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Efficient use of reference group cues in a single dimension*

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Abstract. If there are groups whose endorsements voters can use as positive (or negative) cues, we demonstrate that voters do not need to know anything directly about candidate positions to be able to identify the candidate whose issue positions and performance is likely to be closest to the voter's own preferences. In one dimension we show that, given certain simplifying assumptions, voters are best off adopting the choice recommended by the single reference group to which they are closest. We also show that even a decision by reference groups not to endorse any candidate may be informative to voters.

1. Introduction

Inspired by Downs (1957), in this paper we provide a simple model to account for an important political and sociological phenomenon, the ability of individuals to make use of information derived from the choice preferences of reference groups with which they do or do not identify. In particular, we shall model the likelihood that individuals can, by using the preferences of reference groups in their environment as sources of information, choose an outcome that is in their own best interest. We present results for the unidimensional case. For this situation, optimal behavior by voters is shown to arise from following the cue presented by their most favored group.

Three previous models have been presented to explain how voters will choose reference cues:

Calvert (1985) presents a model which argues biased cues (those which favor one or the other candidate) are more useful than neutral cues. Biased cues have more value because they are more likely to provide information which will change voters' minds.

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McKelvey and Ordeshook (1984, 1985a, b, 1986) describe a process by which voters use societal preferences to determine their own preferences. For the process to work (in a single dimension) each voter is assumed to know (1) which candidate is further to the left, (2) poll results which characterize the overall preferences of society on the candidates and the issue dimension, and (3) where the voter stands on the issue dimension relative to all other voters. From this information, the voter uses societal preferences to "triangulate" the midpoint between the candidates to ascertain for which candidate to vote. In two-dimensional space, voters must locate bisecting hyperplanes (lines) by a process of sequential triangulation.

Miller (1986) argues that, just as Condorcet's jury theorem (Condorcet, 1785; Black, 1958; Grofman, 1975; Grofman, Owen, and Feld, 1983; Grofman and Feld, 1988) suggests that when more people make a decision they are more likely to make the "correct" decision, a voter who samples more cues is more likely to make the correct voting decision. The correct voting decision for an individual is that which he would have obtained if he was perfectly informed.

Also relevant is the literature on the use of cues by decision makers (especially legislators) with cues taken from fellow decision makers (see, e.g., Kingdon, 1973; Matthews and Stimson, 1975).

Like Calvert (1985), we shall consider cues derived simultaneously from multiple sources rather than focusing exclusively on choice between competing sources. Unlike McKelvey and Ordeshook (1984, 1985a, b, 1986), we shall not require voters to know poll results but, similar to them, we assume that voters can evaluate the spatial location of information sources and can know which candidate is furthest to the right. Unlike Miller (1986; cf. Grofman, Owen, and Feld, 1983), we shall not deal (except in passing) with the question of whether the *group* decision is likely to be the same as the one that would have been made by perfectly informed individuals.

The model we propose has a variety of applications including choices by legislators between a bill and the status quo as a function of who sponsors the bill or which (interest) groups are known to favor or oppose it, choices between candidates by a mass electorate, and choices by voters about initiatives and referenda (especially in those states, such as California, where key proponents and opponents of a measure may be identified to voters because they are signatories of statements in a "voter's handbook").

2. Information sources arrayed on a single line

We consider the case of two sources of cues each with *known* locations on a unidimensional continuum. Assume there are two candidates (choices) (A and B) whose locations on this continuum can also in principle be specified, but whose locations may not be known to all voters. Let the location of source S_1 on the line be s_1 and that of S_2 be s_2. Let voter V's location be v. Let us also assume that it is known whether A or B is further to the left. (It is not unreasonable to expect voters to know this; e.g., in the U.S. Republicans are almost always to the right of Democrats in any given jurisdiction. Cf. Grofman, Griffin and Glazer, 1989 forthcoming; McKelvey and Ordeshook, 1985a; Sullivan and O'Connor, 1972.) For simplicity let A be the leftmost of the two candidates.

2.1. When the voter is between two sources

Let us first consider the case with one source on either side of the voter. Assume that S_1 is to the left of V and S_2 is to V's right. We make the simplifying assumption that utility declines directly with distance from the voter's ideal point. This is a strong assumption, but it is not unreasonable to believe that it holds "approximately." Now, if S_2 is to the left of $\frac{A+B}{2}$, then S_1 will prefer A, since S_1 must then be closer to A than to B. Similarly, if S_2 is to the right of $\frac{A+B}{2}$, S_2 will prefer B. For any pattern of preference of the cues, e.g., S_1 preferring A and S_2 preferring B, the voter can be certain of a zone in which $\frac{A+B}{2}$ can be located. There are four cases, but only three are logically possible under the specified assumptions.

