Appendix for "Issue Scales, Information Cues, and the Proximity and Directional Models of Voter Choice"

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Appendices

A More detail on the proximity and directional models

There are many versions of the formal proximity model, but every version shares the property of assuming the voter's utility for selecting a candidate decreases monotonically with the distance between the voter and candidate. One common proximity model is

$$U_{ij} = \alpha - \sum_{k=1}^{K} \beta_k (v_{ik} - c_{jk})^2 \tag{1}$$

where U_{ij} is the utility that voter i has for selecting candidate j, v_{ik} is the position of voter i on issue k, c_{jk} is the position of candidate j on issue k, α is analogous to a regression constant and represents the expected value of U_{ij} for a voter that perfectly agrees with the candidate on every issue, and the β_k parameters are analogous to regression coefficients and allow the issues to be weighted differently in a voter's calculus. Control variables and a residual term can be added to Equation 1 to embed the model in a linear regression.

Rabinowitz and Macdonald's directional model of issue voting explicitly defines voter utility to be a function of direction and intensity rather than of distance (Rabinowitz and Macdonald 1989). Supposing that a value of 0 for v_{ik} and c_{jk} – as defined in Equation 1 – represents the ideological midpoint, the directional model can be written as

$$U_{ij} = \alpha + \sum_{k=1}^{K} \beta_k (v_{ik} c_{jk}). \tag{2}$$

If the voter and the candidate both take conservative positions on the same issue, then both v_{ik} and c_{jk} are positive, and their product yields positive utility. Likewise, if the voter

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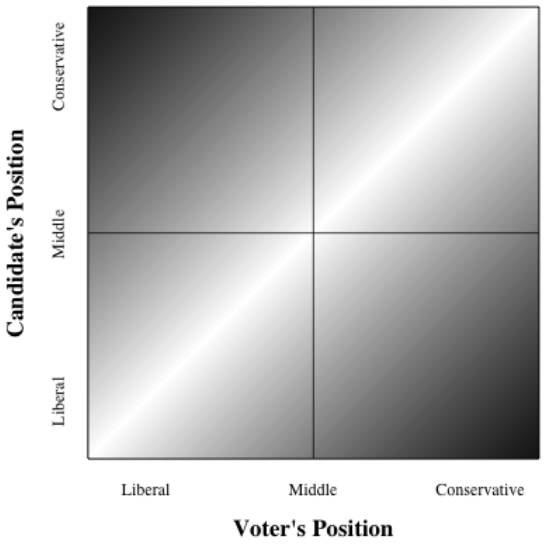
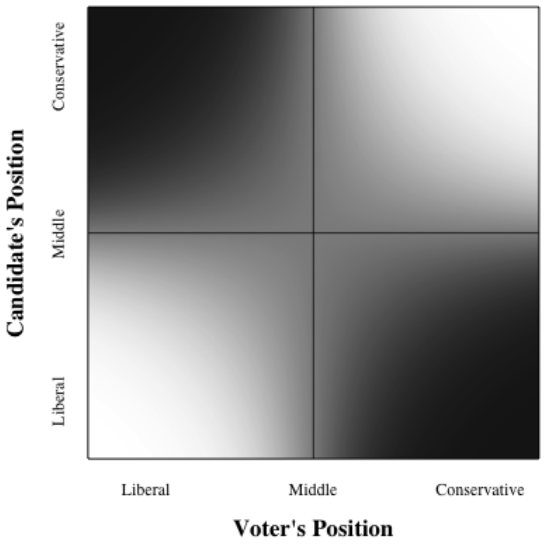
Figure 1: Voter evaluations of candidates under the proximity and directional models. Lighter shading indicates higher voter evaluation for a candidate.

(a) The proximity model



(b) The directional model



and candidate both take liberal positions, then v_{ik} and c_{jk} are both negative and the product is again positive. If however the voter and candidate take different sides on the issue, then the product of v_{ik} and c_{jk} is negative. As a result, even a moderately partisan voter prefers any candidate on her side of the issue to every candidate on the other side, and prefers the most extreme candidate of the candidates on her side.[1]

Figure 1 contains two heat maps illustrating a voter's utility for a candidate under the proximity and directional models. In each graph, the x-axis represents the voter's position on an issue, arranged left to right from extremely liberal positions to extremely conservative positions. The y-axis represents the position of a candidate, where the smallest values are extremely liberal positions and the largest values are extremely conservative positions. Each point in the Cartesian coordinate plane is shaded according to how much utility a voter at that position on the x-axis has for the election of a candidate at that position on the y-axis. The lighter the shade, the greater the utility.

