Analyzing Politics
Rationality, Behavior, and Institutions

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Summary

We've wandered a bit far afield, but we hope the reader has been sensitized to the fact that, even when individuals honestly reveal their preferences, it is nevertheless entirely possible for a group's preferences to be "badly behaved" (read: intransitive) in comparison to those of the individuals that comprise it. This is an instance of what political philosophers Brian Barry and Russell Hardin call "rational man and irrational society." As a consequence, what is best for the group, or even what a majority thinks is best for the group, is not at all evident. Even more important, the precise institutional procedures by which the group determines what it shall do are absolutely critical in making that choice.

In the next several chapters we make these matters, and more besides, a bit more precise. In Chapter 4 we will focus on the method of majority rule and the problem of group preference intransitivity. In Chapter 5 we will continue on this theme by investigating the method of majority rule from the perspective of the spatial model of group choice. Chapter 6 turns attention to the issue of manipulation, in terms of both the misrepresentation of preferences and agenda strategies. Finally, in Chapter 7 we take up the theme of alternative ways for groups to make choices.

1 Rational Man and Irrational Society? (Beverly Hills, Calif.: Sage, 1982).

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Group Choice and Majority Rule

In the previous chapter we introduced three subjects, though only in the most casual of fashions: cycling majority preferences, manipulation of agendas and of the way preferences are revealed, and alternative voting methods for making group choices. In the next several chapters we take these subjects up one at a time and in considerably more detail. By the end of our intellectual tour, we hope the reader will have come to appreciate (if not admire) the expertise politicians must acquire in order to master the arcane procedural details of group choice.

Cyclical Majorities

Condorcet's Paradox

We saw in the last chapter that a group of rational individuals can collectively produce irrational results. Even though each individual in the group has preferences that are consistent (complete and transitive), this need not be true of the group's preferences. This puzzle has come to be known as Condorcet's paradox, named after the eminent scientist, philosopher, and mathematician of late eighteenth-century France who
(re)discovered it. Although not actually a paradox in the strict logical sense, the disjuncture between group preferences and the preferences of individuals always seems to surprise and puzzle students when they first encounter it. Its general format is given in Display 4.1, where a group $G = \{1, 2, 3\}$ must choose by majority rule from among the three alternatives, $\{a, b, c\}$, which could be political candidates, public policies, or places to go in Boston on a sunny spring afternoon. A majority, $\{1,3\}$, prefers $a$ to $b$; another majority, $\{1,2\}$, prefers $b$ to $c$; but (contrary to transitivity) still another majority, $\{2,3\}$, prefers $c$ to $a$. For members of a group with these preferences, majority rule produces alternatives that are said to cycle. This raises both a normative and a positive question—what should the group $G$ do? and what will the group $G$ do? In more general contexts, in which G is a legislature, a town meeting, or indeed possibly an entire electorate or society, these questions take on a broad significance.

However, before we get up a head of steam on “broadly significant” questions, and with all due respect to Monsieur Condorcet, a prior question naturally arises: just how important is this puzzle of group intransitivity? Is it merely an ar-

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1 For the longest time, Condorcet was credited with inventing this voting paradox. Only recently has it come to light that, in fact, he had rediscovered something that had been known five hundred years earlier. For a general historical overview of this subject, see Jahn McLean and Arnold B. Urken, eds., Classics of Social Choice (Ann Arbor: University of Michigan Press, 1993).

cane logical possibility, a trick foisted upon the unknowing student by professors, philosophers, and textbook writers? Or is it a profound discovery, the stuff from which important insights about political philosophy and social life are made? In our opinion, the answer lies much closer to the latter.

We sneak up on the general issues raised in the preceding paragraph by thinking first about the likelihood of Condorcet’s paradox in the simplest of all settings, namely the three individuals and three alternatives given in Display 4.1. Any one individual may rank order the three alternatives in thirteen different ways (see Display 4.2). Preference orderings (1) through (6) involve no indifference and are said to be strong. Orderings (7) through (12) involve some indifference, while (13) represents total indifference; these latter orderings are weak. Each member of the group thus may adopt any one of thirteen orderings, so that there are $13 \times 13 \times 13$, or 2197, combinations of three individuals with preferences over three alternatives. That is, there are 2197 different “societies.” To keep things simpler still, we will focus on the $6 \times 6 \times 6$, or 216, societies of three persons with strong preferences (preference ordering 1 through 6 in Display 4.2). We now determine how many of these societies are afflicted with Condorcet’s paradox.

Notice in Display 4.1 that the cyclical group preferences are produced by a situation in which each alternative is ranked first by exactly one person, second by exactly one per-
**DISPLAY 4.3**

**ANOTHER SET OF CYCLICAL MAJORITY PREFERENCES**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>c</td>
<td>a</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>c</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td></td>
</tr>
</tbody>
</table>

...son, and third by exactly one person. This produces the "forward cycle," \( a P_G b P_G c P_G a \), where \( P_G \) means "is preferred by a majority of the group to." There are actually six different ways to produce this forward cycle, since Mr. 1's preference ordering in Display 4.1 could be held by any one of the three individuals, Ms. 2's by any one of the two remaining, and Mr. 3's by whomever is left. There are also six ways to produce the "backward cycle," \( c P_G b P_G a P_G c \), generated by the individual orderings given in Display 4.3, as well as by any reassignment of them among group members.\(^2\) So, taking forward and backward cycles together, there are exactly 12 of 216 (strong-preference) societies that generate group preference cycles.\(^3\)

So we now know that in the world of three-person groups choosing among three alternatives, the odds are extremely good that majority rule will work smoothly. In 204 of the 216 possible configurations there will be a Condorcet winner rather than a Condorcet cycle.\(^4\) If each of the preference configurations (societies) that cause majority rule cycles is no more likely than each of the 204 for which majority rule works smoothly, then majority rule will generate consistent group preferences most of the time. In short, majority rule is normally a splendid way to conduct business, when the number of individuals is small and the alternatives are few.

If only life were so simple! Alas, it is not. And as soon as we start complicating things, the case for majority rule needs reexamination. There are really only two ways in which to make our pure majority rule setting more complicated. We can increase the number of individuals \((n)\) or we can increase the number of alternatives \((m)\). (Of course, we can increase both at the same time, too.) We are interested in deriving a probability or proportion that gives the likelihood of a majority rule preference cycle, given the number \(m\) of alternatives and the number \(n\) of individuals in the group. We write this probability as \(Pr(m,n)\). We already know, for example, that \(Pr(3,3) = 12/216, \) or \(.056\). Generally,

\[
Pr(m,n) = \left[\frac{\# \text{ of "problem" preference configurations}}{m!}\right]
\]

This formula states that the probability of intransitivity in the majority preferences of a group of size \(n\) voting on \(m\) alternatives is the ratio of two numbers. The numerator is the number of "societies" with cycling group preferences, like those presented in Displays 4.1 and 4.3. This number is 12 for \(m = 3\) and \(n = 3\), as we saw in the discussion surrounding those displays. The denominator gives the total number of possible societies, computed as follows: With \(m\) alternatives any individual in the group may choose any one of \(m\) x \((m - 1)\) x \((m - 2)\) x \(\ldots\) x \(3\) x \(2\) x \(1\) (or \(m!\) in mathematical symbols) different

\(^2\) Display 4.3 is simply Display 4.1 with everyone's preference ordering reversed.

\(^3\) We are claiming here that only the preferences given in Displays 4.1 and 4.3, and their reassignments, produce group preference cycles. These twelve preference configurations are the only ones in which each alternative appears exactly once at each rank level. It is relatively easy to show that if any alternative shows up at the same rank for more than one individual, then the group preference will not cycle. The reader may like to try his or her hand at establishing this fact.

\(^4\) A Condorcet winner is the alternative that can defeat all others in pairwise majority contests. If three alternatives do not cycle, then it must be the case that one of them is a Condorcet winner.
Table 4.1

<table>
<thead>
<tr>
<th>Number of Alternatives (m)</th>
<th>Number of Voters (n)</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
<th>11</th>
<th>limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>.056</td>
<td>.069</td>
<td>.075</td>
<td>.078</td>
<td>.080</td>
<td>.088</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.111</td>
<td>.139</td>
<td>.150</td>
<td>.156</td>
<td>.160</td>
<td>.176</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.160</td>
<td>.200</td>
<td>.215</td>
<td></td>
<td></td>
<td></td>
<td>.251</td>
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<tr>
<td>6</td>
<td>.202</td>
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<td></td>
<td></td>
<td></td>
<td>.315</td>
</tr>
<tr>
<td>limit</td>
<td>≈1.000</td>
<td>≈1.000</td>
<td>≈1.000</td>
<td>≈1.000</td>
<td>≈1.000</td>
<td>≈1.000</td>
<td></td>
</tr>
</tbody>
</table>


ways to order his or her preferences over the alternatives. Since there are n individuals, this means there are m! x m! x . . . x m! (n times), or (m!)n different societies. This number, for m = n = 3, is (3 x 2 x 1)3 = 6 x 6 x 6 = 216, as we also saw in the discussion of Display 4.2. Fortunately for us, computationally talented scholars have determined Pr(m,n) from the formula given above for various values of m and n. A partial summary of their calculations is presented in Table 4.1.5

The columns of this table give groups of different sizes, ranging from three to some extremely large number (which we call the “limit”). The rows give sets of alternatives of different sizes, again ranging from three to a limiting (very large) number. The entries of the table give the probability that majority preferences cycle, Pr(m,n). Thus, if we look at the first row (m = 3 alternatives), the probability of a cyclical majority rises slowly from the .056 we computed above for three-member groups to .088 in the limit as the number of group members becomes very large. Increase the number of alternatives to four and the probability of a cyclical majority roughly doubles for each group size; that is, it starts at a higher level and smoothly increases to a limiting probability of .176. As the number of alternatives grows very large, Pr(m,n) approaches 1.0—it becomes nearly certain that there will be preference cycles among majorities.