I. S_1 prefers A, S_2 prefers A ——— (a)

S_1 V S_2 A B

or

———

S_1 V A S_2 B (b)

or

———

A S_1 V S_2 B (c)

II. S_1 prefers A, S_2 prefers B ——— (a)

A S_1 V S_2 B

or

——— (b)

A S_1 V B S_2

or

——— (c)

S_1 VA B S_2

or

(d)

S_1 AV S_2 B

III. S_1 prefers B, S_2 prefers B (a)

A B S_1 V S_2

or

(b)

A S_1 VB S_2

or (c)

A S_1 V S_2 B

The case where S_1 prefers B but S_2 prefers A is impossible under the specified assumptions.

2.2. When the voter is between the two sources and both reference groups provide the same cue

Recall that we assume that voter V is between S_1 and S_2. In each of three subcases of case I, voter V can know with certainty that he should vote for A, since both sources agree, and thus V must be to the left of the $\overline{AB}$ midpoint. In case III(a), voter V can know with certainty that he should vote for B. In like manner, in case III(b), voter V can know that with certainty $\frac{A+B}{2}$ is to his left, and therefore he should vote for B. In III(c), an analogous argument holds. Thus, if the two reference groups are to either side of him and they both agree, then it is always clear what the voter should do – namely do what they advise. The voter's knowledge about how reference groups to the right and the left of him are voting will be sufficient to enable him to vote in his own best interest *if* the two groups are in agreement. The probability that this agreement will occur equals the probability that $\frac{A+B}{2}$ is to the right of S_2 plus the probability that $\frac{A+B}{2}$ is to the left of S_1.

2.3. When the voter is between the two sources and the reference groups give conflicting advice

Now, let us consider the case where $\frac{A+B}{2}$ is between s_1 and s_2. In this case, S_1 and S_2 give conflicting advice. Whose advice should the voter take, and how likely is that advice to be in the voter's own interest? Let us take case II(c), for example. Here B is to the left of s_2 but A is between s_1 and s_2. If the location of the voter, V, is between $\frac{A+B}{2}$ and s_2, he should listen to S_2; if the voter is between $\frac{A+B}{2}$ and s_1, he should listen to S_1. If we look at the other three cases we see that the situation is identical. Thus we need only ascertain whether S_1 and S_2 give conflicting advice.

Let $\frac{A+B}{2}$ be a uniformly distributed random variable; i.e., let us assume that the voter doesn't really know anything about the "relative" locations of the two candidates from his own ideal point, even though he does know which is further to the left. Then, the probability that $\frac{A+B}{2}$ is to the right of the voter equals

$$\frac{\overline{vs_2}}{\overline{s_1v} + \overline{vs_2}} = \frac{\overline{vs_2}}{\overline{s_1s_2}} .$$

The probability that the voter will make the correct choice (e.g., the choice that is in his own self-interest) if he makes the choice recommended by the source closest to him, say S_1, is equal to

$$\frac{\overline{vs_2}}{\overline{s_1s_2}} . \tag{1}$$

Clearly, when sources disagree, the voter is better off (more likely to make the right choice).

(a) the closer to him is the closer of the two sources, and
(b) the greater is the distance between the sources, $\overline{s_1s_2}$, since, for a fixed value of $\overline{vs_1}$,

$$\frac{\overline{vs_2}}{\overline{vs_1} + \overline{vs_2}\,,} ,$$

increases in value as $\overline{vs_2}$ increases in value, that is, the probability of a correct choice increases as $\overline{s_1s_2}$ increases in value when we hold constant the degree of closeness of the closer source.

It might seem from these results that the voter should always look to find one close source and one distant source, but this is erroneous. We need to take into account the probability that we will be in Case II. If we are in Case I or Case III, the voter will be correct with certainty if he optimally uses the information from his cues, i.e., does what they both will agree on. In Case II, his sources are split and he will be right with probability

$$\frac{\overline{vs_2}}{\overline{s_1s_2}}$$

if we let S_1 be the source closer to him.

