All voting is strategic

James M. Buchanan · Yong J. Yoon

Abstract All voting is strategic because the shared outcomes are note within the choice set of any voter, the elements of which can only be strategies. Voting behavior need not reflect the individual's ordering of outcomes, and the conventional distinction between sincere and sophisticated voting is misguided. In voting choice, the ordinal ranking of outcomes must be supplemented by intrapersonal evaluation of utility differences among these outcomes and also by predictions concerning the behavior of other participants in the nexus of interdependence.

1. Introduction

As Amartya Sen inferred in his AEA Presidential Address (Sen, 1995), social choice theorists have failed to distinguish carefully between two categorically different questions: (1) Given knowledge of individual ordinal preferences over "social states," is it possible to construct a "social welfare function," defined over these alternatives that will satisfy plausibly acceptable criteria for stability? (2) Given a defined rule of aggregation, how do participants in a collectively organized group make effective "collective choices" among the alternatives confronted?

The first of these questions is, of course, that which was directly and specifically addressed by Kenneth Arrow in his 1951 seminal book (Arrow, 1951), with the negative response formulated as the impossibility theorem. As widely interpreted, however, this Arrow theorem has been deemed directly relevant to the second question, hence, the implied challenge to the viability of democracy. However, the second question, which in one sense summarizes much of the whole research program in public choice, has never been analytically divorced from the first.

A central point to be made is that, for the first enterprise, there is no need to refer explicitly to *individual choice behavior*, as such. An individual in this construction is simply defined

J. M. Buchanan (✉)Y. J. Yoon
Center for Study of Public Choice, George Mason University, Fairfax, Virginia 22030
e-mail: jburgess@gmu.edu

as the ordinal preference ordering over properly defined "social states" – an ordering that exists independent of any specific behavior.

Any attempt to address the second question must, on the other hand, commence with the calculus of individual choice. Any collective outcome or result must emerge, ultimately, from the choices made and actions taken by participants, each of whom faces the alternatives that are privately or locally confronted as these are dictated by some decision or aggregation rule. And, importantly, these alternatives are different in kind from those that are incorporated in the ordinal ranking of end-states. There has been a slippage in logical analysis derivative from the failure to distinguish between the two categorically different settings. Almost without exception, analysts have proceeded from the definition of a person by a primitive preference ordering over collective outcomes, the starting point of the construction aimed at resolving the first question, to the quite different choices that confront individuals in their roles as participants in the collective choice process. Confusion and ambiguity are predictable.[1]

Our aim in this paper is to clarify the analysis and to identify sources of ambiguity. As we shall indicate, the implication is that public choice theorists, in particular, must "start over" in their examination of the calculus of individual choice in voting processes. The benchmark seemingly offered by the primitive ordinal preferences must be jettisoned in the recognition that all voting is necessarily "strategic" rather than "parametric," as these terms are commonly understood.

This shift in perspective allows us to emphasize (1) the relevance of intrapersonal evaluation of utility differences among outcomes and (2) information concerning others' voting behavior.

2. Behavioral revelation of ordinal preferences

Economists undergird their basic analysis with the minimizing postulate that individuals, in making choices in stylized market interactions, reveal an ordinal preference ranking over the separate alternatives confronted. This skeletal structure allows the construction of an operational theory of market choice in which there exists a one-to-one matching between the items in the ordinal preference ranking and the observed choices made and implemented. Persons are indeed what they seem; their choice behavior accurately reveals their ordinal preferences. In the stylized and limiting case, there is no choice among strategies, as such; the choices are among the set of feasible end-states or outcomes available to each choosing party as these are brought into being by the separated actions. Each person makes choices parametrically, as if his behavior exerts no influence either on the behavior of others in the nexus or on the aggregate "social state" generated by the behavior of all participants. From the interaction among all participants, a "social" outcome or result emerges, but in the stylized market order, the parties, themselves, are not required to and do not evaluate these results, as such. Nor do the ordinal preferences, as revealed in market choices, provide any information at all about an imagined evaluation of such "social" results.