So, the good news we inferred from the small-group/few-alternatives situation does not extend to more general situations. As the number of group members increases, and especially as the number of alternatives increases, the probability of badly behaved majority preferences grows, becoming nearly certain as we approach the limit. In general, then, we cannot rely on the method of majority rule to produce a coherent sense of what the group “wants,” especially if there are no institutional mechanisms for keeping participation restricted (thereby keeping n small) or weeding out some of the alternatives (thereby keeping m small).

This is a troubling state of affairs for anyone trying to analyze politics. We have just concluded that, most of the time, when we employ majority rule, we must tolerate either group incoherence, a highly compressed franchise (small n), or highly restricted agenda access (small m). That is the gist of Table 4.1. There is, however, an important qualification.

In computing the entries of Table 4.1, a very specific assumption was made about the likelihood of various preference configurations. We assumed that, for any size group (n), each of the strong preference orderings is as likely as another to characterize the preferences of an individual. Moreover, one

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5 A very accessible discussion of this entire subject is found in William H. Riker, Liberalism Against Populism (San Francisco: Freeman, 1982), Chapter 5. The literature on estimating Pr(m,n) is cited there in footnote 3.

6 Throughout this text, we shall use “coherent,” “consistent,” and “transitive” interchangeably.
person's "selection" of a preference ordering is entirely independent of some other person's. Thus, for \( m = 5 \) for example, there are \( 5 \times 4 \times 3 \times 2 \times 1 = 120 \) ways to strongly order the five alternatives. Each of the group members is assumed to have his or her preferences represented by any one of these 120 preference orderings with equal probability. Thus, for \( n = 7 \) persons for example, there are \( (120)^7 \) equally likely seven-person societies. And, as the appropriate entry in Table 4.1 reveals (the one for \( m = 5 \) and \( n = 7 \)), 21.5 percent of these societies generate cyclical majority preferences. That is, more than one time out of every five, a group of seven choosing among five alternatives by majority voting will produce group incoherence.

However, almost any real conception of society is bound to be more all-embracing than a collection of equiprobable preference-orderings; indeed, most conceptions of society emphasize interdependence rather than independence among individuals. Individuals often choose to join groups, for example, precisely because they have preferences in common with other group members. This would lead one to expect correlation, not independence, between the preferences of group members. The conception of society as a collection of independently chosen preference orderings provides no more than baseline assessment of majority rule methods. So, our concerns about cycles in majority rule as reflected in Table 4.1 are probably exaggerated—but only somewhat. Even if the feasible "societies" are not equally likely, as long as either \( n \) or (especially) \( m \) is large, the odds of majority preferences cycling is sufficiently large to be of concern. Moreover, in other circumstances such as we believe to be quite common in politics—circumstances described momentarily as "distributive politics"—majority cycles are inevitable. Condorcet's paradox cannot be lightly dismissed. We hammer these points home in concluding this section, first with one last abstract example and then with a couple of real-world cases of cyclical majorities.

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**Cyclical Majorities and "Divide the Dollars"**

So many interesting political fights involve a group deciding how to share something. Usually it is something desirable and the fighting is about getting the most favorable distribution. Manna from heaven is wonderful, but how should it be divided up? The same logic, however, applies to things people want to avoid. For the past decade or so, reducing the federal deficit has been of great political import in the United States. Everyone agrees that several hundred billion dollars of public expenditures need to be cut (or revenues raised), but from where and from whom? Divvying up program cuts or tax burdens, just like sharing the revenues from newly discovered oil or some other windfall, involves group conflict over distribution.

Suppose a small town has lucked into a windfall of \$1000, because the state had made an earlier error of overcollecting fees from the town. The town's three-person board of selectmen7 must decide how to spend this "found" money, this manna from heaven. The politicians on the board represent the East, Central, and West districts of town, respectively, and, like most representatives, they want to hang on to their jobs by taking care of their respective constituents. By this it is meant that each politician—whom we shall name E, C, and W—believes that the more money he or she can land for the district, the better his or her chances are for reelection. The board operates by simple majority rule. Is there a division of the spoils that a board majority prefers to any other division? That is, is there a Condorcet-winning sharing scheme or, instead, do the sharing schemes cycle?

Let us write a share of the \$1000 for each district as \( s(E) \), \( s(C) \), and \( s(W) \), respectively. A sharing scheme, \( \{s(E), s(C), s(W)\} \), is feasible if (1) each of its components is nonnegative (you can't give one of the districts a negative share of \$1000).

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7 "Board of selectmen" seems to be a New England thing. In other parts of the United States, the local legislature is called a city or town council or board of aldermen.
—$s(E)$, $s(C)$, $s(W) \geq 0$; and (2) if the components sum to no more than $1000—s(E) + s(C) + s(W) \leq 1000$. In this feasible set, $(1000, 0, 0)$ is the most-preferred distribution for $E$, $(0, 1000, 0)$ is most-preferred by $C$, and $(0, 0, 1000)$ is $W$’s first choice. Generally speaking, a selectman prefers one distribution to another if and only if his or her component is larger in the one distribution than in the other.

Our claim is that “divide the dollars” is a game that produces cyclical majorities. No distribution is preferred by a majority to every other distribution; there is no Condorcet winner. Before showing this generally, let’s consider some cases. Consider first what many would consider the fair distribution—$[33\frac{1}{3}, 33\frac{1}{3}, 33\frac{1}{3}]$. A majority consisting of $E$ and $C$ prefer $[500, 500, 0]$ to it; another majority consisting of $E$ and $W$ prefer $[600, 0, 500]$ to it; and, finally, the coalition of $C$ and $W$ prefer $[0, 0, 500]$ to it. In each of these instances two of the three selectmen do better than with the fair distribution, in the sense that they bring home more revenue to their constituents. The fair distribution is thus vulnerable to some majority coalition of selectmen ganging up on the excluded selectman. But what about these latter distributions? It turns out that they, too, are vulnerable. And the distributions to which they are vulnerable are also vulnerable. In fact, majority preferences over various distributions cycle. To see this, consider the distribution $[500, 500, 0]$ that $E$ and $C$ prefer to the fair distribution (since $500 > 33\frac{1}{3}$ for both $E$ and $C$). Against $[500, 500, 0]$, $E$ and $W$ prefer $[700, 0, 300]$ (since $700 > 500$ for $E$ and $300 > 0$ for $W$); and then $C$ and $W$ favor the fair distribution to $[700, 0, 300]$ (since $33\frac{1}{3} > 0$ for $C$ and $33\frac{1}{3} > 300$ for $W$), thereby producing a majority cycle (Display 4.4).\(^8\)

\(^8\) Generally speaking, consider an arbitrary feasible distribution, $d = [x, y, z]$. This can be any distribution whose components are greater than zero and which sum to no more than $1000$. Take two small positive amounts, $\delta$ and $\epsilon$ (where $\delta + \epsilon \leq 2$), and reallocate them away from $W$ to $E$ and $C$. This new distribution, $d' = [x + \delta, y + \epsilon, z - \delta - \epsilon]$, is also feasible as long as we don’t take too much away from $W$ (which is what the inequality in the parenthesis above guarantees). Now, since $\delta$ is positive, $E$ prefers $d'$ to $d$ and, since $\epsilon$ is positive, $C$ prefers $d'$ to $d$. (Of course, for exactly these same reasons, $W$ prefers $d$ to $d'$.) Since a majority of the selectmen prefer $d'$ to $d$, the latter is not a Condorcet-winning sharing scheme. But $d$ was an arbitrary scheme. It could have been any distribution and the same logic would have applied. So, what we have proved is that no sharing scheme is a Condorcet winner, since any scheme is subject to reallocations like the one constructed above.

We have claimed that “divide the dollars” represents a generic kind of politics. We have just proved that sharing out benefits and burdens, or what is known as “distributive politics,” is inherently cyclical in majoritarian settings. Any proposed distribution is open to amendment as different majorities jostle with one another for advantage. Final outcomes, whatever they happen to be, are extremely sensitive to other institutional features of the group decision-making setting. They will depend, for example, on someone exercising agenda power, or on some arbitrary time limit on deliberation, on procedural features like who is permitted to make motions, or whatever. In sum, in this very important class of political activity, the only way to avoid preference cycles like the one in Display 4.4 is to impose some form of antimajoritarian restriction. This is the principal content of Arrow’s Theorem, the subject of the next section. Before turning to that, we illustrate our main point one more time with some illustrations drawn from American political history (Case 4.1).

