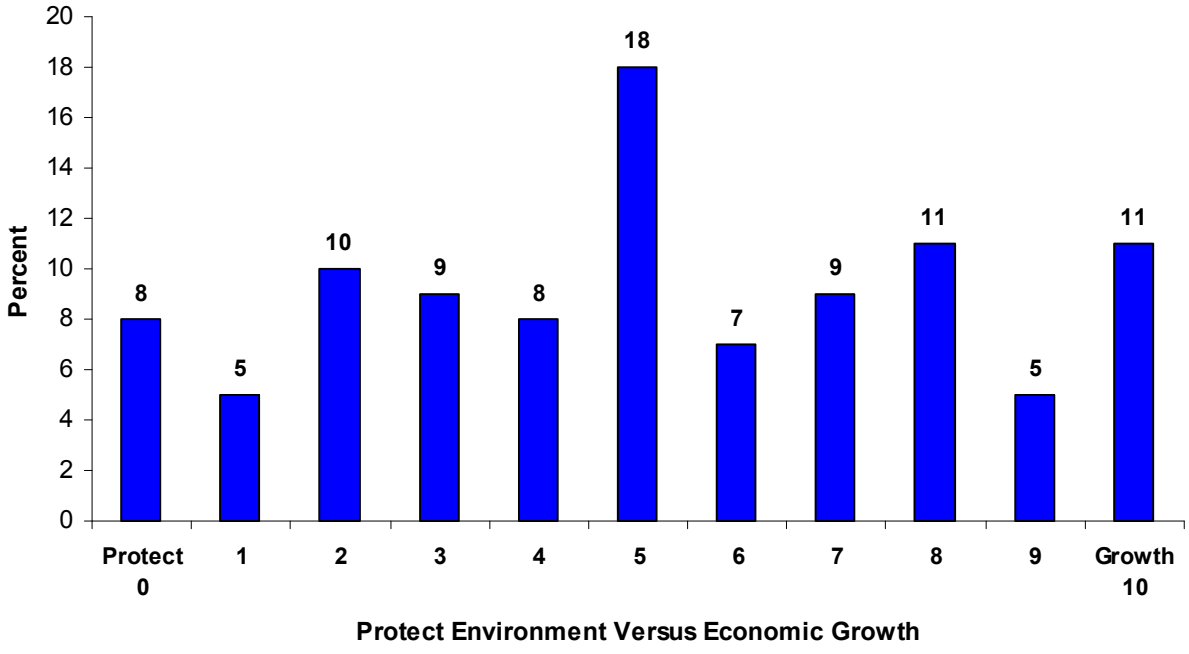

Figure 3. Percentages Voting Yes on Proposition 23 by Images of U.S. Senate Candidates

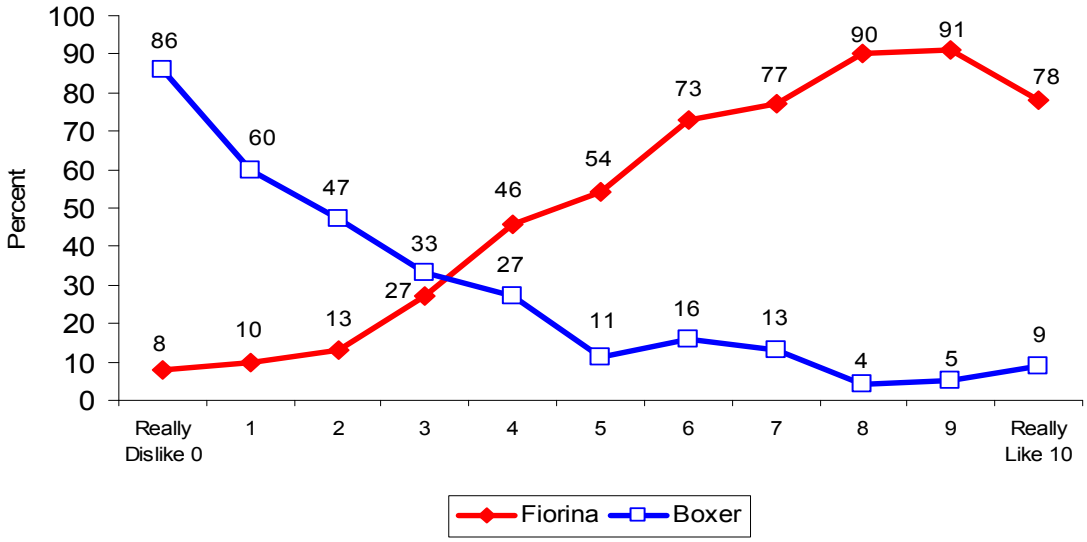

Figure 4. Relative Senatorial Candidate Images x Political Knowledge Interaction Effects in Proposition 23 Vote Model