In dramatic contrast, in any and all collective action settings, this characteristic is absent. Each participant knows that only from the expressed evaluation over collective outcomes can some "choice" emerge, but, at the same time, he knows that authority is lacking for any unilateral determination of the end-state. The end-state emerges from the separated inputs, the "choices," on the part of all participants. This elementary insight directly suggests that the

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[1] In an early 1954 paper, Buchanan emphasized the distinction between individual choices in the market and in voting, but he did not directly sense the issues treated here (Buchanan, 1954).

relevant alternatives for individual choices are *strategies*, as defined in familiar game-theory usage.

In collective action, in voting, the individual selects among the available strategies and, if rational, will choose that strategy which will maximally further the achievement of the ultimate end-state that stands highest on the primitive preference ordering of all such feasible end-states. Note, however, that there is no one-to-one mapping between an individual's "choice" (voting) behavior and the ordinal ranking of end-states or shared collective alternatives. Most social choice analysis, perhaps due implicitly to concentration on the first of the two problems stimulated by Arrow's work has failed to recognize the disjuncture here. This analysis has presumed, without conscious understanding, that an individual's ordering over end-states somehow translates directly into observable voting, with the corollary that departure from the ordering reflects deviant behavior, albeit possibly rational in some senses. Hence, the familiar references are made to strategic voting outside the norm, as being "insincere" or "dishonest." But, why should a vote be classified "sincere" only when it satisfies a condition that is derived separately from the choice situation actually confronted? From the very nature of collective action, all voting, as such, is necessarily strategic.[2]

In the stylized market setting, persons reveal their ordinal preferences through their behavior; hence, they can be modeled as if they are maximizing an ordinal utility function subject to the constraints separately faced. But what is revealed by comparable individual behavior in the stylized collective setting? If the correspondence between individual behavior and the ordering over end-states is abandoned, what is there left to salvage?

At this point, we may return to the first question initially posed and examine closely the conditions under which Arrow's theorem carries implications for the second question. If we can imagine persons confronting collective alternatives in a series or sequence of pairwise comparisons, divorced one from another, we could, seemingly, restore a semblance of logical structure to the analysis of the process. If, under a majority decision rule, we can think of the individual as faced by two alternatives for voting (candidates, platforms, discrete collective options) with the presumption that nothing at all is known about the possible existence or nonexistence of other alternatives beyond the two under consideration, along with the presumption that nothing at all is known about the predicted voting profiles of other voters, then the selection among the two options will mirror the ordinal ranking of the two in the voter's primitive evaluations. That is to say, under these quite rarified conditions, the individual's *revealed* voting pattern can be interpreted as if the objective is that of maximizing an ordinal utility function, analogous to standard market behavior.

In this setting, the individual's choice between the levers or keys marked *A* and *B* in the voting booth does reflect the primitive ordinal standing of the two collective alternatives, *A* and *B*, even if the individual voter knows that his own selection of one or the other does not determine the collective result. But the strategy choice between levers or keys *A* and *B* is dictated by the absence of information. In this position, there will always remain some

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[2] Several theorists have attempted to extend the primitive preference ordering to allow for "strategic" departures from the correspondence between this ordering and observed action, while adhering to precepts for rational behavior. (See, for example, Farquharson, 1969; Gibbard, 1973; Satterthwaite, 1975). Such efforts seem misguided in their failure to appreciate that the distinctive setting within which choices are made eliminates any general relevance of any primitive ordering over end-states. Austen-Smith and Banks (1998, 2000) recognize the categorical distinction here, but from a perspective different from our own. See also Myerson and Weber (1993) and Feddersen and Pesendorfer (1999).

positive probabilistic sense that a vote for *A* over *B* will increase the prospect that *A* will be the emergent outcome.[3]

3. Independence of irrelevant alternatives

If we move beyond the severely restrictive assumptions made previously about the individual voter's information, the voting choice, as observed, no longer reveals anything about the primitive reference ordering over collective end-states. That is to say, a vote for *A* rather than for *B* in the pairwise comparison does not indicate that *A* stands higher in the voter's preference order over these two options.

The critical assumptions are those that, first, limit the voter's information about the existence or nonexistence of collective alternatives not immediately presented in the pairwise comparison and, second, limit the information about the predicted behavior of other voters. Implicitly at least, Arrow recognized the relevance of the first of these assumptions when he imposed the requirement concerning the irrelevance of independent alternatives as a condition for carrying through the impossibility theorem. Clearly, if the individual voter knows nothing at all about the possible existence of *C* or any other alternative likely to be considered, when the levers marked *A* and *B* are confronted, the vote will be cast for the one from between the two that stands highest in his primitive ordering.