\(\text{Display 4.4} \)

<table>
<thead>
<tr>
<th>Distribution 1</th>
<th>Distribution 2</th>
<th>Majority Coalition Preferring 2 to 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>[33\frac{1}{3}, 33\frac{1}{3}, 33\frac{1}{3}]</td>
<td>[500, 500, 0]</td>
<td>(E,C)</td>
</tr>
<tr>
<td>[500, 500, 0]</td>
<td>[700, 0, 300]</td>
<td>(E,W)</td>
</tr>
<tr>
<td>[700, 0, 300]</td>
<td>[33\frac{1}{3}, 33\frac{1}{3}, 33\frac{1}{3}]</td>
<td>(C,W)</td>
</tr>
</tbody>
</table>

Case 4.1
Civil War Taxes, Great Depression Taxes, 1980s Tax Reform

Tax politics is distributive politics par excellence; it is certainly a good example of divide the dollars. Various social groups want to avoid paying more taxes, and this leads to unstable coalitions and preference cycles. The question to be asked, then, is how we have been able to pass tax reform legislation at all (reforms either to increase taxes, decrease taxes, or redistribute the burden). We have chosen three episodes to demonstrate the dynamics of preference cycles as they play out in the U.S. Congress. In the first case, uncertainty played a critical role. In the second case, institutional features restricted the ability of groups to offer amendments to a proposed bill. In the final episode, organizational problems prevented a coalition from uniting to block proposed legislation.

The very first income tax in (what remained of) the United States was passed in 1861 as part of the effort to finance the Civil War. The interesting thing about the income tax is that it resulted from a preference cycle (and was not even part of the original suggestion for raising revenue). There was a motion in the House of Representatives to raise federal revenue by taxing wealth. To this motion was offered an amendment to raise revenue instead by taxing land. And, of course, if neither the original motion nor the amended version passed, the status quo of no taxes would prevail. Different majorities preferred the land tax to the wealth tax, the wealth tax to no tax, and no tax to the land tax. There was much confusion and to-and-fro during the debate as this majority preference cycle wreaked havoc. Finally, someone introduced the idea of taxing income. This swept to victory primarily because, unlike each of the other taxes (in which politicians knew exactly whose ox would be gored), there was much uncertainty about how an income tax would impact various constituencies. Politicians preferred the “lottery” of an income tax to no tax at all or a tax on either land or wealth.**

A legislative bill to raise, lower, or redistribute taxes is a proposal to alter the status quo in some fashion. One way to prevent preference cycles is to restrict the right of anyone to make amendments to a proposal. Then there are, in effect, only two alternatives—the proposal and the status quo—and a majority either prefers the proposal to the status quo or the status quo to the proposal, or there is a tie (in which case, by convention in nearly all legislatures, the status quo prevails). At various times throughout its history, and especially in the first half of the 20th century, Congress has restricted the rights of legislators to offer amendments to tax bills. When it has not, preference cycles often emerged. The Revenue Acts of 1932 and 1938, for example, were pieces of legislation in which Congress did permit members to amend the legislation on the floor, and scholars have identified the majority preference cycles that resulted from this activity. From experiences like these, members of Congress have often agreed in advance to impose institutional restrictions on one another’s legislative rights—in this instance, a restriction on the right to offer amendments—in order to avoid preference cycles.†

The Tax Reform Act of 1986 provides still another case in which preference cycles were overcome. What happened?

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* The institutional features we emphasize here are procedural rules that are common in most legislatures. They will be discussed more systematically in the next chapter.

† The organizational problems to which we allude, known as collective action problems, will be more fully analyzed in Chapter 9.


Against the status quo of doing nothing—always an option, of course—Senator Bill Bradley (D-N.J.) took advantage of various “supply-side economics” arguments to fashion a proposal that attracted a majority from both parties. As initially introduced by Bradley, the bill eliminated hundreds of billions of dollars in tax breaks in return for a lower individual tax rate. At this point it was expected that so-called special interests (whose tax breaks were being eliminated) would band together to offer a proposal (essentially an amended bill) that would woo away Republicans from the Bradley bill. This proposal, while protecting special-interest tax breaks and “bribing” Republicans in various ways, would nevertheless be sufficiently offensive to the majority that they would rather have no bill at all. That is, the so-called special-interest bill would defeat the Bradley proposal, but then would itself be defeated by the status quo. The result would be no bill at all, even though the Bradley bill was preferred to the status quo. In short, the special-interest proposal would generate a preference cycle that would have the effect of killing tax reform altogether. But this special-interest proposal did not materialize. Like hogs around a trough, the individual groups in the special-interest camp were so focused on preserving their own tax breaks that they failed to coalesce to produce the proposal to split the Bradley coalition. Deputy Treasury Secretary Richard Darman, the Reagan administration’s tax reform strategist, had said at the time that an organized effort by the special interests would have been a “killer coalition.” Darman went on to say that the lobbyists were “brought down by the narrowness of their vision. Precisely because they defined themselves as representatives of single special interests, they failed to notice their collection power.”


Group Choice and Majority Rule

ARROW’S THEOREM

We have looked both theoretically and practically at the puzzle of Condorcet’s paradox. The choices of rational individuals (based on complete and transitive preferences) do not necessarily translate through majority voting into a well-defined group preference. Condorcet’s paradox is problematic for majority rule in theory because its probability in natural groups is not trivial, and grows both with the size of the group and with the number of possible alternatives for choice. It is problematic for majority voting in practice because in very real political settings, especially those dealing with the distribution of a fixed pie, voting cycles do emerge.

Nevertheless, it may be that we aren’t looking at the problem properly. Maybe the problem of group incoherence is a peculiarity of round-robin tournaments, or of specific features of majority rule, but not of voting more generally. If we employed some alternative way of arriving at a group choice, the problem might be less severe, or might possibly even go away altogether. That is, it might be possible to overcome the theoretical and practical problems of group incoherence by structuring the institutional arrangements of group choice differently. Arrow’s Theorem, one of the most profound insights of 20th-century political thought (and one that won its originator a Nobel Prize in economic sciences), indicates that these hunches, these hopes that the problem of group incoherence will go away if only we think about it in the right way, are wrong. Arrow’s Theorem asserts that Condorcet’s paradox is a problem for any “reasonable” method of aggregating individual preferences into group preferences.

Arrow’s Theorem: Assumptions

Kenneth Arrow, in his seminal Social Choice and Individual Values,10 assembled a set of general conditions that he claimed

any reasonable method for aggregating preferences would satisfy. He did not equate these conditions with “reasonableness.” Rather, in a much more powerful argument, he suggested only that his conditions were minimal; any reader is free to add additional reasonable requirements that the method by which a group makes choices should satisfy. Arrow concludes that no method of aggregating individual preferences into a coherent group preference can simultaneously satisfy even his minimal conditions.\(^1\)

Arrow sets the problem up in an abstract fashion. There is a group of individuals, \(G = \{1, 2, \ldots, n\}\), where \(n\) is at least three. (Rather than naming group members, we will simply call them by numbers.) There is also a set of alternatives, \(A = \{1, 2, \ldots, m\}\) where \(m\) is also at least three. When we want to refer to a typical individual we will call him or her Mr. or Ms. \(i\). Likewise, when we want to refer generally to alternatives, we will refer to alternative \(h\) or \(j\) or \(k\). All of this will be apparent in context.\(^2\) The individuals in \(G\) are assumed to possess preferences over the alternatives of \(A\), written \(R_i\) for \(i \in G\), which satisfy:

Rationality assumption. \(R_i\) is complete and transitive.

This is just property 1 and property 2 from Chapter 2. Completeness is the assumption that Mr. \(i\) is capable of saying, for any pair of alternatives, which he prefers (or that he is indifferent between them). Transitivity is the requirement that Mr. \(i\)'s preferences are coherent—that if he prefers \(h\) to \(j\) and \(j\) to \(k\), then he prefers \(h\) to \(k\).

\(^1\) Therefore, the conclusion extends to any collection of conditions beyond the minimal ones proposed by Arrow: If no method satisfies the minimal conditions, then certainly it will not satisfy any expanded set of conditions.

\(^2\) For the reader unfamiliar with mathematical notation, we will occasionally make use of the set-theoretic symbol \(\in\), which means “is an element of.” Thus, \(i \in G\) means “Mr. or Ms. \(i\) is a member of group \(G\).” Similarly, \(h, j, k \in A\) means “\(h, j, k\) are all alternatives in \(A\).”

Group Choice and Majority Rule

To the rationality assumption for group members, Arrow adds four conditions to be taken as minimal requirements for the method by which the group makes choices:

**Condition U (Universal Admissibility).** Each \(i \in G\) may adopt any strong or weak complete and transitive preference ordering over the alternatives in \(A\).

**Condition P (Pareto Optimality or Unanimity).** If every member of \(G\) prefers \(j\) to \(k\) (or is indifferent between them), then the group preference must reflect a preference for \(j\) over \(k\) (or an indifference between them).

**Condition I (Independence from Irrelevant Alternatives).** If alternatives \(j\) and \(k\) stand in a particular relationship to one another in each group member’s preferences, and this relationship does not change, then neither may the group preference between \(j\) and \(k\). This is true even if individual preferences over other (irrelevant) alternatives in \(A\) change.

**Condition D (Nondictatorship).** There is no distinguished individual \(i^* \in G\) whose own preferences dictate the group preference, independent of the other members of \(G\).

Condition U makes sense if we are interested in designing a mechanism of group choice that responds to the preferences of group members. Although we assume that the individuals in \(G\) are rational, we do not want to restrict their preferences in any other manner. Rather, we want the mechanism to be universally applicable. Thus, if \(A = \{a, b, c\}\), then Ms. \(i\) may select as her preferences any one of the thirteen preference orderings given in Display 4.2.