Let us normalize so that the feasible zone of politics equals one (i.e., the length of the line along which choices are arranged will be set equal to one). The probability of a correct choice by the voter is then, by Bayes Theorem

$$P(\text{case I or III}) \cdot \qquad (1)$$

$$+ \ P(\text{case II}) \cdot \left(\frac{\overline{vs_2}}{\overline{s_1s_2}}\right)$$

$$= (1-\overline{s_1s_2}) \cdot (1) + \frac{(\overline{s_1s_2})\ (\overline{vs_2})}{\overline{s_1s_2}} \qquad (2)$$

$$= 1 - \overline{s_1s_2} + \overline{vs_2}$$

$$= 1 - \overline{s_1v}$$

Clearly, $1 - \overline{s_1v}$ increases as $\overline{s_1v}$ decreases. Thus as expected, the voter would wish to have his closer source be as close to him as possible so that he could rely on that source's judgment as if it were his own. Note also, however, that, less intuitively, Eq. (2) shows that the probability that the voter will be correct is independent of either $\overline{vs_2}$ or $\overline{s_1s_2}$. It does not matter where the voter's second source is located because the expected value of the information provided by that source is constant. The second cue's role in providing confirming evidence when both sources agree (in which it is desirable for the second source to be close to the voter), is essentially counterbalanced by its role in specifying the probability of a correct choice when both choices disagree (in which it is desirable for the second source to be away from the voter).

For example, let $\overline{s_1v} = 1/6$ and $\overline{vs_2} = 1/3$. Here, the probability of a correct choice equals $1/2 + 1/3 = 5/6$. If $\overline{s_1v} = 1/6$ and $\overline{vs_2} = 1/4$, then the probability of a correct choice equals $7/12 + 1/4 = 5/6$, etc.

2.4. Both sources on the same side of the voter

Let us now consider what happens if both sources are to the same side of the voter, say to the right. Again let A be to the left of B. We shall now not be bothered to locate A and B, since all that is relevant is the $\frac{A+B}{2}$ midpoint. Here, the cases are:

The sources differ: S_1 recommends A and S_2 recommends B	$V \quad S_1 \quad \frac{A+B}{2} \quad S_2$	(I)
Both sources recommend a vote for A	$V \quad S_1 \quad S_2 \quad \frac{A+B}{2}$	(II)
Both sources recommend a vote for B	$V \ \frac{A+B}{2} \ S_1 \quad S_2$	III(a)
	$\frac{A+B}{2} \ V \quad S_1 \quad S_2$	III(b)

If S_1 and S_2 agree that the voter should vote for A, he should certainly do what they advise (Case II). If S_1 and S_2 both recommend a vote for B (Case III), the issue is less clear. If v is between $\frac{A+B}{2}$ and s_1, the voter should vote for B (Case IIIb). If v is to the left of $\frac{A+B}{2}$, he should vote for A (Case IIIa). If $\frac{A+B}{2}$ is uniformly distributed, then the probability that the voter is to the left of $\frac{A+B}{2}$, given that S_1 and S_2 agree in recommending B, is

$$\frac{\overline{Lv}}{\overline{Lv} + \overline{Vs_1}} = \frac{\overline{Lv}}{\overline{Ls_1}}. \tag{3}$$

Note that $\frac{A+B}{2}$ cannot be to the right of s_1 if we are in Case III, since then S_1 would not recommend B. Thus, the probability that the voter should take the sources' advice when both recommend a vote for B depends entirely on where S_1, the source closest to him, is and has nothing to do with either the location of B, or, as we shall see, with the location of S_2.

Let us return to Case II. We said that the voter should prefer A when both S_1 and S_2 recommend it. However, actually the advice from S_2 is irrelevant, since if the closer source, S_1, recommends A then that information is sufficient to tell the voter that he should pick A, *regardless* of what S_2 recommends. If we are in Case II, S_2 will recommend A, but if we are in Case I then S_2 will recommend B; however, S_1, the nearer source, is the only source which voter V should heed.

In short, if there are two sources located on the same side of the voter and if the voter can know whether A or B is the rightmost candidate, the voter need only pay attention to the closer source. If the closer source on his right recommends the righter of the two candidates, the voter should take that advice if the source is closer to the voter than the voter is to the extreme left end of the spectrum. Similarly, under these conditions, if that closer source recommends the lefter of the two candidates, then the voter should certainly take that advice. If a source to the right of you prefers the left-wing candidate, then so must you.