In many instances the proximity and directional model make similar predictions for a voter's preference over candidates. According to both models, utilities in the bottom-left and top-right corners in Figure 1 are very high, and utilities in the top-left and bottom-right corners are very low – meaning that more extreme voters have a high utility for more extreme candidates on their side and have a very low utility for more extreme candidates on the other side. The important distinction between the models is best seen in the middle of these two

[1]We regard the wording of the issue we present in our experiment — modeled on the wording of the ANES health insurance question — as excluding unacceptably extreme positions, so we do not include a penalty in this model.

graphs. According to the proximity model, a voter has highest utility for a candidate that shares her position, regardless of what that position is. Thus the lightest shades in Figure 1a exist on the 45 degree line and no point on that line is lighter than any other. In contrast the points in the middle of Figure 1b are much dimmer than the points towards the bottom-left and upper-right corners.

We do not claim that the proximity and directional models are the *only* feasible models of voter choice. Another alternative is the discounting model proposed by Grofman (1985), considered as a competing model by Tomz and Van Houweling (2008), which posits that voters consider the status quo in making a spatial decision. If an elected official will only be able to move policy partway between the status quo and the elected official's ideal point, then it is rational for a voter to prefer a candidate who is more extreme than her own position so that the resultant policy is closer to the voter's position. In order to implement the discounting model, we need to measure both the status quo and a performance weight parameter that represents the efficacy of the candidate in moving policy away from the status quo. We choose not to adjudicate between the discounting model as well as the proximity and directional models for three reasons. First, we have no reason to expect that the presence of a discounting logic in voters' calculus should interact with our experimental treatment. Second, since the publication of Tomz and Van Houweling's (2008) study, health insurance has been the subject of campaigns aimed to create variation in voters' perceptions of the status quo on this issue. Third, it is difficult to estimate performance weights in our survey since no information is provided about the candidates other than their positions on health insurance. While discounting and many nuanced models of voter choice are also worth experimental analysis, we restrict ourselves to a comparison of the proximity and directional models for clarity and parsimony.

B Exploring the Limitations of the Experimental Treatments

We turn to two brief supplemental analyses which may reveal some limitations of this research. In this section, we examine two possibilities. First, do the relative positions of the candidates on health care inform the effects of the treatments on candidate selection? More specifically, it is possible that participants who were asked to choose between two candidates who were both located on the same side of the issue responded differently than did those who faced a choice between candidates on opposite sides of the issue. This is an important consideration because it is possible that our results only hold under one condition and thus may be less generalizable. When participants placed themselves at -1, 0, or 1, it is possible to place two candidates on either the same side or on different sides such that the proximity and directional models make different predictions. 296 participants placed themselves at -1, 0, or 1. Of these participants, 151 were randomly exposed to candidates on the same side and 145 saw candidates on different sides. Our "same side" indicator is coded 1 for the former group and 0 for the latter.

Table 1: The Effects of the Treatments as Conditioned by the Sides on Which the Candidates are Located

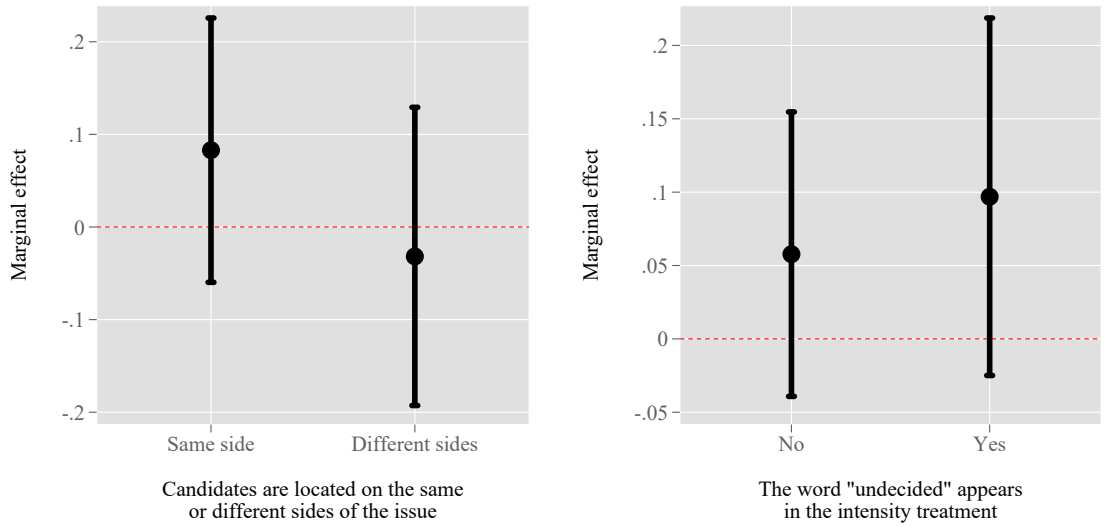
	Same side		"Undecided"	
Intensity treatment	0.41	(0.36)	0.23	(0.20)
Candidates located on the same side of the issue	1.43*	(0.36)		
Intensity × Same side	-0.54	(0.49)		
"Undecided" used in the treatment			-0.47*	(0.23)
Intensity × "undecided"			0.16	(0.33)
Intercept	-1.10*	(0.27)	0.06	(0.14)
Log likelihood	-189.66		-440.92	
N	296		643	