The rationale for condition P is also driven by a concern for linking group preference to individual preferences. Surely
if the group preference ordering ranked alternative $k$ ahead of alternative $j$, even though every member of $G$ had the opposite preference, then we would be correct in describing the choice mechanism as perverse. It would certainly be the case that the group preference ordering was not a “positive” reflection of individual preferences, and this Arrow wanted to prevent.

Condition 1 states that the relative positions of alternatives $j$ and $k$ in the group preference ordering should depend only upon their relative positions in individual orderings. Suppose a group of American historians in 1990 sought to rank American presidents. Some ranked Thomas Jefferson ahead of Andrew Jackson while others had the opposite view. The decision rule—whatever it happened to be—combined these various views into a group preference, say for Jefferson over Jackson. Suppose all had Bush below these two. Suppose, however, that Bush’s brilliant leadership during the Persian Gulf War of 1991 caused some members of the group to elevate Bush in their respective preference orderings. Condition 1 states that it still should be the group’s assessment that Jefferson ranks ahead of Jackson—that in the comparison between Jefferson and Jackson, the group’s (changed) assessment of Bush is irrelevant and therefore should not affect this comparison.

Condition D is an extremely minimal fairness condition. It says that if $j$ is preferred to $k$ by some specific person—say Ms. $i^*$—and if $k$ is preferred to $j$ by everyone else, then it cannot be that the group preference is $j P G k$. There cannot be some privileged person in the group (Ms. $i^*$) whose preferences become the group’s preferences, no matter what the preferences of the other members of the group, even if this person is an expert, a philosopher-king, or a megalomaniac.

As we noted above, these four conditions are rather sparse and minimalist. There is a range of other things, both procedural and substantive, that many thinkers would want to include as additional “reasonable” conditions on the mechanism for group choice. As well, the four conditions are stated in an especially weak form. For example, condition D only precludes the most extreme form of dictator—one who gets her way against unanimous opposition; it does not preclude weaker forms of social and political inequality—oligarchies, power elites, exclusive committees, and so on. The theorem we are about to state, as applied to the minimalist conditions, will apply with a vengeance to any more elaborate set of conditions one might want to impose on the method for making group decisions.

**The Theorem and Its Meaning**

We have emphasized how weak, reasonable, minimalist, and sparse the Arrow conditions are because Arrow’s Theorem is of the “even if” form: even if we insist only on conditions as weak, reasonable, minimalist, and sparse as these, something horrible may still happen. The theorem, known as an impossibility result, follows:

**Arrow’s Theorem.** There exists no mechanism for translating the preferences of rational individuals into a coherent group preference that simultaneously satisfies conditions U, P, I, and D.

Put more dramatically, any scheme for producing a group choice that satisfies, U, P, and I is either dictatorial or incoherent—the group is either dominated by a single distinguished member or has intransitive preferences. This restates the Arrow Impossibility Theorem in terms of the great tradeoff it implies: *There is, in social life, a tradeoff between social rationality and the concentration of power.* Social organizations that concentrate power provide for the prospect of social coherence—the dictator knows her own mind and can act ra-
tionally in pursuit of whatever it is she prefers. Social organizations in which power is dispersed, on the other hand, have less promising prospects for making coherent choices. Though these organizations may appear fairer and more democratic to the person in the street, they may also be more likely to be tongue-tied or inconsistent in ordering the alternatives under consideration.\footnote{An alternative interpretation of the tradeoff is that we cannot insist on coherence universally—that the Rationality Assumption and condition U are in tension. As we shall discuss later in this chapter, the tension goes away if we relax our insistence on a universal domain.}

Does this mean that any particular mechanism for aggregating preferences is always either inconsistent or unfair? Absolutely not. Earlier, for example, we saw that in the three-voter/three-alternative situation, the method of majority rule yielded coherent group preferences in 204 of 216 configurations. It is easy to see (and we shall show this more formally below) that majority rule satisfies conditions U, P, I, and D. \textit{It is just that this method cannot guarantee group coherence in all situations} (as the twelve “troublesome” configurations give testimony to). That is, the Rationality Assumption is violated on some occasions.

Perhaps, as we discussed earlier, we are overreacting to this problem. The doubtful reader might say, “Sure, coherence and fairness in preference aggregation cannot be guaranteed, but perhaps this conflict only arises occasionally. Nothing is perfect, after all.” This is an overly optimistic view. The very fact that some social situations produce either incoherence or unfairness means that it will be possible for clever, manipulative, strategic individuals to exploit this fact.

Before turning to an illustration of how this theorem should affect the way we think about social life, let us make one last abstract observation. Although we have claimed that Arrow’s conditions of reasonableness are rather weak and un-

exceptional (and that, if anything, one might wish to impose additional and more demanding conditions on the method for producing group preferences), some may claim that Arrow’s conditions are already too demanding. That’s fair enough. But we can report that in the more than forty years since Arrow’s theorem first appeared, social choice theory (as the field created by Arrow has come to be called) has become something of an academic light industry. Somewhere on the order of 2500 books and articles have been written on Arrow’s Theorem. Scores of new theorems—variations on Arrow’s original result—have been proffered in which one or more of Arrow’s conditions has been weakened or altered.\footnote{Several surveys cover this broad literature. An accessible point of entry is provided by Riker, \textit{Liberalism Against Populism}, especially Chapter 5. The more advanced reader should consult Amartya K. Sen, \textit{Collective Choice and Social Welfare} (San Francisco: Holden-Day, 1970) or Jerry S. Kelly, \textit{Arrow Impossibility Theorems} (New York: Academic Press, 1978).} Short of actually eliminating one of the fairness conditions—for example, by permitting dictators—the Arrow result does not evaporate. Fairness and consistency in decision making by social groups must be traded off. This forces us to think about political life in new ways, as the Case 4.2 illustrates.

\textbf{Case 4.2}

\textbf{Legislative Intent}

A piece of legislation cannot possibly cover all conceivable contingencies for which it might be relevant. So, in any specific instance a bureaucrat, judge, or lawyer must determine whether a specific statute is applicable in a given situation. Because differences of opinion can arise over whether or in what manner a statute is applicable, the appellate courts are often called upon to render a judgment. Judges, lawyers, and legal scholars often give priority to the following ques-
tion in making this determination: What did Congress intend in passing this law? In discovering congressional intent, appellate courts hope to discern the class of circumstances covered by a statute, even if not explicitly mentioned in the statute.

Often the specific instance in question is a novel circumstance that could not possibly have been anticipated in advance in legislative deliberations. For example, do the laws from the 1930s affecting and regulating the propagation of radio waves also apply to television, satellite, or cellular telephone transmissions? To answer in the negative is to say that, because the statute neither explicitly addressed nor could conceivably have anticipated these novel developments, the statute does not apply. Congressional intent can only be discovered in the “plain meaning” of the language in the statute. To answer in the affirmative, on the other hand, is to acknowledge that lawmaking is a costly undertaking, that a legislature cannot be all-knowing, and thus that legislation should be interpreted widely and reasoning by analogy should be encouraged in order to minimize the occasions in which the legislature has to revisit subjects.

Especially in the context of New Deal politics in the 1930s and civil rights politics in the 1960s, 1970s, and 1980s, liberals have tried to define legislative intent broadly so as to permit the federal courts to expand the domain over which congressional statutes applied. By arguing against a broad interpretation of intent and in favor of the “plain meaning” doctrine, conservatives have sought to limit what they regard as judicial imperialism—a judiciary that, in effect, uses its power to interpret laws in order to extend or rewrite them. Thus, liberals have developed principles of statutory interpretation to enable broad meaning to be read into acts of Congress, whereas conservatives have insisted on canons of interpretation that require judges to stick to the plain meaning of the statutory language.

Who is right here? Short of appealing to our own personal prejudices and policy preferences, we can provide an analytical perspective by means of Arrow’s Theorem. The theorem cautions against assigning individual properties to groups. Individuals are rational, but a group is not, since it may not even have transitively ordered preferences. If this is true, then how can one make reference to the intent of a group? That is, a legislator may have intentions; a legislature does not. Indeed, in passing a statute, there may be as many different intentions as there are legislators voting for the bill. And some of these may not even be consistent with one another. Former Senator John Danforth (R-Mo.) has said, “Any judge who tries to make legislative history out of the free-for-all that takes place on the floor of the Senate is on very dangerous grounds. . . . It is a muddle.”

We thus sympathize with the advice given by one of the most eminent jurists in American legal history, Justice Oliver Wendell Holmes: “The job of this Court is not to ask what the legislature intended, but rather what the statute means.” This may not require an extremely literal reading of all legislation (an extremely restrictive notion of “plain meaning”), but it leaves no room for legislative intent. Indeed, because groups differ from individuals and thus may be incoherent, legislative intent, like jumbo shrimps and student-athletes, is an oxymoron! Arrow’s Theorem warns us not to attribute individual characteristics, like rationality, to groups.

* Consequently, Antonin Scalia, associate justice of the Supreme Court, has declared, “We are governed by laws, not by the intentions of legislators.” The Danforth and Scalia quotes are both found in Joan Biskupic, “Scalia Sees No Justice in Trying to Judge Intent of Congress on a Law,” Washington Post, May 11, 1993, A4.

ARROW’S THEOREM AND MAJORITY RULE

We have been careful to state Arrow's Theorem as applying to any process or mechanism by which individual preferences are combined, or aggregated, or added up to produce a group preference ordering. From the perspective of democratic theory, however, we are most interested in the applicability of Arrow's Theorem to the method of majority rule. In this section we explicitly link the two.