We are left with the conclusion that, for the given assumptions, voters need only pay attention to the closer source if there is more than one source on a given side. Suppose, as before, that the closest source, S_1, is to the voter's right. The probability that the voter will end up making a correct choice if he has only a cue from one direction to rely on is

$$
\begin{aligned}
& \text{P (correct choice)} \\
= \; & \text{P}(\text{S}_1 \text{ recommends A}) \cdot \text{P(voter is correct in choosing A)} \\
+ \; & \text{P}(\text{S}_1 \text{ recommends B}) \cdot \text{P(voter is correct in choosing A)} \\
= \; & \text{P(case I or II)} \cdot (1) \\
+ \; & \text{P(case III)} \cdot \frac{\overline{\text{Lv}}}{\overline{\text{Ls}_1}} \\
= \; & (\text{s}_1\text{R}) \cdot 1 + \frac{\overline{\text{Ls}_1}\;\overline{\text{Lv}}}{\text{Ls}_1} \\
= \; & \overline{\text{s}_1\text{R}} + \overline{\text{Lv}} \\
= \; & 1 - \overline{\text{s}_1\text{v}}
\end{aligned}
$$

Thus, the probability of a correct choice by the voter is exactly the same with one source as with two, regardless of whether the second source is on the same or on the opposite side of the voter, as long as the second source is no closer to the voter than is the first source. This result was, of course, foreshadowed by our earlier findings that the expected correctness of the voter did not depend in any way on the location of the second source of advice (or whether that source was located on the same side as the voter or on the opposite side). Nonetheless, it is a rather counterintuitive result. It implies that in a choice among candidates on a left-right continuum, if voters have minimal information (i.e., which candidate is further to the right), the best a voter can do is to find a source as close to him as he can locate and then take that source's advice.

Thus, we are led to:

Proposition 1: When the voter expectations of the distribution of candidate locations is uniform, and cueing sources know the candidates' locations with certainty, then a voter should always vote in accord with the advice of his closest source, and the voter will be correct with probability $1 - \overline{vs_c}$ *where* s_c *is the location of the source closest to the voter.*

It is useful to contrast the outcome when a voter has one (or more) source(s) of information with that in which the voter has no cue to rely on. Consider the two possibilities

Case I

L V $\frac{A+B}{2}$ R

Case II

L $\frac{A+B}{2}$ V R

If $\frac{A+B}{2}$ is uniformly distributed, with no information except that B is to the right of A, the voter who picks B will correct $\overline{vR}$ proportion of the time and wrong $\overline{Lv}$ proportion of the time. Thus, voters on the right for whom $\overline{vR} > \overline{Lv}$ should, ceteris paribus, vote right; and similarly, voters on the left should, ceteris paribus, vote left. However, as we have seen, a voter's chance of making the correct choice can be considerably improved if he has access to information about the preference of sources of information near to him.

2.5. The usefulness of negative cues

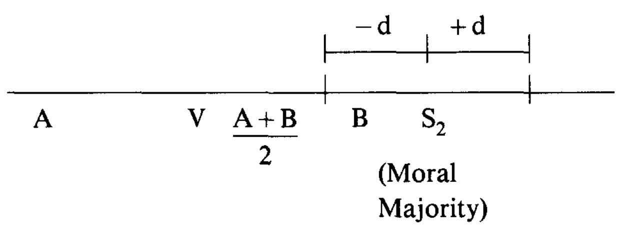
Of course, instead of following the strategy of doing what the source nearest to him advises, the voter can do the exact opposite of what the source furthest from him recommends. However, this is not a very desirable strategy. At its best, i.e., when the source is located at either L or R, it is no more likely to lead the voter to a correct choice than the a priori strategy in which the voter simply picks B if $Vr > Lv$ and picks A otherwise. At its worst, when the furthest source is close to the voter, it involves making the wrong choice with probability greater than 1/2, since (under our previous assumptions) the probability of a correct choice is simply $\overline{s_2v}$.

As we have seen, orienting negatively to a reference group which is far away is of little value if you already know which of two alternatives is farthest to the left (or right) on the dimension in question. However, if that information is not known, using a negative cueing source to ascertain it is desirable. For example, if you detest the "Moral Majority," then knowing that that group endorses a candidate tells you that the candidate is to the right of his opponent on the social conservatism dimension.