Logistic regression coefficients are reported along with standard errors in parentheses.
* = $p \leq 0.05$ (two tailed)
† = $p \leq 0.1$ (two tailed)

Second, some readers may be concerned about the presence of the word "undecided" in some of the intensity treatments given that politicians typically seek to avoid using the term. "Undecided" appears in the intensity treatment whenever a candidate is placed at 1 or -1. That happens when participants place themselves at 2 or -2, 1 or -1 when candidates are displayed on different sides, and 0 when candidates are placed on the same side. We thus created an "undecided" indicator and coded it 1 for participants exposed to a candidate placed at 1 or -1 and 0 for those who were not.[2] We report both models in Table 1 and once again calculate the relevant marginal effects of interest, which are presented in Figure 2.

Turning first to the same sides analysis, we observe in panel (a) of Figure 2 that the marginal effects of the intensity treatment are positive when both candidates are located on the same side of the issue and negative when they are on opposite sides. However, note that neither marginal effect approaches traditional (i.e. $p \leq 0.05$) levels of statistical significance as indicated by the overlapping of the confidence intervals with the line 0 on the Y axis. To be more specific, of the 151 participants who placed themselves at -1, 0, or 1 and saw candidates on the same side of the issue, 76 received the policy treatment and 75 received the intensity treatment. Among participants who received the policy treatment, 57 (75%) chose the proximity candidate and 19 (25%) chose the directional candidate. Among participants who received the intensity treatment, 50 (66.7%) chose the proximity candidate and 25 (33.3%) chose the directional candidate. Of the 145 participants who placed themselves at -1, 0, or 1 and were exposed to candidates on different sides of the issue, 74 received the policy treatment and 71 received the intensity treatment. Among participants who received

[2]Note that, as was the case in nearly every other analysis we present in this research, we do not include participants who have the most extreme preferences — -4 and 4 — in this analysis because in that case, both the proximity and the directional models make identical predictions about which candidate participants should select.



(a) Candidates are on the same or different sides

(b) "Undecided" is present or not

Figure 2: The marginal effects of the intensity treatment when candidates are or are not located on the same side of the issue and when the word "undecided" is or is not present.

the policy treatment, 31 (41.9%) chose the proximity candidate and 43 (58.1%) chose the directional candidate. Among participants who received the intensity treatment, 32 (45.1%) chose the proximity candidate and 39 (54.9%) chose the directional candidate.

These differences are not statistically discernable from zero as indicated by the marginal effects reported in the figure. That said, the proportion of directional voting is larger overall when candidates are on different sides and the treatment effect is larger when the candidates are on the same side. Regardless, neither subset of the sample is large enough to conclude that the main result is confounded by an effect of candidates being on the same or different sides.

To what extent does the presence of the word "undecided" affect our results? Panel (b) of Figure 2 shows the marginal effects of the intensity treatment when the word does and does not appear in a given participant's treatment. Both marginal effects are positive and the magnitude of the marginal effect calculated for the intensity treatment when "undecided" appears is larger than when the word does not appear. However, neither effect differs significantly from zero. Still, we provide more detailed information drawn from these data below.

244 participants saw a candidate placed at -1 or 1. Of these, 123 received the policy treatment and 121 received the intensity treatment with the word "undecided." Among participants who received the policy treatment, 74 (60.2%) chose the proximity candidate and 49 (39.8%) chose the directional candidate. Among participants who received the intensity treatment, 61 (50.4%) chose the proximity candidate and 60 (49.9%) chose the directional

candidate.

399 participants were not exposed to candidates placed at -1 or 1. Of these, 200 received the policy treatment and 199 received the intensity treatment, which did not use the word "undecided." Among participants who received the policy treatment, 97 (48.5%) chose the proximity candidate and 103 (51.5%) chose the directional candidate. Among participants who received the intensity treatment, 85 (42.7%) chose the proximity candidate and 114 (57.3%) chose the directional candidate. To be clear and as indicated by the logistic regression results, these results do not suggest that treatment produced significant effects on candidate selection among either of these subgroups.