In this setting, it is only as and if other alternatives are introduced, from some source exogenous to the voter, that any possibility of a majoritarian cycle can emerge, requiring that the individual voter resort to a part of the primitive ordering not relevant to the initial choice among the levers or keys restricted to the two alternatives initially presented.

4. Other voters

The second assumption that is required in order to make inquiry into the first question initially posed relevant for the second question is that concerning the voter's information about the predicted behavior of other participants whose voting choices will also affect the determination of the collective outcome. As noted, the individual voter will know that any such outcome will emerge only from some aggregation of the separate individual votes within a defined rule.

But what predictions can the individual voters make about the behavior of other participants? And how will such predictions affect the voting calculus itself? We can imagine a whole spectrum of possibilities here ranging from a total absence of information, on the one hand, to perfect information, on the other. Interestingly, only in the extreme case of zero information can we conclude that an individual's vote, as observed, will reflect the primitive ordinal preference between the two options, as presented, provided that the possible presence of other alternatives is recognized.

Consider the simplest example, familiar in the standard constructions. There are three collective outcomes possible: *A, B, C.* There are three voters: 1, 2, 3. The final collective

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[3] As the number of voters increases, probability of any single vote influencing the outcome decreases. This relationship is the basis for the conceptions of rational abstention and rational ignorance and also gives rise to the possible explanatory significance of expressive voting. On rational abstention and ignorance, see Downs (1957) and Tullock (1967). On expressive voting, see Brennan and Buchanan (1984) and Brennan and Lomasky (1993).

result is to be settled by a series of pairwise majority votes. Presume, now, that the voter knows both the number of possible collective outcomes and the decision rule. If he knows nothing at all about the behavior of the other two voters, the choice of one voting lever or the other in any pairwise comparison will reflect accurately the standing of the two end-state alternatives, regardless of his own subjective utility profile.[4]

Consider, however, the other extreme of the information spectrum. Suppose that Voter 1 ranks the collectives options *ABC*, but that the voting behavior of the remaining two persons can be predicted with certainty. How will Voter 1 choose between the levers or keys marked *A* and *B*, if these are the two options immediately presented?

There are four possible voting profiles of the other two voters, as between the options *A* and *B*. In one-half of these profiles, Voters 2 and 3 will both vote for one alternative over the other. Voter 1 will not be able to influence the collective outcome. In the other half of the set of possible profiles for Voters 2 and 3, Voter 1's action will be decisive. We may conclude that, if Voter 1 can predict with certainty the voting behavior of Voters 2 and 3, and if the act of voting involves any cost, Voter 1 will abstain in one-half of the voting processes. Note that this result holds even in the stylized small-number setting, quite apart from the familiar diminution of influence as the number of participants increases.

We may remain with the three-person, three-alternative construction and examine more carefully the behavior of reference Voter 1 in those cases in which his vote is determining of the result. Suppose that Voter 1 knows with certainty that Voter 2 will vote for *B* over *A*, and that Voter 3 will vote for *A* over *B*. Suppose that Voter 1 also knows, however, that Voter 2 will vote for *C* over *A*, and that Voter 3 will also vote for *C* over *A*, when these two different alternatives are presented. This pattern of voter profiles is, of course, that which generates the familiar cyclical sequence.

In this highly rarified setting, will Voter 1's behavior necessarily reflect the underlying primitive ordinal ranking over collective outcomes? What conditions must be met for such a one-to-one correspondence to occur?

For now, assume that the ordinal ranking of the collective alternatives is all that Voter 1 knows about his own utility function. This assumption amounts to the postulate that the utility differences between the separate options are equal (see the utility profile *F*1 in Figure 1).

Note that, in this situation, Voter 1 will be *indifferent* between voting for *A*, which will set off the majoritarian cycle, or voting for *B* which will guarantee that *B*, reflecting Voter 1's median preference, will be the stable result. Even in this highly stylized example, we have a trace of an answer to Gordon Tullock's question: Why so much stability? (Tullock, 1981).[5]

The thrust of the argument is clear. To the extent that the two restrictive informational requirements are relaxed, majority voting procedures are more likely to generate stability than the simplistic transference of the Arrow theorem might imply. This preliminary conclusion can be reached without further inquiry into the knowledge that the individual participant might possess about his subjective utility function. As the next section will indicate, such an inquiry allows the whole analysis to be quite differently evaluated.