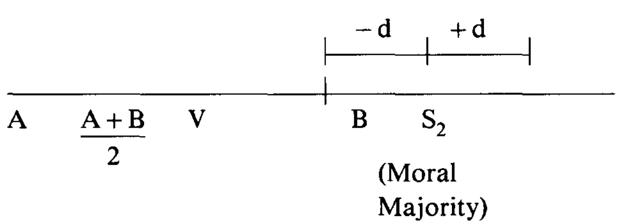
2.6. Using cues when groups have the option not to endorse any candidate

Negative cues may provide more information if we amend our model to allow cueing groups to have three options: "endorse candidate A," "endorse candidate B," and "endorse neither candidate." If a negative reference group S_2 (located considerably to the right of the voter) uses a cutoff rule such that it will never endorse a candidate who is not within a certain fixed distance of its own position, then knowing that a candidate is endorsed tells you that the candidate must be on a certain line segment of the continuum, close to the endorsing source, say, within a distance d. Assume further that if both candidates fall within that distance, no endorsement is given. Again, let B be the rightmost of the two alternatives. The possibilities are illustrated below.

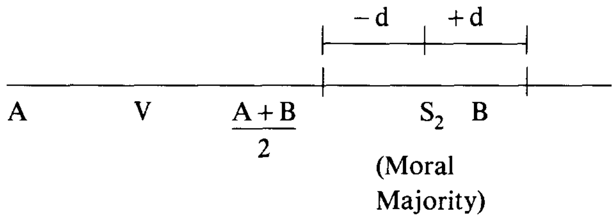
Endorsement for B
Case I(a)



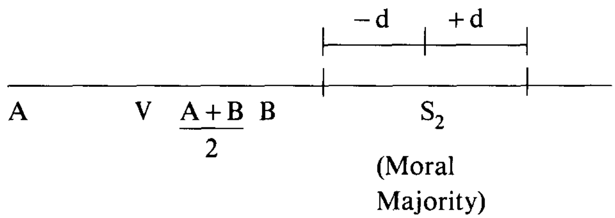
Endorsement for B
Case I(b)



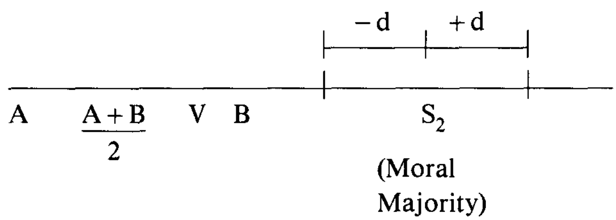
Endorsement for B
Case I(c)



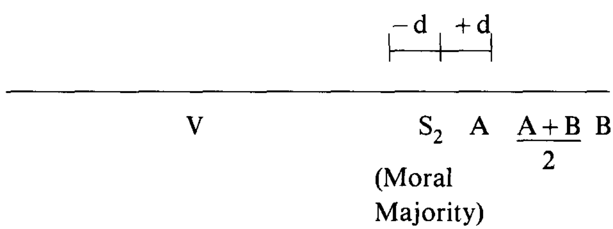
No Endorsement
Case II(a)



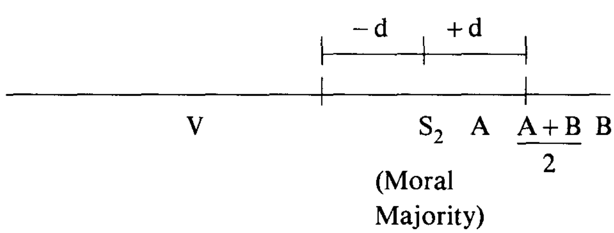
No Endorsement
Case II(b)



No Endorsment
Case II(c)



Endorsement for A
Case III



If B is endorsed by S_2 (Case I), we know that B must be the rightmost of the two alternatives. Moreover, if there were an endorsement for B (Case I) we know that B is to be found in the interval (s_2-d, s_2+d), and A is to be found in the interval $(0, s_2-d)$.

Thus,

Proposition 2: If a rightwing (leftwing) source far from the voter only endorses candidates close to that source, and can locate candidates with certainty, then an endorsement from that source of the rightmost (leftmost) candidate is a near certain cue to vote against such an endorsed candidate.

Of course, if a rightwing source endorses the leftmost candidate, that tells you that the rightmost candidate must be extreme indeed. Thus, in Case III, an endorsement for A from S_2 tells V to vote for A. On the other hand, if the negative source merely endorses (what is from their standpoint) the lesser of two evils, i.e., if d is very large, knowledge that they have endorsed a candidate is of limited value. Indeed, if they are a *very* extreme source, the endorsement tells the voter little beyond which is the rightmost of the two candidates.