That said, these results provide little evidence that the main result is being driven by participants' aversion to the word "undecided." First, participants were more likely to choose the proximity candidate under either treatment when a candidate is placed at -1 or 1 than when a candidate is not placed at -1 or 1. Second, the rate of directional voting under the intensity treatment increases by 10.1 percentage points relative to the policy treatment when the word "undecided" was used and by 5.8 percentage points when it was not used. There is not enough data, however, to suggest that this difference is meaningful or distinct from the moderating effect of participants' self-placements.

C Other Factors that May Condition the Treatment Effect

It is possible that the effects of the intensity treatment on candidate selection are conditioned by one or more individual-level characteristics or attitudes. While we caution our readers that our experiment was not specifically designed to test these ideas and that in many cases we lack enough data to draw strong inferences, we briefly explore these possibilities in this section. We consider four possible variables that may condition the effects of the treatments on candidate selection: (1) a respondent's own position on health insurance coded from -3 to 3 where higher numbers indicate greater levels of conservatism on the issue,[3] (2) whether respondents place themselves at zero or at a non-zero position, (3) respondents' level of educational achievement where higher values indicate greater formal education, and (4) respondents' partisan identities.

The dependent variable — candidate selection — is coded 1 for participants who chose the candidate favored by the directional theory and 0 for those who chose the one favored by the proximity theory. The primary independent variable of interest is the intensity treatment indicator, coded 1 for those who were exposed to the intensity treatment and 0 for those exposed to the policy treatment. We interact the variables of interest with our intensity treatment indicator to observe the degree to which its effects are conditional upon the value

[3]Recall that respondents who placed themselves at the endpoints of the scale — -4 and 4 — did not take part in the experiment because there was no way to provide them with both a directional and a proximity-favored candidate due to the limits of the issue scale.

Table 2: How Do Individual-level Characteristics and Attitudes Condition the Effects of the Intensity Treatment on Candidate Selection?

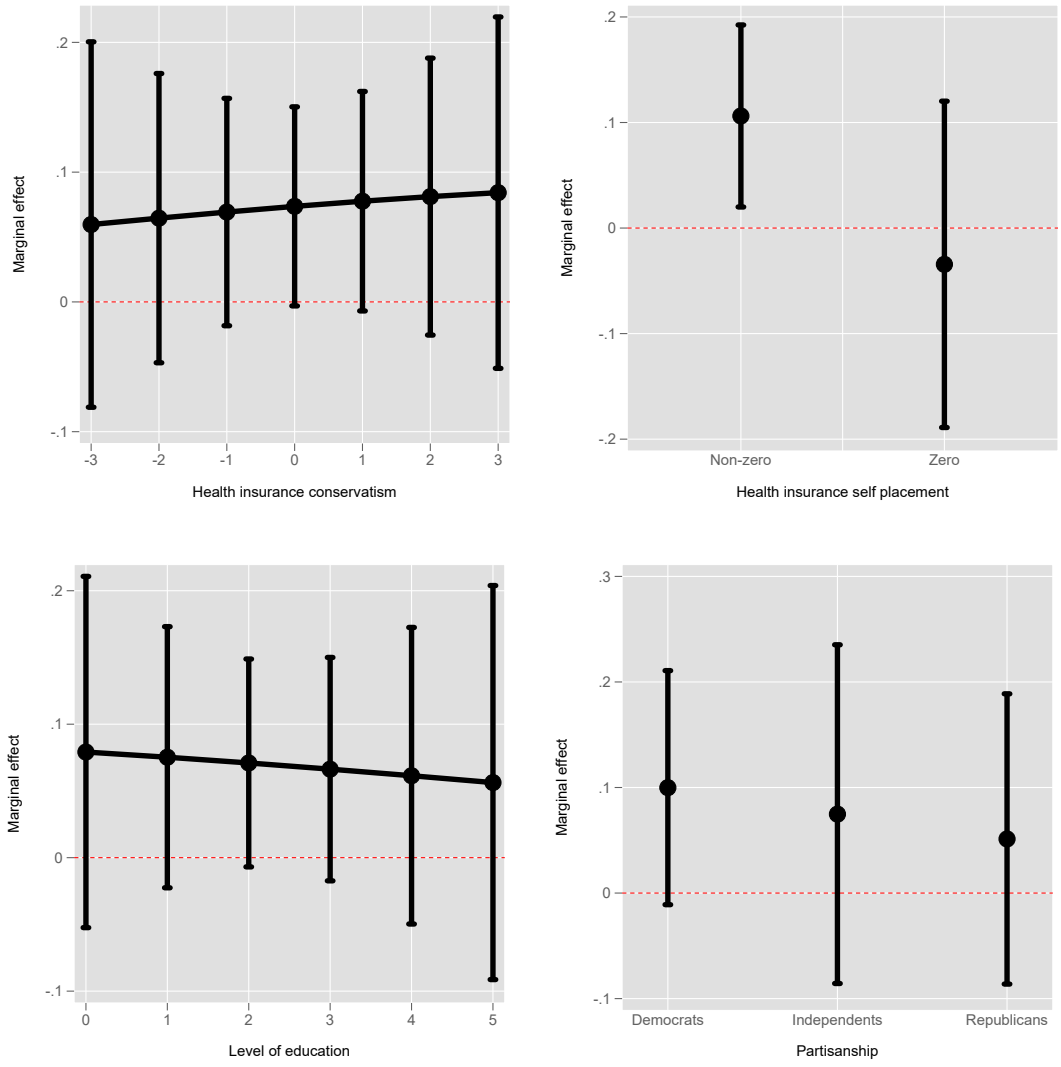
	Position	Zero	Education	PID
Intensity treatment	0.296+	0.431*	0.305	0.405+
	(0.159)	(0.183)	(0.322)	(0.234)
Health insurance position	-0.112+			
	(0.058)			
Intensity × Position	0.016			
	(0.082)			
Zero self-placement		-0.110		
		(0.259)		
Intensity × Zero		-0.572		
		(0.371)		
Education			0.106+	
			(0.062)	
Intensity × Education			-0.008	
			(0.088)	
Independent identification				0.169
				(0.299)
Republican identification				0.491+
				(0.255)
Intensity × Independent				-0.104
				(0.407)
Intensity × Republican				-0.196
				(0.371)
Intercept	-0.111	-0.091	-0.447*	-0.323+
	(0.112)	(0.128)	(0.223)	(0.165)
BIC	907.146	906.796	908.315	918.513
N	643	643	643	641