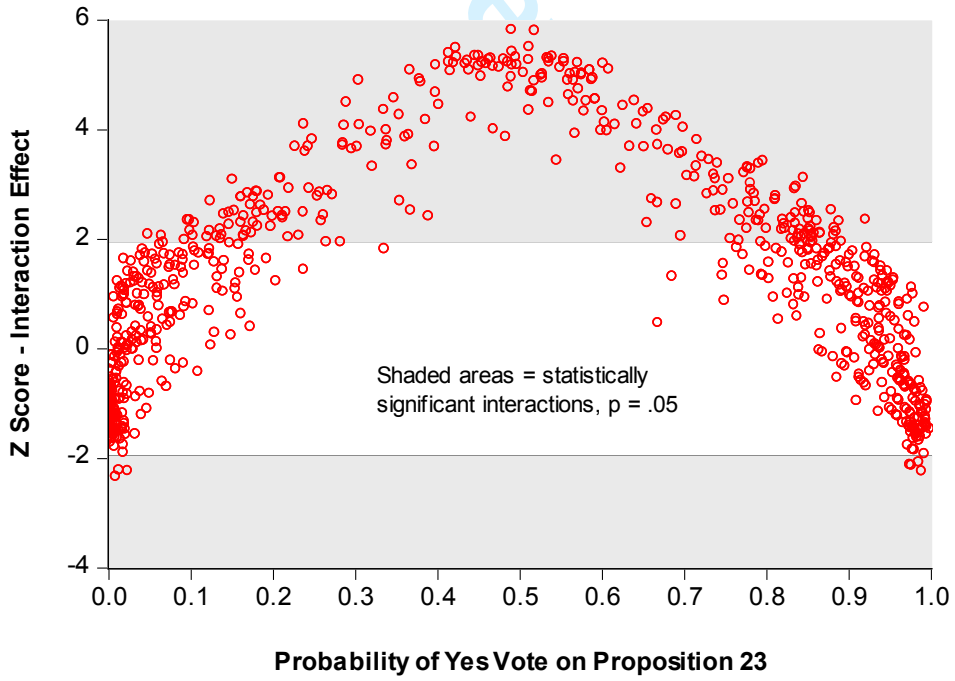

Figure 5. Candidate Image-Political Knowledge Interaction Effects by Folded Probability of Yes Vote on Proposition 23

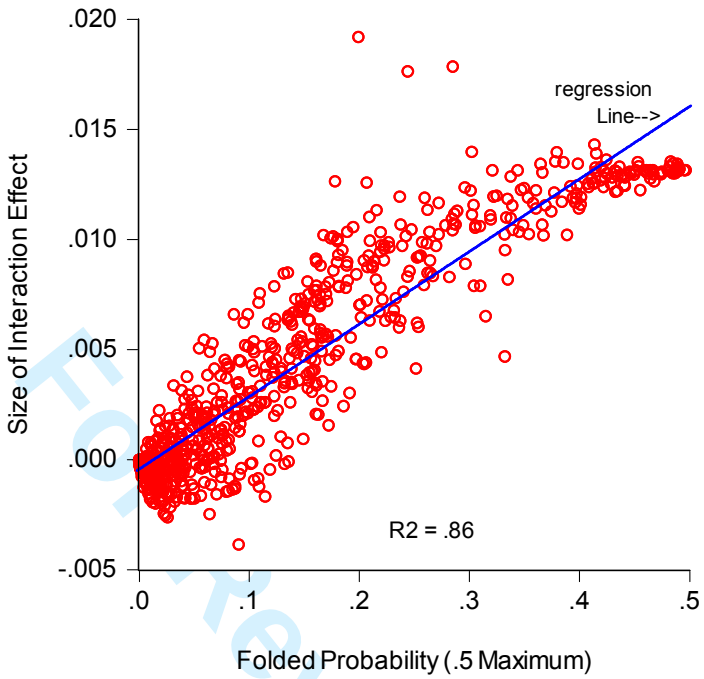

Table 1. Binomial Probit Models of Yes Voting on California Proposition 23 Initiative