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[4] In the initial version of this paper, an appendix was included that developed the formal proof of this proposition. This proof is available to interested readers upon request of the authors.

[5] In the situation so described, the emergent result from the elimination of the cycle does depend on the sequence in which the alternatives are paired, one with another. Control of the agenda for the voting process becomes important.

Fig. 1 Utility profiles
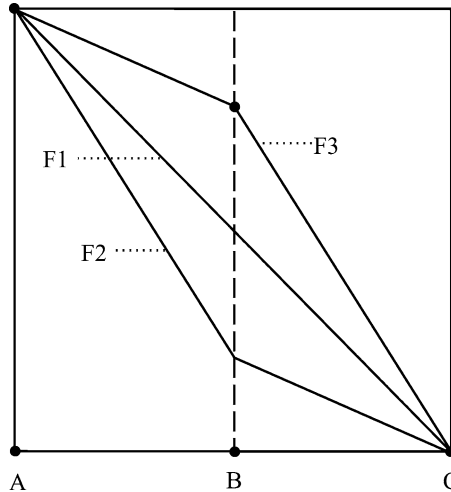
5. Ordering of utility differences[6]

Failure to distinguish between the two questions posed at the outset has caused analysts to unwittingly transfer the economists' decision theory mind-set to the individual calculus of voting–a transference that is not grounded in either logic or empirical reality.

After Robbins (1932) challenged the classical utilitarian basis for an economics of welfare, attention was shifted to Pareto, whose construction allowed for an operational theory of market choice to be developed on the presumption that persons need only be able to rank order the alternatives separately confronted. Utility, as such, need not be measurable, and any effort to make interpersonal comparisons was judged to be out of scientific bounds.

Von Neumann and Morgenstern (1944) modified the analysis to demonstrate that if persons are able to rank order options that represent lotteries among alternative end-objects, such an ability, in itself, implies that persons, intrapersonally, can indeed order differences among such objects. The Von Neumann-Morgenstern logic has, however, been extended only with application to choices among lotteries. There seems to have been a continuing failure to incorporate the obvious proposition to the effect that an individual may, in any and all choice settings, evaluate the relative differences among the alternatives confronted. That is to say, utility is clearly measurable *intrapersonally*.

Simple introspection will suffice to clinch the argument. Consider an individual on a cold winter's day who must choose among three possible settings on the thermostat: 75 degrees, 65 degrees, and zero. The difference between the first two of these options is obviously less than the difference between the second and the third. And this ability to compare differences is self-evident without any reference to lottery-like characteristics of the alternatives.

Economists have overlooked this element of analysis because no such intrapersonal measurement of utility (or whatever other term is used here) is required to develop the theory of market choice. They have inadvertently carried over such neglect into analyses of voting

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[6]Elements of the argument and analysis of this section are contained in our paper "Subjective Evaluation of Alternatives in Individual Voting Choice" presented at the conference honoring Geoffrey Brennan convened in Rome, Italy, in September 2004.

choice. And, if attention is focused solely on the first question as posed, that is, on the construction of a social welfare function, the stylized model allows only for the revelation of preferences from a series of pairwise voting between each two options separately considered. In other words, the structure, so stylized, reveals the primitive ordering, nothing more.

If attention, however, is shifted to the second question, as initially posed, then any analysis of the individual's voting calculus must incorporate some presumption about that individual's ability, or the lack thereof, to make intrapersonal comparisons. An acknowledged inability to make interpersonal comparisons implies nothing at all about an ability to evaluate alternatives along some internal scalar.

The discussion in the preceding section demonstrated that, even if we arbitrarily restrict the voter's ability to make intrapersonal comparisons, there will exist conditions under which observed voting behavior will not accurately reflect the underlying primitive ordering over outcomes. If we move beyond this restriction and allow the individual voter to possess some ability to compare differences along with some ability to predict the behavior of other voters, any linkage at all between observed voting behavior and the primitive ordering is severed.