First, we need to define our terms. The method of majority rule (MMR) requires that, for any pair of alternatives, \( j \) and \( k \), \( j \) is preferred by the group to \( k \) (written: \( j P_O k \)) if and only if the number of group members who prefer \( j \) to \( k \) exceeds the number of who prefer \( k \) to \( j \). We can characterize this method explicitly and then see that it is clearly a special instance of the methods satisfying Arrow's conditions. That is, we first show that MMR is actually composed of several essential building blocks or properties. Then we show that these properties are all special cases of the general conditions in Arrow's Theorem.

Consider, then, some additional (so-called) "reasonable" conditions on preference aggregation methods:

**Condition A (Anonymity).** Social preferences depend only on the collection of individual preferences, not on who has which preference.

**Condition N (Neutrality).** Interchanging the ranks of alternatives \( j \) and \( k \) in each group member’s preference ordering has the effect of interchanging the ranks of \( j \) and \( k \) in the group preference ordering.

**Condition M (Monotonicity).** If an alternative \( j \) beats or ties another alternative \( k \)—that is, \( j R_O k \)—and \( j \) rises in some group member's preferences from below \( k \) to the same

or a higher rank than \( k \), then \( j \) now strictly beats \( k \)—that is, \( j P_O k \).

Like Arrow's conditions, conditions A, N, and M embody notions of fairness in a prospective method of group choice. Anonymity is just what it sounds like. It is a condition that requires only that we know what an individual's preferences are, not who the individual is holding them. Thus, if, in a group setting like the one involving the group of college friends described in Chapter 3, Andrew and Bonnie swap preference orderings, condition A requires that the group's choices are unaffected by this. Condition A requires that each individual's preferences be fed into the group decision-making machinery with his or her name omitted.

Neutrality is for alternatives what anonymity is for individuals. Condition N says that it does not matter how we label alternatives; all that matters is the alternatives' respective ranks in individual preference orderings.

Finally, monotonicity requires that the method of group choice respond "nonperversely" to changes in individual preferences; moreover, it requires that the method satisfy a very specific "knife-edge" property. The first feature of condition M requires that if one alternative is strictly preferred by the group to another (\( j P_O k \)), and then rises in someone's preferences, it still is strictly preferred; that is, the method of preference aggregation does not respond to this change in a perverse or negative manner. The second feature of condition M states that if two alternatives, \( j \) and \( k \), are judged to be "socially indifferent" (\( j I_O k \)), and \( j \) and \( k \) are then switched in someone's preference ordering, \( j \) would now be strictly preferred to \( k \)—\( j P_O k \); in effect, this says that the decision procedure must be sensitive to changes in individual preferences (a knife-edge property).

We can now report two results. The first characterizes the method of majority rule:
May's Theorem. A method of preference aggregation over a pair of alternatives satisfies conditions U, A, N, and M if and only if it is MMR.

Kenneth May, a mathematician interested in social choice issues at about the time Arrow proved his famous theorem, established this especially clean and clear way of describing MMR. The theorem states, in essence, that if a group uses "counting noses" as its method of deciding between any pair of alternatives, then it necessarily satisfies the four conditions of May's Theorem. These four conditions are the method of majority rule.

Consequently, if in some circumstance you believe MMR is inappropriate, then it must be because you think one of May's conditions should not hold. Should grades in the class for which you are reading this book be determined by majority rule? Should amendments to the U.S. Constitution be decided by majority rule? Should the captain of a pirate ship be elected by a majority of the pirates? Should my choice of a breakfast cereal tomorrow morning be decided by a majority vote of my neighbors? Should family decisions be put to a majority vote? In each of these cases, there is bound to be some diversity of opinion. What May's Theorem permits each of us to do is to defend our opinion by saying why (if in the affirmative) we believe the four conditions in the theorem are apt or why (if in the negative) we believe one of the four conditions is unsuitable. Tell us why, for example, most of you believe MMR is inappropriate as a means for selecting an individual's morning repast.

There is more to the story, as given in the next theorem. Display 4.5 will allow you to keep track of the conditions upon which the theorems of Arrow and May are based (which by

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**Display 4.5**

<table>
<thead>
<tr>
<th>CONDITIONS CHARACTERIZING GROUP DECISION-MAKING METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrow</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>A (Anonymity)</td>
</tr>
<tr>
<td>N (Neutrality)</td>
</tr>
<tr>
<td>P (Unanimity)</td>
</tr>
<tr>
<td>I (Independence from Irrelevant Alternatives)</td>
</tr>
<tr>
<td>D (Non-dictatorship)</td>
</tr>
</tbody>
</table>

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this point are probably overwhelming you if you never encountered them before). The theorem below shows that May's conditions, which are equivalent to the simple majority-rule group decision process, are but a special case of Arrow's conditions. We then draw the obvious conclusion—majority rule therefore must be a process vulnerable to the afflictions described by Arrow.

No-Name Theorem. The conditions of May's Theorem are special cases of those of Arrow's Theorem:

May Condition | Arrow Condition
---|---
A | D
N | I
M | P

It is pretty easy to see why the first implication in the theorem is true. If there were a dictator, then the condition of anonymity could hardly hold, since the group preference is produced by an identifiable individual; consequently if some procedure is anonymous, then it must be nondictatorial. The second and

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\[16\] We couldn't think of a better name for it! The "\[\rightarrow\]" symbol means "logically implies."
third implications are a little trickier to establish and so we implore the reader either to take the claims on faith or to consult May’s original paper or Riker’s discussion of it.17

Stringing together May’s Theorem, Arrow’s Theorem, and the No-Name Theorem yields the result that MMR is but a special case of the aggregation mechanisms covered by the Arrow conditions and, therefore, is subject to the same vulnerabilities. Symbolically, we have:

$$\text{MMR} \rightarrow \{U, A, N, M\} \quad \text{(May’s Theorem)}$$

$$\{U, A, N, M\} \rightarrow \{U, P, I, D\} \quad \text{(No-Name Theorem)}$$

$$\{U, I, P, D\} \rightarrow P_j \text{ violates the Rationality Assumption (Arrow’s Theorem).}$$

MMR is “equivalent”18 to \{U, A, N, M\} from May’s Theorem; these four conditions, in turn, imply the Arrow conditions from the No-Name Theorem; and these latter conditions imply incoherent group preferences from Arrow’s Theorem. Hence, MMR cannot assure coherent group choice—something we have already seen in practice several times.

**Restrictions on the Arrow Conditions**

What is to be done? We have claimed that the Arrow conditions and the May conditions—which are special cases of the Arrow conditions—are mild and innocuous requirements of fairness. But it may be somewhat misleading to suggest that all the conditions are, in fact, criteria of fairness. Condition P certainly is, since its claim is that it would be unfair if \(P_j\) failed to reflect whatever (unanimous) consensus exists among group

members. If everyone thought \(j\) was better than \(k\), then shouldn’t the social preference be \(j P_k k\)? Likewise, condition D is a fairness requirement—allowing for a dictator is unfair *prima facie*. Condition I is intuitively less clearly a fairness requirement. It effectively requires that the group preference between any pair of alternatives, say \(j\) and \(k\), depends on the individual preferences between \(j\) and \(k\). It is claimed that it would be “inappropriate” if individual preferences for irrelevant alternatives like \(h\) affected how \(j\) and \(k\) were ranked. In short, condition I says that the only “sensible” way to determine whether a group prefers \(j\) to \(k\), \(k\) to \(j\), or is indifferent between them is to ask each group member what his or her preference is between \(j\) and \(k\). So, condition I is perhaps more fittingly thought of as a criterion of appropriateness or sensibleness, rather than of fairness. Nevertheless, it qualifies as a procedural requirement.

It is difficult, then, to alter condition I, P, or D without at least having to present a compelling value-laden argument as to why a fair or procedurally appropriate criterion should be changed. Condition U, on the other hand, is an entirely different kind of condition. It is not a fairness criterion, nor a criterion of appropriateness or sensibleness. It is a *domain* requirement, and an especially wishful one at that. Essentially, it expresses the desire that the group decision mechanism work in all conceivable environments—that the mechanism have the widest possible domain. This is certainly desirable. But if we insist on this, then Arrow’s Theorem tells us we will inevitably trade off fairness for consistency. Maybe we can do better by *not* insisting on condition U. That is, it may be possible to obtain both fairness and consistency, but in a restricted domain of circumstances. This insight, at any rate, provided the basis for several very interesting variations on the otherwise pessimistic conclusion of the Arrow result.


18 That’s what the double arrow means. That is, “\(\rightarrow\)” means both “\(\rightarrow\)” (implies) and “\(\leftarrow\)” (is implied by).
Single-Peakedness

This most famous domain restriction was invented, even before Arrow’s Theorem, by the Scottish economist Duncan Black. He believed that minimal forms of consensus well short of unanimity might be sufficient to produce coherent group choice. For example, in that strife-torn part of the world not far from where Duncan Black thought these thoughts—Northern Ireland—Catholics and Protestants are, in one sense, diametrically opposed to one another. Most Catholics (at least at the time we write this paragraph) want Northern Ireland united with the Republic of Ireland (RI), while most Protestants want a peaceful continued constitutional connection of Northern Ireland to Great Britain (GB). The status quo (SQ) is a constitutional connection to Great Britain accompanied by a continual state of de facto war for the long-suffering residents of that country. Catholics regard GB as the worst of the alternatives, while Protestants regard RI as worst. Neither regards SQ as worst. Now this sort of “consensus” is hardly earth-shattering, but in its most general form it is sufficient to assure that a $P_c$ based on majority rule will be transitive.