	Model A		Model B	
Predictor	β	s.e.	β	s.e.
Environmental Attitudes	-.938****	.118	-.854***	.121
Liberal-Conservative Beliefs	-.288***	.111	-.250***	.113
Negative Economic Evaluations	.155**	.085	.156*	.087
Relative Images: Senatorial Candidates	.039**	.020	-.153***	.041
Gubernatorial Candidates	-.020	.018	-.022	.019
Political Knowledge	---	---	-.057	.042
Senatorial Candidates x Political Knowledge	---	---	.033***	.006
Obama Image	.019	.029	.022	.030
Party Identification: Democrat	-.118	.196	-.203	.199
Republican	-.019	.170	.015	.175
Other Party	.277	.356	.142	.371
Risk Orientations: Very Risk Acceptant	.015	.178	-.030	.181
Somewhat Risk Averse	-.139	.172	-.070	.177
Very Risk Averse	-.505**	.231	-.411*	.237
Campaign Contact: Republican	.304**	.158	.245	.164
Democrat	-.298**	.158	-.291*	.165
Age	-.006*	.004	-.005	.004
Education	.016	.046	-.001	.047
Gender	-.176*	.131	-.142	.140
Annual Family Income	.002	.021	.008	.021
Unemployed	.228	.211	.345	.220
Race/Ethnicity: African-American	.207	.245	-.008	.258
Hispanic	.282*	.181	.224	.184
Other	.437*	.194	.428*	.199
Constant	-.127	.341	.038	.381
McKelvey R^2	.72		.76	
Percentage of Votes Correctly Classified	87.7		87.8	
Lambda	.72		.72	
Log-Likelihood	-274.216		-259.205	
AIC	594.431		568.410	
N	862		862	

* - p ≤ .10; ** - p ≤ .05; *** - p ≤ .01; **** - p ≤ .001; one-tailed test for all predictors except socio-demographics.

--- - variable not included in model.

Appendix A
Question Wording

Economic Evaluations

a. Personal Retrospective: "Thinking about economic conditions, now does the financial situation of your household now compare with what it was 12 months ago?"
b: National Retrospective: "Would you say over the past year, the nation's economy has..."
c. "Thinking ahead, how do you think the financial situation of your household will change over the next 12 months? Will it..."
d. "Thinking ahead, would you say that over the next year, the nation's economy will..."
Response categories for a. - d.: much better, better, same, worse, much worse, not sure.

Environmental Attitudes
1. Cap and Trade
There is a lot of discussion about 'Cap and Trade' legislation designed to protect the environment by limiting the amount of carbon released into the atmosphere. The nonpartisan Congressional Budget Office estimates 'Cap and Trade' would cost the American economy 22 billion dollars over the next decade. Some people think this price is worth paying but others disagree. Are you in favor of the 'Cap and Trade' legislation or opposed to it?
Response categories: strongly in favor, in favor, neither in favor nor opposed, opposed, strongly opposed, don't know

2. Climate Change and Taxes
In order to deal with the issue of climate change, would you be willing to see your taxes increase...
Response categories: great deal, somewhat, not very much, not at all, don't know

3. Climate Change - Important Problem
On a scale from 0 to 10 where 0 means 'not an important problem and 10 means 'an extremely important problem,' how would you rate the issue of climate change?
Response categories: 0 - not important problem, 1....10 - extremely important problem, don't know

4. Environment Versus Economy
On a scale from 0 to 10 where 0 means protect the environment regardless of possible negative effects on the economy and 10 means promote economic growth regardless of possible negative effects on the environment, where would you put yourself?
Response categories: 0 - protect the environment regardless of possible negative effects on the economy, 1...10 - promote economic growth regardless of possible negative effects on the environment.

Liberal-Conservative Ideology
1. Abortion
There has been a lot of discussion about abortion in recent years. Which one of the following statements comes closest to your view? Response categories: (i) By law, abortion should never be permitted; (ii) The law should permit abortion only in case of rape, incest, or when the woman's life is in danger; (iii) The law should permit abortion for reasons other than rape, incest or danger to the woman's life, but only after the need for abortion has been clearly established; (iv) By law, a woman should always be able to obtain an abortion as a matter of personal choice; (v) don't know.