However, regardless of whether s_2 is far away from v, if d is not too large, then an endorsement from s_2 is very informative, because it more or less precisely pinpoints the location of one candidate. Thus, in our expanded model, where sources can choose whether or not to endorse a candidate, it will no longer be true that information from more than one source is irrelevant. If we have an endorsing source on the left, and one on the right, we may be able to locate each candidate's position within a small zone of uncertainty, and thus a voter can improve considerably his ability to choose the alternative he truly would most prefer.

Let us now look at Case II in our model, where no endorsement is given. Now we know that neither A nor B lies in the zone (s_2-d, s_2+d). If S_2 is very far to the right, we may act as if we were in Case II(b), i.e., we may disregard the possibility of B being to the right of the point s_2+d. Our analysis is essentially identical to that in our earlier discussion of how to proceed when there is a positive reference cue, S_1, except that now, rather than considering the whole space (0,1), we *restrict ourselves to options which are found in the line length* $(0, s_2-d)$. Since, for example, v may be relatively to the left in the whole space, but relatively centrist in the space $(0, s_2-d)$, this restriction will almost certainly change the relative probabilities of which candidate is to be favored. Thus, if a negative reference cue fails to endorse a candidate, especially if d is relatively large, we can be confident that neither of the two alternatives open to V will be that "bad" (at least vis-à-vis the S_2 direction).

As for Cases II(a) and II(c), either A is found in the interval $(0, s_2-d)$ and B is found in the segment $(s_2+d, 1)$, or both A and B are found in the segment $(s_2+d, 1)$. In either case the voter will never wish to vote for B.

The implication of these results is that

Proposition 3: When preference groups have the option of no endorsement, even the absence of an endorsement can be informative – by telling the voter that the probable domain in which both candidates are located is a particular restricted line segment.

The above (endorsement, no endorsement) model can also be worked through for the case where the reference group is a positive (close) source for the voter, but we shall leave those details to the reader. Also, the above model can be extended further to consider what happens if sources have the option of various types of endorsement, e.g., strong versus weak. Here, it should be obvious that

Proposition 4: The more endorsement (intensity) options open to the cueing source, the more precisely can the voter use the information about types of endorsement to precisely locate the probable candidate positions.

Also, it might be that, as in the McKelvey and Ordeshook (1985) model, the magnitude of support from a given source might be used to help set bounds on the candidate location.

We should note, of course, that our results are based on a two-candidate competition with uniform priors by voters about the location of candidates on single dimension, voter centainty as to which candidate is to the right of the other, and voter knowledge of the relative proximity of reference groups to the voter. When these assumptions are relaxed, some of our results will no longer hold. For example, if there is uncertainty as to the accuracy of the information provided by reference group cues, then, even on a single dimension, multiple cueing sources will, in general, be better than a single source. Similarly, if all reference groups are not single-issue oriented but compare candidates in terms of a multidimensional platform, then multiple cues will be better than a single cue.

3. Discussion

Sniderman and Hagen (1984: 16) have written: "The average citizen, though he (or she) may know little about policies, knows whom he likes and, still more important perhaps, whom he dislikes. This can be a sufficient basis for figuring out a consistent policy stance."[1] Brady and Sniderman (1985: 1081) have shown that citizens can estimate what politically relevant groups – liberals and conservatives, Democrats, Republicans, and blacks and whites – stand for on major issues.

We have provided a model to illustrate how the single reference group to which a voter is closest (on some given single dimension) can be used to cue that voter's choice in a fashion compatible with the voter's own "true" preferences were he to possess perfect information about candidate locations. In addition, we have looked at the role of negative as opposed to positive cues and at the additional accuracy to be gained when reference groups restrict their endorsements to candidates who are located within a fixed distance of each group's ideologically preferred position.

For multiple dimensions, our work generalizes in that each voter can use the group to which the voter is closest on each separate dimension, combining cues in a Bayesian efficient fashion (in line with the model offered by Nitzan and Paroush, 1985, and Shapley and Grofman, 1984), provided that some appropriate weighting mechanism is given across the different evaluative dimensions.

Note

1. Similarly, Kinder (1983: 405) reminds us of "the persistent prominence of social groups in Americans' appraisals of parties and presidential candidates." As he puts it

> However unsophisticated the underlying process, the political meaning people derive from groups may be very powerful in shaping their beliefs .... In Converse's original coding of open-ended replies in the 1956 SRC Survey, citizens who made use of social groups comprised by far the largest single category – 42 percent of the entire public. Many things have changed since 1956, but references to groups continue to occupy a central place in citizens' appraisals of parties and candidates – and not only in the United States (Kinder, 1983: 405, with some change in sentence ordering).

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