Consider, again, the simple and familiar example: three alternatives, *ABC*, and three voters, 1,2,3, under majority voting in pairwise selection. Consider the calculus of Voter 1, whose primitive ordering over the three options is *ABC*, who predicts that the voting profiles of Voters 2 and 3 will be *BCA* and *CAB* respectively. Suppose further that, for Voter 1, the difference between the first two of the options is smaller than the difference between the second and the third. That is,

$$U(A) - U(B) < U(B) - U(C),$$

as depicted in the profile F3 in Figure 1. In this setting, note that the predicted cyclical sequence, if it occurs, will generate a net value of

$$[U(A) + (UB) + UC)]/3,$$

but that this value is less than the utility of *B*. That is, if

$$[U(A) + (UB) + UC)]/3 < U(B),$$

this voter will vote for *B* rather than for *A* in the pairwise comparison. The stable outcome *B* will emerge despite the impossibility theorem.

This result stems, of course, from the postulated ordering of differences. Such an ordering may be reversed. That is,

$$[U(A) + (UB) + UC)]/3 > (B),$$

in which case the voter will prefer the cycle to any guarantee of his median position, even to the extent of inducing a cycle that would be otherwise absent. (Utility profile $F2$ in Figure 1.)

If we move beyond the severe limits of the stylized examples and make the plausible assumptions that (1) the voter has a good idea as to the set of collective outcomes to be presented as alternatives in a series of pairwise votes; (2) is able to evaluate subjectively the differences between these alternatives; and (3) has at least some ability to predict the behavior of other voters, it is highly unlikely that such a voter's observed voting pattern would reflect the primitive preference ranking over these alternatives. A correspondence

between the pattern of strategic voting choices and the primitive ranking had best be treated as an accidental fluke rather than the benchmark from which departures are assessed.

6. Generalization

To this point, we have confined analysis to the behavior of the individual voter. The obvious next step toward any predictive explanation of collective outcomes would be an analysis of how the separate individual voting choices are aggregated under the relevant decision rule. One elementary conclusion immediately emerges. If the individual's voting choice depends on any prediction about the voting behavior of others, any presumption of perfect or even near-perfect information cannot be generalized to apply over all voters. It becomes logically contradictory to postulate that each voter can predict with certainty how other voters will act, if these others are to be allowed choices. The setting is necessarily game-theoretic, and it is the intersection among the separated strategic choices of all voters that determines the collective outcome.

This conclusion remains relevant even in those large-number circumstances in which the individual voter faces a very small prospect of being able to influence the electoral outcome. In this case, the choice behavior of the single voter is "nonstrategic" in the sense that such behavior does not take place in any expectation of being able to influence the behavior of others. But individual voting choice must be motivated by an expectation that the collective result can be influenced at least probabilistically. Absent this expectation, any motivation for voting at all disappears. Hence, the voting choice remains "strategic" in the sense that the behavior itself depends on the predictions that are made about others' behavior.

The psychological setting for the individual participant in collective choice is dramatically different from that for the individual in stylized market choice. In the latter case, the individual (as pure price taker) can indeed behave parametrically. The objective that can be brought into being by choice itself is localized to the chooser who can act as if the remainder of the environment does not change. The ultimate effect of any individual choice on the inclusive "social state" does not enter the consciousness of the chooser.

7. Conclusion

We acknowledge that the argument presented in this paper is destructive. The implication of the recognition that all voting is and must be strategic, defined as departure of observed voting patterns from primitive ordering over alternative collective outcomes, is that social and public choice theorists must jettison much of the conventional analysis and start over. If the aim of analysis is to be able to move toward answering the second rather than the first question posed at the outset, the setting within which the individual participant acts must be clarified, even in the highly stylized voting models. The necessary interdependence of separate individual choices made and the necessary recognition by the participant that the collective outcome or result emerges from the intersection of these choices, as determined by a decision rule, means that behavior is strategic and cannot be derivative directly from the participant's primitive ordering.

Recognition that all voting behavior is strategic in this game-theoretic sense implies that the proper analytical tool structure is to be found in game theory rather than some analogue to the decision-theory basis that has informed conventional analyses of market choice. Unfortunately, for the most part, efforts in game theory have remained on small-number interactions. Progress in analyzing voting choice and emergent collective action

in large-number settings can only be made in the extension and utilization of the tools of *n*-person game theory.

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