2. Same-Sex Marriage

There has been a lot of discussion about same sex marriage in recent years. Which one of the following statements comes closest to your own view? Response categories: (i) By law, people of the same sex should never be allowed to marry one another; (ii) People of the same sex should be allowed to have a legally recognized 'civil union' but not allowed to marry one another; (iii) People of the same sex should be allowed to marry one another if they choose; (iv) don't know.

3. Defense Spending
Some people believe that we should spend much less money for defense. Others feel that defense spending should be greatly increased. On a scale from 0 to 10, where 0 means 'government should spend much more on defense' and 0 means 'government should spend much less on defense' where would you place yourself on this scale? Response categories: 0 - government should spend much more on defense, 1...10 - government should spend much less on defense.

4. Cut Taxes Versus Increase Spending on Social Services
Using the 0 to 10 scale below, where the end marked 0 means the U.S. government should cut taxes a lot and spend much less on health and social services, and the end marked 10 means the U.S. government should raise taxes a lot and spend much more on health and social services, where would you place yourself on the scale? Response categories: 0 - government should cut taxes a lot and spend much less on health and social services, 1...10 - government should increase taxes a lot and spend much more on health and social services.

5. Liberal-Conservative Scale
Thinking about politics these days, how would you describe your own political viewpoint? Response categories: very liberal, liberal, moderate, conservative, very conservative, not sure.

Senatorial and Gubernatorial Candidate Images
These four questions are asked for Carly Fiorina, Barbara Boxer, Meg Whitman and Jerry Brown. An example is: Using a scale that runs from 0 to 10, where 0 means strongly dislike and 10 means strongly like, how do you feel about Carly Fiorina, the Republican candidate for the U.S. Senate in your state? Response categories: 0 - strongly dislike, 1...10 - strongly like, don't know.

President Obama Image
Using the 0-10 scale below, please indicate how much you like Barack Obama? Response categories: 0 - dislike very much, 1...10 - like very much, don't know.

Campaign Contact
a. Did anyone working for a candidate or other people from the political parties call you on the telephone or visit your home to talk with you about the recent election? Response categories: (i) yes, I was contacted, (ii) no, I was not contacted, (iii) don' know

(b) [If "yes"] Which of the following candidates or parties contacted you? [Please tick all that apply] Response categories: (i) Democrats, (ii) Republicans, (iii) other parties or candidates [please specify below], (iv) don't know.

Party Identification
Generally speaking, do you usually think of yourself as a Republican, a Democrat, an Independent or what? Response categories: (i) Republican, (ii) Democrat, (iii) Other party, (iv) Independent, no party, (v) don't know

Political Knowledge

Respondents were asked if the following statements were true or false: The political knowledge questions are: (i) "Former Senator Hillary Rodham Clinton is now Secretary of State;" (ii) "Over 2000 American soldiers have been killed in Afghanistan;" (iii) "The U.S. Constitution gives President Obama the power to declare war against foreign countries;" (iv) "The Democrats had the most members in the U.S. House of Representatives before the election on November 2nd;" (v) "Immigrants can vote in American national elections if they become permanent resident aliens (that is, get a 'green card');" (vi) "The official unemployment rate in the United States is currently above 9 percent;" (vii) "Harry Reid supports 'Card Check' legislation to strengthen trade unions;" (viii) "Before adjourning for the November 2010 elections, congress passed a bill to increase taxes on anyone earning over $250,000 a year." Response categories for (i) to (viii) were: true, false, don't know.

A political knowledge index ranging from 0 to 8 is constructed by calculating the number of correct answers to (i) - (viii). The mean number of correct answers for California respondents is 4.7 and the standard deviation is 2.3. For non-Californians, the mean is 4.9, and the standard deviation is 2.2.

Risk Orientations

Generally speaking, how willing are you to take risks? Are you....Response categories: (i) very willing to take risks, (ii) somewhat willing to take risks, (iii) somewhat unwilling to take risks, (iv) very unwilling to take risks, (v) don't know.