Black’s Single-Peakedness Theorem. Consider a set $A$ of alternatives from which a group $G$ of individuals must make a choice. If, for every subset of three alternatives in $A$, one of these alternatives is never worst among the three for any group member, then this is sufficient consensus so that the method of majority rule yields group preferences $P_c$ that are transitive.

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Group Choice and Majority Rule

The condition that some alternative from every collection of three alternatives in $A$ is “not worst” for all group members is called the single-peakedness condition, because it means that there is a way to plot a preference curve for each group member that has a single peak in it. We will show this in the next chapter. Essentially the theorem says that majority rule works perfectly well, even when group members hold wildly divergent views on what the group ought to do, so long as a minimal degree of consensus, captured by single-peakedness, obtains.

Value-Restriction

In a brilliant insight, the economist Amartya Sen asked, “What’s so special about being ‘not worst’?” Consider the set of alternatives $A = \{a, b, c, d, e\}$. What if, for $\{a, b, c\}$, all the members of a group agreed that $b$ were “not best”? What if they agreed that $c$ were “not middling”? Indeed, what if for $\{a, b, c\}$ there was consensus that alternative $a$ was “not worst,” whereas for $\{b, c, d\}$ all group members agreed that $d$ were “not best,” and in $\{c, d, e\}$ the group members agreed $e$ were “not middling”? Sen refers to this as the condition of value restriction. A group’s preferences are value-restricted if, for every collection of three alternatives under consideration, all members of the group agree that one of the alternatives in this collection either is not best, not worst, or not middling (with all members agreeing on which quality the alternative in question was not). He proved a remarkable result, generalizing Black’s Theorem:

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18 Black was unable to serve in the British army during World War II, so he took on voluntary night-watch duty in Scotland. Spending long nights in a bunker watching for German aircraft, his curious mind toyed with various geometric conditions that would enable majority rule to function smoothly. These ideas appeared in a series of papers at the end of the war. Their fullest statement is found in Duncan Black, The Theory of Committees and Elections (Cambridge, Eng.: Cambridge University Press, 1958).


21 In terms of Display 4.2, agreement by group members that $b$ were “not best” means that no member of the group had preference ordering $3, 4, 7, 9$, or $11$.

22 Likewise, agreement by the group that $c$ were “not middling” means that no group member had preference ordering $2$ or $4$ in Display 4.2.
Sen's Value-Restriction Theorem. The method of majority rule yields coherent group preferences if individual preferences are value-restricted.

Both single-peakedness and value restriction circumscribe Arrow's universal domain condition, U. True enough, majority rule won't work in all situations. But, in a surprisingly large number of such situations (204 of 216 in the three-person/three-alternative situation, recall), the kind of consensus required may, in fact, exist.

CONCLUSION: THE ILLUSIVENESS OF COLLECTIVE CLARITY

There is much to digest in this chapter. And you should not be particularly alarmed if much of this material remains somewhat alien and unfamiliar to you. Since Arrow's famous theorem, social choice theory has become a technical language and style of analysis with which to explore features of group decision making with great care and precision. It also permits the careful consideration of significant facets of political philosophy concerning what democratic, majoritarian, institutional arrangements are capable of, as well as what meaning should attach to the outcomes they produce. In short, the literature on social choice is quite sophisticated and covers, in an entirely more analytical style, much of the same ground as the more qualitative work on democratic political philosophy.

As a practical matter, we hope the reader now appreciates the fact—probably not at all obvious or transparent before you read this chapter—that combining individual preferences into a group choice, by majority rule or some other method, is not a straightforward undertaking. One thing should be clear from even a quick and dirty read of the chapter: No method, no procedure, or no institutional arrangement that is "fair" in the

most spartan, minimalist sense of this term is capable of manufacturing the silk purse of group coherence from the sow's ear of individual coherence all the time. Rationality may inhere in the tastes and values of individuals, but there is no magic wand that transforms this individual clarity about preferences into a collective clarity, especially when the group size is large, when individual preferences are heterogeneous, or when there is a large number of alternatives for group members to consider. This is the content and import of Arrow's Theorem. However, certain kinds of consensus—single-peakedness (Black) and value restriction (Sen)—lubricate the institutional gears of group choice processes.

These are not the last words on these subjects in this book. Indeed, they are only the first. Although this brief summary hardly covers the territory of social choice, don't hang up yet; we want to continue the conversation in the next chapter.
Spatial Models of Majority Rule

Our story line to this point has emphasized a tradeoff in group decision making between the coherence of group choices, on the one hand, and the fairness of the method of decision making, on the other. If we consider a limited set of group decision-making circumstances, then we may be able to avoid the pain of this tradeoff. Put somewhat differently, if individual preferences happen to arrange themselves in particular ways—that reflect a consensus of a specific sort—then group decisions (certainly those made by majority rule) work out quite nicely. In the last chapter, we described single-peaked preferences as one kind of consensus that facilitated coherence in majority-rule decision making. In this chapter we want to give an intuitive geometric characterization of this condition.

Frankly, however, all this gets pretty boring pretty quickly. The authors, and perhaps some of the readers, may enjoy technical riffs and philosophical discourses, but most readers are more impatient and anxious to see some payoff. We think this chapter constitutes an important investment. Once we give single peakedness a geometric representation we will be able to apply it to some interesting political situations—namely, two-party electoral competition and legislative committee decision making.

Spatial Formulation

The Simple Geometry of Majority Rule

Suppose a group's problem is, in effect, to pick a point on a line—the group must select some single numerical parameter. For example, a bank's board of directors must decide each week on the week's interest rate for 30-year home mortgages. In effect, the relevant interest rates are points on a line, one endpoint being 0 percent and the other being some positive number, say 10 percent. We write this interval as [0,10]. In this and other circumstances, we want the reader to imagine a group of individuals each of whom has a most-preferred point on the line, and preferences that decline as points further away in either direction are taken up.

In Figure 5.1 we display the preferences of the five-person board of bank directors, \( g = \{1, 2, 3, 4, 5\} \). The board is meeting
to decide the interest rate to charge for home mortgages this coming week. Each individual \( i \in G \) has a most-preferred point (also called bliss point or ideal point), labeled \( x_i \), located on the [0, 10] interval (drawn as the horizontal axis), representing his or her most-preferred interest rate.\(^1\) Thus, director 1 has a most-preferred interest rate \( (x_1) \) of just less than 4 percent, director 2’s \( (x_2) \) is just more than 4 percent, and so on. On the vertical axis we have written the label “utility” to measure preferences. For each individual we have graphed a utility function which represents the director’s preferences for various interest rate levels in the [0, 10] interval. Naturally, the utility function, labeled \( u_i \) for Mr. or Ms. \( i \), is highest for \( i \)’s most-preferred alternative, \( x_i \), and declines as more distant points are considered. Thus, Ms. 5 most prefers an interest rate a little higher than 8 percent, with her preference declining either for higher or lower rates. For obvious reasons (just look at the graphs) we say that the preferences of these individuals are single-peaked, which we define as follows:

**Single-Peakedness Condition.** The preferences of group members are said to be single peaked if the alternatives under consideration can be represented as points on a line, and each of the utility functions representing preferences over these alternatives has a maximum at some point on the line and slopes away from this maximum on either side.

Is there any connection between this definition of single peakedness and Black’s definition given in the last chapter? That is, do utility functions with a single peak, as displayed in Figure 5.1, have anything to do with all voters agreeing that some alternative is “not worst”? You bet! Take any three interest rates displayed in Figure 5.1—say 3 percent, 5 percent, and 9 percent. It is pretty easy to see that 5 percent is not the worst among these three rates for any of the five members of the group. Indeed, we claim that for any three interest rate levels the reader chooses, one of those is not worst for any of the five bankers. That’s what single peakedness means!

In order to develop some tools that we will use in subsequent analysis, let’s look at one of these individual bankers in isolation (by which we really mean let’s look at an isolated utility function). In Figure 5.2 we show the most mean-spirited of the bank-board directors, Ms. 5, who most prefers a fairly high interest rate: \( x_5 = 8.25 \)%.\(^2\) Consider an alternative rate, \( y = 7 \)% . The set of points Ms. 5 prefers to \( y \) is described by the set labeled \( P_5(y) \) in Figure 5.2. This is Ms. 5’s preferred-to-y set: if \( y \) were on offer, then \( P_5(y) \) describes all the points she would prefer to it, given her preferences. As the figure shows, \( P_5(y) \) is computed by determining the utility level for \( y \) and

\(^1\) Recall that “\( i \in G \)” means “the element \( i \) in the set \( G \),” where \( i \) stands for any one of the five bank directors.