Note: cell entries are estimated coefficients generated using logistic regression. Standard errors are reported in parentheses.
* = p $\leq$ 0.05 (two-tailed)
+ = p $\leq$ 0.05 (one-tailed)

of a given variable. We present the results of a series of logistic regression models below in Table 2. That said, the primary quantities of interest for readers, the marginal effects of the intensity treatment at each potential value of the conditioning variables, are plotted as points and presented in Figure 3.[4] We focus on discussing these marginal effects.

[4]The vertical lines represent the 95% confidence intervals for each marginal effect. If these lines overlap with the gray horizontal line plotted at zero on the Y axis, this indicates that a given marginal effect does not differ from zero at the traditional 0.05 level of significance.

Figure 3: The marginal effects of the intensity treatment on candidate choice across various individual level characteristics and attitudes.



Note: the scale of the Y-axes varies across the plots. The outcome is transformed into predicted probability.

In general, it does not appear as if these attitudes and characteristics consistently conditioned the effects of the treatment on candidate selection. Turning first to the panel in the upper left corner of Figure 3, it appears as if the marginal effect of the intensity treatment is always positive — meaning that the intensity treatment on average makes participants more likely to select the directional candidate across all health insurance positions — and increases slightly as participants hold increasingly conservative positions on health insurance. That said, none of these marginal effects differ significantly from zero at a traditional ($p \leq 0.05$) level of confidence. We observe similar null results for the conditioning effects of respondents' levels of education and partisan identities; each of the marginal effects produced are positive, but fail to differ from zero.

Next we turn to the cases in which we find at least some evidence that the variables condition the effects of the intensity treatment. The marginal effect of the intensity treatment is positive and differs significantly from zero among people who place themselves at positions other than zero on the health insurance issue scale. This effect appears to be negative for people who placed themselves at zero, but note that this effect does not differ significantly ($p \leq 0.05$) from zero.

We thus conclude that, in general, the effects of the intensity treatment are largely not conditional upon these attitudes and characteristics. But we must also caution readers that our experiment was not designed with these additional tests in mind and that we may lack appropriate sample sizes to adequately test these possibilities.

References

Grofman, Bernard. 1985. "The Neglected Role of the Status Quo in Models of Issue Voting." *Journal of Politics*. 47(1): 229-237.

Rabinowitz, George and Stuart Elaine Macdonald. 1989. "A Directional Theory of Issue Voting." *American Political Science Review*. 83(1): 93-121.

Tomz, Michael and Robert P. Van Houweling. 2008. "Candidate Positioning and Voter Choice." *American Political Science Review*. 102(3): 303-318.