Demographics

a. Age: measured using question asking respondents to designate their year of birth. Age is 2010 - year of birth.

b. Education: Respondents were asked to indicate their highest level of education completed using a six-point scale ranging from: (i) did not graduate from high school, to (vi) postgraduate degrees (MA, MBA, MD, JD, PhD, etc.).

c. Ethnicity/Race: Respondents were asked: "What racial or ethnic group best describes you?" Categories were: (i) White; (ii) Black or African-American; (iii) Hispanic or Latino; (iv) Asian or Asian-American; (v) Native American; (vi) Middle Eastern; (viii) Mixed Race; (ix) Other [please specify]. For the multivariate analysis, 0-1 dummy variables were constructed for African-Americans, Hispanics, and Others [categories (iv) to (ix) above]. Whites were treated as the reference category.

d. Gender: measured using question asking respondents to designate their gender. For the multivariate analysis of referendum voting, men are scored 1 and women, 0.

e. Annual Family Income: Respondents were asked to designate their annual family income before taxes using 13 categories ranging from (i) under $20,000 to (xiii) $250,000 and over. A "don't know" category also was provided.

f. Employment Status: Respondents were asked to designate their current employment status. Response categories: (i) working fully time now; (ii) working part time now; (iii) temporarily laid off; (iv) unemployed; (v) retired; (vi) permanently disabled; (vii) taking care of hoe or family; (viii) student; (ix) other work status [please specify]. For the multivariate analysis, respondents choosing categories (iii) or (iv) were considered unemployed.

Endnotes

[1] In the United States, progressive era reforms of the early 20th century resulted in western states such as California and Oregon using initiatives and referendums to decide a broad range of policy questions. See, e.g., Bowler, Donovan and Tolbert (1998); Cronin (1989); Magleby (1984).

[2] For reviews of the initiative and referendum voting literature, see Bowler and Donovan (1998); Bowler, Donovan and Tolbert (1998); Butler and Ranney (1994); LeDuc (2003). For studies of the impact of initiatives and referendums on citizen engagement, issue salience and the political process, see Donovan, Tolbert and Smith (2009); Smith and Tolbert (2004, 2010).

[3] Particular proposals should have differential relevance for different groups of people. For example, Proposition 23 was designed to alleviate unemployment and, hence, it may have appealed to jobless persons, or groups such as ethnic minorities, women and young people who are especially vulnerable to adverse labor-market conditions.

[4] On heuristics and decision-making in initiative and referendum settings, see Lupia (1994); Lupia and McCubbins (1998); Bowler and Donovan (1998); Clarke, Kornberg and Stewart (2004).

[5] Voters' political attitudes and beliefs assist them in using heuristics. For example, they may compare their party identifications and ideological positions with those of proponents and opponents of a proposal (Sniderman, Brody and Tetlock, 1991). More general psychological predispositions may be relevant as well. For example, as discussed above, it has been conjectured that widespread risk aversion is an important reason why initiative and referendum proposals frequently are defeated (e.g., Bowler and Donovan, 1998; Nadeau, Martin and Blais, 1999; Clarke, Kornberg and Stewart, 2004).

[6] A recent study of voting in Britain's 2011 national referendum on changing the electoral system presents empirical evidence consistent with this hypothesis. See Clarke et al. (2013).

[7] For example, survey data gathered in a recent national study of voting in Britain's 2010 AV ballot referendum reveals that the percentage of respondents correctly identifying Conservative Prime Minister David Cameron's position on the proposal increased monotonically from 0.7% to 94.1% over a six-point political knowledge scale. Comparable increases in correct identifications of the positions of opposition party leaders, David Miliband (Labour) and Nick Clegg (Liberal Democrat) are from 5.9% to 75.1% and from 11.9% to 95.2%, respectively. See Clarke et al. (2013).

[8] Proposition 23 was a ballot initiative, not a referendum, because it appeared on the ballot because of a petition signed by citizens of California, not because of actions by the state legislature.

[9] Official Voter Information Guide, www.voterguide.sos.ca.gov/proposition/23.

[10] Fieldwork for the 2010 PSA was directed by Elizabeth Christie, YouGov/Polimetrix. A description of YouGov/Polimetrix sampling procedures may be found in Vavreck and Rivers (2008). For a recent mode-comparison analysis demonstrating the utility of high quality internet surveys, see Ansolabehere and Schaffner (2011). Financial support for the present study was provided by the National Science Foundation (Grant #SES-1048117) and the University of Texas at Dallas. The authors wish to thank the NSF and UTD for their generous assistance. The survey data and supporting documentation will be placed on the authors' website to permit replication analyses.

[11] In the sample of California referendum voters (weighted N = 860), 56.4% reported voting no on Proposition 23 and 43.6% reported voting yes. National congressional vote shares in the survey are

Democrat = 47.1%, Republican = 50.5%, other = 2.4. These vote shares differ by only 2.3%, 1.1% and 1.2%, respectively, from the actual totals.