\(^2\) Obviously, everything is relative. This interest rate for a thirty-year fixed-rate mortgage was, for much of the early 1990s, a little on the high side. A decade earlier, when interest rates were in the mid-teens, a home buyer would have regarded a rate of 8.25 percent as a godsend.
then identifying all the interest rates on the horizontal axis with utility levels greater than the utility for y.\(^3\)

In Figure 5.3 we display the preferred-to-y sets of all five bank directors (note that y, in this figure, is just below 6 percent). Notice that these sets overlap to some degree—there are points in common to \(P_2(y)\) and \(P_3(y)\), for example. This means that there are specific points that both Mr. 4 and Ms. 5 prefer to y.\(^4\)

Of great interest to us is the set of points a majority prefers to y. This is called the winset of y, written as \(W(y)\). We define it as follows. Let \(M\) be the set of majorities in our group of bankers, \(G\); it is the collection of three-person coalitions (there are ten such coalitions), four-person coalitions (there are five of these), and the coalition-of-the-whole. So, there are sixteen different majority coalitions in \(M\); they are listed in Display 5.1. For each majority coalition, consider the common intersection of preferred-to-y sets (if there is any); these are the points that this particular majority prefers to y. Thus, the members of the majority \([3,4,5]\) in Figure 5.3 share points each prefers to y. Take the union of these sixteen sets. This is \(W(y)\).\(^1\)

It is now rather straightforward to describe the coherent choices of groups. If some alternative, \(x\), has an empty winset (written: \(W(x) = \emptyset\), where \(\emptyset\) means “empty” in set notation), then it is a clear candidate for the group choice. Why? Simply because \(W(x) = \emptyset\) means there is no other alternative that any of the sixteen majority coalitions prefers to \(x\). It’s hard to deny choosing \(x\) if there is nothing any majority agrees on in its place. On the other hand, if the winset of \(x\) is not empty \((W(x) \neq \emptyset)\), then it is hard to justify the choice of \(x\). How can you

\[\text{FIGURE 5.3}\]

\[\text{DISPLAY 5.1}\]

**THE MAJORITY COALITIONS OF G=[1,2,3,4,5]**

<table>
<thead>
<tr>
<th>Size of Coalition</th>
<th>Coalitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>([1,2,3],[1,2,4],[1,2,5])</td>
</tr>
<tr>
<td></td>
<td>([1,3,4],[1,3,5],[1,4,5])</td>
</tr>
<tr>
<td></td>
<td>([2,3,4],[2,3,5],[2,4,5])</td>
</tr>
<tr>
<td></td>
<td>([3,4,5])</td>
</tr>
<tr>
<td>4</td>
<td>([1,2,3,4],[1,2,3,5],[1,2,4,5])</td>
</tr>
<tr>
<td></td>
<td>([1,3,4,5],[2,3,4,5])</td>
</tr>
<tr>
<td>5</td>
<td>([1,2,3,4,5])</td>
</tr>
</tbody>
</table>

\(^3\) We will include the endpoint of this set in the preferred-to-set, even though, technically speaking, the end point is an alternative that the group member ranks at the same utility level as y.

\(^4\) In set-theoretic notation, we can write these common points as the intersection of the two preferred-to-y sets: \(P_2(y) \cap P_3(y)\). (\(\cap\) is the intersection symbol, so that \(A \cap B\) means “the points in both set \(A\) and set \(B\).”

\(^1\) In Figure 5.3 it turns out that members of only one of the sixteen majorities, \([3,4,5]\), has overlapping \(P_i(y)\) sets. Members of the remaining fifteen majorities (listed in Display 5.1) cannot agree on any points they jointly prefer to y. Thus \(W(y) = P_2(y) \cap P_3(y) \cap P_4(y)\).
choose $x$ when some majority of the group clearly wants some other specific alternative? And, if the winset is nonempty for every alternative, then we have a problem: the group’s preferences are incoherent since some majority prefers something to every alternative available.

The question of the moment is whether, or in what circumstances, an $x$ possessing an empty winset exists. If any complete and transitive preferences may be held by the individuals in $G$—Arrow’s “universal domain” condition—then, as we have seen, the answer is “not necessarily.” Why? Because under Arrow’s condition U, it is possible for majority preferences to cycle, in which case $W(x) = \emptyset$ for no alternative. But, if preferences are restricted then a different answer is possible.

**Black’s Median Voter Theorem.** If members of group $G$ have single-peaked preferences, then the ideal point of the median voter has an empty winset.

One such group consisting of individuals with single-peaked preferences is pictured in Figure 5.3. The median voter ideal point in this group is $x_3$ of Mr. 3. The claim of Black’s Theorem (the same Duncan Black, by the way, as in the last chapter) is that $W(x_3) = \emptyset$, and that $x_3$ is the majority choice.

We can prove this theorem using the example of the five bank board members. Consider any arbitrary point in the feasible set of interest rates, $[0, 10]$, to the left of $x_3$—say the point labeled $\alpha$ in Figure 5.3. Notice that $\alpha$ is preferred to $x_3$ by members 1 and 2, but that $x_3$ is preferred to $\alpha$ by members 3, 4 and 5. Thus, $x_3$ is majority-preferred to $\alpha$. But $\alpha$ is any arbitrary point to the left of $x_3$. For any such point we know at the very least that member 3, 4, and 5 will prefer $x_3$ to it. (It is possible that some of the remaining members will share this preference, too.) Next, consider any arbitrary point to the right of $x_3$ (not pictured). Members 4 and 5 may prefer it to $x_3$, but members 1, 2, and 3 hold the opposite preference, so that $x_3$ is majority preferred. The argument is exactly the same as with $\alpha$ above, since we selected an arbitrary alternative to the right of $x_3$. To sum up, then, we now know that the ideal point of the median voter is preferred by a majority to any arbitrary point to the right or to the left of it, that is, to all remaining points. Hence, it has an empty winset and is the majority choice.

Before complicating this key result, let us mention that there are three hidden assumptions, and probably more besides, that warrant some discussion. First, in our example we proceeded with the group $G$ that is odd in number. Thus, in Figure 5.3 we could display the five group members, with

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6 The median of a set ordered from left to right is the point such that at least half the points are at or to its right and at least half the points are at or to its left.
member 3 the unique median. What if the size of the group were even? Suppose, for instance, that we ignored Ms. 5 in the figure and focused instead on the truncated group \( G' = \{1, 2, 3, 4\} \). Now members 2 and 3 are both medians. Moreover, since it takes three votes to constitute a majority, it is true that \( W(x_0) = \emptyset \) and that \( W(x_3) = \emptyset \), too. Indeed, the winset of any point in the interval between the two, \( [x_0, x_3] \), is empty. Technically, then, Black's Median Voter Theorem is true whether the group size is odd or even. But when a group is even in number, the fact that there may be tie votes means there may be more than one alternative with the property that it can't be beaten. This absence of a unique winner is a pain in the neck. It is a bit like more than one pretender to the crown, or more than one person claiming to be king of the mountain. It is for this reason that groups establish some procedure for breaking ties well in advance of any substantive deliberations or, better yet, they make sure that the group is odd in number.\(^7\)

Second, we have assumed full participation. Everyone with the franchise is assumed to exercise it. Of course, in any particular instance of group choice this need not happen. If bank board members 4 and 5 oversleep one week, then Ms. 2 becomes the median voter of the now reduced three-person board; if members 1 and 3 are out of town the following week, then Mr. 4 becomes the median. In each of these cases, as well as in the case of the full board, the median voter result applies. Who the median is, however, depends upon who the participants in the group are. We may forecast the group decision if we make assumptions about participation (for example: assume everyone votes), or we may make forecasts contingent on participation (for example, if 4 and 5 oversleep, then we predict \( x_2 \) will be the group's choice; but if everyone votes, then \( x_3 \) is the predicted choice).

Third, we have assumed that those exercising the franchise do so sincerely. But as we have seen in earlier chapters, group members will have occasion and incentive to misrepresent their preferences and not reveal them honestly. This is a subject of great interest that we take up on its own in Chapter 6.

The (Slightly) More Complicated Geometry of Majority Rule

As we shall demonstrate in the next section, one-dimensional models of choice with the single-peakedness condition permit rather sophisticated ways to think about real politics. They generate very crisp expectations about how politics in these settings gets played out. But so many social situations cannot be reduced to one-dimensional affairs.

Recall the game of "divide the dollars." If the game were played by a group of three individuals, then it is necessary to have two dimensions in which to represent outcomes. The first dimension gives the amount that player 1 receives, while the second dimension gives the amount that player 2 receives. (Subtract the sum of these two numbers from the total number of dollars to be divided and you get the amount that player 3 receives.\(^8\)) We hope we convinced the reader earlier that games of division, like divide-the-dollars, are commonplace in political life. So, it must be conceded that, as crisp and as sophisticated as the one-dimensional models are, they are special cases of a more general multidimensional arrangement. We need to see what this more general arrangement is like.

We can say most of what we need to by focusing on a two-

\(^7\) For example, the U.S. Constitution requires the Senate to be even-numbered, but establishes a tiebreaking procedure. The Vice President of the United States, sitting as the president of the Senate, may (only) vote in case of a tie. Likewise, the standing rules of the House of Representatives provide a tiebreaking rule, asserting that a motion fails if it obtain no more yeas than nays—it fails on a tie.

\(^8\) Generally, when dividing a fixed pie among \( n \) categories (or people), we need only \( n-1 \) dimensions to display all outcomes.
dimensional circumstance, like that pictured in Figure 5.4. (There are actually three dimensions in this figure, but this will be clarified shortly.) We consider a problem in budgeting, in which a group of legislators, perhaps an appropriations committee, must decide how to divide expenditures between "guns" and "butter" (symbolizing the competition between defense and other domestic programs). Outcomes, then, are described by two numbers: dollars spent on butter and dollars spent on guns. The set of outcomes, or simply the "policy space," is two-dimensional, and this is the domain over which preferences are expressed. The third dimension of Figure 5.4,

If the size of the budget were fixed in advance, then by the argument in the previous paragraph and footnote, we would need only one dimension, say dollars for defense; once this is established, dollars for domestic programs is strictly determined—it's what is left over. When the budget is not determined in advance, then we need both dimensions to display all outcomes.

marked "utility," permits us to draw three-dimensional graphs of legislator preferences. As earlier, a legislator is assumed to have an ideal point in the policy space. His preference function, or utility function, is at a maximum over this point. We assume further (in most of the applications we pursue) that preferences decline with "distance" from the legislator's ideal point. A typical legislator, with typical ideal point and preference function, is displayed in Figure 5.4. The legislator's preference function is a "hump" that reaches its highest utility level just over his ideal point in which \( b_i \) dollars are spent on butter and \( g_i \) dollars on guns. This ideal point, \( (b_i, g_i) \), is located in the plane of the butter-guns policy space.