[12] Question wordings are presented in Appendix A.

[13] Pro-environmental policy positions tend to be espoused by people with liberal political beliefs on a broad range of economic and social issues. In this regard, it is noteworthy that 34% of Californians labeled themselves “very liberal” or “liberal,” 36% labeled themselves "conservative" or "very conservative," 26% said they were "moderates" and 4% "didn't know" where to place themselves on the liberal-conservative scale.

[14] Whitman described her plans: "My plan is to suspend AB 32 for at least one year while we develop the sensible improvements the law badly needs to protect the jobs of hard-working Californians while improving our environment." See www.huffingtonpost.com/2010/09/23/meg-whitman-opposes-propo_n_736822.html.

[15] Fiorina's mean score on the 0 (strongly dislike) - 10 (strongly like) scale was 4.1 and Boxer's was 4.3. Few people were indifferent between the candidates: 51.5% gave a higher score to Boxer, 44.1% gave a higher score to Fiorina, and 4.4% rated them equally.

[16] Whitman's mean score on the 0-10 affect scale was 3.8 and Brown's was 4.4. Brown and Whitman were rated higher by 51.5% and 42.0%, respectively, with 6.5% rating them equally.

[17] We employ a binomial probit model to estimate the effects of leader image heuristics interacting with levels of political knowledge on the probability of voting for Prop 23. Focusing on the probability of voting for Prop 23 facilitates intuition in the sense that probabilities are bounded between 0 and 1 and, unlike the linear probability model, the binomial probit model adheres to these bounds. Given the nonlinear functional form of the binomial probit model, the impact of any predictor variable on the voting probability of interest will vary depending on the values of other predictor variables (e.g., Nagler, 1991; Berry, DeMerritt and Esarey, 2010). The rationale for introducing an explicit multiplicative interaction term is discussed below.

[18] The analysis explains 77.7% of the item variance, with factor loadings ranging from .81 to .92. The environmental attitudes variables are scored such that high scores indicate positive (pro-environmental) attitudes.

[19] The analysis explains 68.0% of the item variance, with factor loadings ranging from .75 to .87. The economic evaluation variables are scored such that high scores indicate negative evaluations.

[20] Democratic and Republic party identifications are measured as 0-1 dummy variables with independents and "don't knows" designated as the reference category. Liberal-conservative beliefs are measured as a factor score variable based on an exploratory factor analysis of five items relating to abortion, same-sex marriage, defense spending, a taxation-social services spending trade-off and position on a general liberal-conservative scale. The factor analysis explains 59.2% of the item variance with factor loadings ranging from .61 to .87. High scores on each of the liberal-conservative variables indicate the respondent takes a liberal position.

[21] Comparative candidate image variables are constructed using the 0-10 affect scales. The senatorial candidate image variable is Fiorina's like-dislike score minus Boxer's, and the gubernatorial candidate image variable is Whitman's like-dislike score minus Brown's.

[22] Obama's image is measured using a 0-10 affect scale. *Circa* October 2010, his average score was 4.6, down from the 5.1 he had recorded at the time of the 2008 presidential election. See Clarke et al. (2012).

[23] Party contact is measured as two (0-1) dummy variables for contact by the Democrats and the Republicans. People not contacted by either party are the reference category.

[24] Using "somewhat willing" (to take risks) or "don't know" responses as the reference category, 0-1 dummy variables are created for the "very willing (very risk acceptant)," "somewhat unwilling (somewhat risk averse)" and "very unwilling (very risk averse)" categories.

[25] Unemployment status is a 0-1 dummy variable, with people stating that they were unemployed or temporarily laid off scored 1 and all other respondents scored 0. Age is age in years; educational level is a 0-6 variable ranging from high school education or less to graduate-level (MA, Ph.D) or professional (LLB, MD) degree; gender is a 0-1 dummy variable with men scored 1 and women, 0; annual family income is a 13-category degree ranging from 1 (under $20,000) to 13 ($250,000 or more) per year; and race/ethnicity is a series of 0-1 dummy variables for African-Americans, Hispanics and "Others" with Whites as the reference category.

[26] Model parameters are estimated using Stata/MP 13.1's binomial probit program.

[27] A proportional reduction in error statistic (Lambda) indicates that the model can reduce classification errors in referendum voting by 72% compared with a naive mode-guessing approach.

[28] Opinions about Proposition 23 might influence candidate images and create a simultaneity bias in the vote model. To check this possibility, we re-estimated the model employing two-stage conditional maximum likelihood (Alvarez and Glasgow, 1999). The test for simultaneity bias was statistically insignificant (B = .019, s.e. = .071, t = 0.27).

[29] Probabilities are computed using the Clarify program (Tomz, Wittenberg and King, 1999). Alternative scenarios using one or two standard deviation shifts in continuous variables yield the same substantive conclusions about the relative importance of various predictors.

[30] Specifically, risk averse people are .16 points less likely to vote yes than risk acceptant individuals. Contacts by the Republican and Democratic parties change the probability of voting yes by .11 and .10 points, respectively. Differences across demographic groups are also modest—younger people and women are .16 and .06 points, respectively, less likely to vote yes, whereas Hispanics and those in the "other" race/ethnicity category are .08 and .16 points more likely than Whites to do so.

[31] The 2010 PSA survey does not contain a measure of knowledge of the positions of the senatorial and gubernatorial candidates on Proposition 23. However, evidence from an earlier study in California by Karp (1998) as well as the British data cited in note 6 above strongly support the assumption that more knowledgeable voters are more likely to be aware of candidates' positions. See also Delli Carpini and Keeter (1997). It bears emphasis that *accurate* perceptions of the candidates' positions on a ballot proposition are not required for voters for use candidate images as a heuristic. What is required is that voters *think* that they know where the candidates stand.

[32] Eight factual statements are used to gauge levels of political knowledge. An additive index (range: 0 to 8) is constructed by calculating the number of correct answers. The mean number of correct answers is

4.7 for Californians and the standard deviation is 2.3. For non-Californians, the mean is 4.9, and the standard deviation is 2.2.

[33] See, e.g., Braumoeller, 2004; Brambor, Clark and Golder (2006); Kam and Franzese (2007); Berry DeMeritt and Esarey (2010); Hanmer and Kalkan (2013).

[34] This is the notation used by Ai and Norton (2003) and Norton, Wang and Ai (2004).

[35] Norton, Wang and Ai's (2004) Stata module (inteff.do) for estimating interaction effects and standard errors in logit and probit models is employed in the present analyses. Greene (2010: 295-96) has argued that the Ai, Norton and Wang approach to studying interaction effects in logit and probit models is correct but may not be particularly useful when scholars do not have hypotheses about the nature of such effects. Here, we have explicit rival hypotheses to guide our analysis and interpretation.

[36] Specifically, environmental attitudes, liberal-conservative beliefs, economic evaluations, risk aversion, Democratic campaign contact, and "other" race/ethnicity remain statistically significant and properly signed ($p < .05$ or greater). Unemployment and Republican campaign contact are significant at $p < .10$. Coefficients for all of these predictors are not significantly different in magnitude ($p < .05$) from those estimated for the no-interaction effect model (Model A).

[37] AIC (Akaike Information Criterion) is computed as -2*LL + 2k where LL is the model log likelihood and k is the number of parameters. See, e.g., Burnham and Anderson (2002).

[38] Standard errors for the interaction effects are computed using the delta method. See Ai and Norton (2003: 125).

[39] Recall that the cumulative normal (Φ) and logit (Λ) distributions are symmetric sigmoid-shaped curves with their inflection points occurring when $p(Y=1|\mathbf{X}) = .5$. At this point these curves are steepest and changes in predictor variables will have their greatest effects on the probability that Y=1. In general, however, the maximum impact of a predictor variable might occur when $p(Y=1|\mathbf{X})$ is greater or less than .5. To investigate this possibility, Model B was re-analyzed using a Scobit specification (Nagler, 1994; see also Achen, 2001). Scobit estimates the α parameter that generalizes a conventional logit model in which α is *assumed* to equal 1.0, thereby producing a symmetric sigmoid curve, i.e., $Pr(Y=1|\mathbf{X}) = 1/(1 + e^{-\mathbf{XB}})^{\alpha}$. A likelihood ratio test fails to reject the null hypothesis that $\alpha = 1.0$ ($\chi^2 = 2.49$, df = 1, $p = .119$). Given the very close similarity between the logit and probit functions, this result strongly suggests that the interaction effects of interest have their largest impact when $p(Y=1|\mathbf{X}) = .5$.

[40] See, e.g., the recent studies of voting in the United States, Canada and France by Clarke, Kornberg and Scotto (2009) and Lewis-Beck, Nadeau and Bélanger (2011).