A more convenient way to represent precisely this same information, however, is given in Figure 5.5. In this figure the reader is looking down directly onto the plane of the butter-guns policy space. It is as though you are hovering in a heli-
copter above the peak of the preference hump in Figure 5.4. The location of our typical legislator's ideal point is exactly the same as in Figure 5.4. But instead of adding a third dimension (coming out of the page toward you) in order to graph his preference function, we instead overlay "slices" of his utility function onto the policy space, producing the set of nested circles called indifference curves. Each circle is a slice of the policy hump in Figure 5.4. It is a locus of policy outcomes among which the legislator is indifferent (since all the points on a circle lie on the same slice and hence at the same height on the utility function of Figure 5.4). Since distance from an ideal point is a measure of preference, points on a circle centered on her ideal, being equidistant from that ideal, are equally preferred by her. The logic is the same in comparing a point on one circle to that on another. A legislator prefers a point on a circle with a smaller radius to one on a circle with a larger radius, because this means the former point is closer to her ideal than is the latter point.\(^{10}\)

Notice the point labeled \(y\) in Figure 5.5. The circle through \(y\) centered on our legislator's ideal point, as we just determined above, contains all the points of legislator indifference to \(y\). This means that all the points inside the circle, being closer to her ideal, are actually preferred by her to \(y\). That is, we can call the points inside the circle our legislator's preferred-to-\(y\) set, a natural generalization of that same concept in the one-dimensional development earlier in this chapter. Figure 5.6 displays three legislator ideal points and each legislator's indifference curve through \(y\) (the curve plus all points inside it comprising each legislator's preferred-to-\(y\) set,

\(^{10}\) In this simplest of multidimensional setups, in which the policy space is two-dimensional and preference is measured by distance, indifference curves will be circles centered on the legislator's ideal point. In more than two dimensions, the indifference "contours" will be spheres or (in four or more dimensions) hyperspheres. A second sort of complication, which applies in the (simplest) two-dimensional as well as higher dimensional situations, is to allow preferences to be related to distance, but in a more complicated way. One dimension of policy may be "more important" to a legislator than another dimension. Thus, movement away from her ideal point along one dimension will have a greater impact on preferences than an identical movement along the other dimension. Put differently, preference is said in this instance to decline with weighted distance from the ideal (where the weights reflect the salience of each dimension to the legislator). In this instance, indifference contours will no longer be circles, but will be ellipses instead. We will stick with the most basic formulation.
labeled $P_i(y)$. The shaded intersection $P_i(y) \cap P_j(y)$ gives the points preferred by both legislators 1 and 2 to $y$; $P_i(y) \cap P_j(y)$ are the points preferred by 1 and 3 to $y$; and, finally, $P_i(y) \cap P_j(y)$ give those points for 2 and 3. Since two out of three is a majority, the union of these three “petals” is the winset of $y$, $W(y)$. Each petal gives the points that a specific majority coalition prefers to $y$.

If we move the ideal points of the three legislators in Figure 5.6 around, so that they line up in a row, we have a situation like that depicted in Figure 5.7. Can you determine the winset of the middle legislator’s ideal, $W(x_3)$? The steps are laid out in that figure. Mr. 2’s preferred-to-$x_2$ set is empty (how could he prefer anything to his most-preferred point?). Ms. 1’s and Ms. 3’s indifference curves through $x_2$ and centered on

![Figure 5.7]

their respective ideal points are tangent to one another. They do not overlap at all. Hence $W(x_2) = \emptyset$, since there are no points preferred to $x_2$ by majority $\{1,2\}$, $\{1,3\}$, $\{2,3\}$, or $\{1,2,3\}$. That is, the members of no majority coalition have preferred-to-$x_2$ sets that intersect. Thus, $x_2$ is the majority choice.

Another look at Figure 5.7 should show why this happened. Consider the bold line through $x_3$ perpendicular to the dashed line. On the $x_1$ side of this bold line, for any selected point off the dashed line, $x_3$ is closer to $x_1$ than the selected point is. So a majority, $\{2,3\}$, prefers $x_2$ to any such point. From a precisely parallel argument, a majority, $\{1,2\}$, prefers $x_2$ to any point off the dashed line on the $x_3$ side of the bold line. So, the only points that remain are those on the dashed line. That is, even though the group choice problem is actually two-dimensional, individual preferences line up so as to make the problem effectively one-dimensional. On this line individual legislators have single-peaked preferences (the reader should convince herself of this), with $x_2$ the median ideal point. Hence, Black’s Median Voter Theorem applies, which is precisely what Figure 5.7 demonstrates.

Having the legislator ideal points line up is pretty convenient, isn’t it? Pretty unlikely, too. Certainly it seems more unlikely than arbitrary configurations such as that in Figure 5.6. Thus, while we have tools like Black’s Median Voter Theorem with which to analyze majority rule in one-dimensional settings, it is probably fair to say that many interesting political circumstances are genuinely multidimensional. Can we say anything about the prospects for a majority choice in multiple dimensions? The answer is yes, but the news is not very good.

The highly unlikely distribution of individual preferences in Figure 5.7 provides a basis for generalization. What allows the ideal point of Mr. 2 to emerge as the majority choice is the fact that the ideals of the others are “symmetrically” distributed about 2’s ideal. From Mr. 2’s ideal any movement
away from it is obviously opposed by Mr. 2 himself; but it is also always opposed by at least one of the other guys. In fact, as we saw when considering the bold line through \( x_2 \) perpendicular to the dashed line containing all three ideal points, any point on Ms. 3’s side of that line is less preferred than \( x_2 \) by 1 and 2, and any point on Ms. 1’s side of the line is less preferred than \( x_2 \) by 2 and 3.

Now let’s add two more voters to the picture that are symmetrical in precisely the same way (Figure 5.8). Voters 2, 4, and 5 lie on a line, just as 1, 2, and 3 do. It is still the case that \( W(x_2) = \emptyset \), because any departure from \( x_2 \) is opposed by at least three of the five voters. You may test this proposition out for yourself by laying a straight edge through \( x_2 \) at any angle. There are always two voters who would like to move to some point on one side of the straight edge, two who would like to move to points on the other side of the straight edge, and one (Mr. 2) perfectly content to stay at \( x_2 \). Since no majority favors moving in any direction (there are always three votes against), the winset of \( x_2 \) is empty. Something about distributing voters symmetrically around a common point seems to be producing a coherent majority choice.

Indeed, we can be very specific here. Let us consider a set of \( n \) voters (where \( n \) is any number, which we will take to be odd to simplify the presentation), whose ideal points are \( x_1, x_2, \ldots, x_n \). These \( n \) ideal points are in a multidimensional policy space, like the one pictured in Figure 5.8 (although the results we present below apply to policy spaces of more than two dimensions, as well). These ideal points are distributed in a radially symmetric fashion if the following conditions hold: (1) There is a distinguished ideal point, labeled \( x^* \); (2) the \( n-1 \) remaining ideal points can be divided into pairs (since \( n \) is odd, \( n-1 \) is even and this is possible); and (3) the two ideal points in any pair, say \( x_i \) and \( x_j \), plus \( x^* \) all lie on a line with \( x^* \) "between" \( x_i \) and \( x_j \). In Figure 5.8, \( x_3 \) is the distinguished point, \( x_1-x_3 \) and \( x_3-x_5 \) are the pairs of remaining ideal points, and \( x_2 \)

lies on a line “between” the ideal points in each pair. Notice that radial symmetry does not require the two ideal points of a pair to be equidistant from the distinguished point (\( x_5 \) is closer to \( x_2 \) than \( x_1 \) is); they must simply line up.

The economist Charles Plott noticed that radial symmetry of ideal points captured in higher dimensions a property that single-peaked preferences possess in one dimensional policy spaces. In a famous paper in 1967,\(^{11}\) he established the following result:

**Plott’s Theorem.** If voters possess distance-based spatial preferences, and if their ideal points are dis-

have in a voting population of more than one million?—completely destroys the previous equilibrium.\textsuperscript{13}

If departures from radial symmetry were relatively unusual events, then this sensitivity to ideal point distributions in Plott’s Theorem would not really be bad news. But, as the reader may grasp intuitively, the requirement of radial symmetry is actually quite restrictive; one would not expect groups “naturally” to have their preferences distributed in such an even manner as this. So departures from this condition take on a greater significance. In what is one of the most remarkable theoretical statements in this entire field, Richard McKelvey demonstrated exactly how significant these departures from radial symmetry are.

**McKelvey’s Chaos Theorem.**\textsuperscript{14} In multidimensional spatial settings, except in the case of a rare distribution of ideal points (like radial symmetry) that hardly ever occurs naturally, there will be no majority rule empty-winset point. Instead there will be chaos—no Condorcet winner, anything can happen, and whoever controls the order of voting can determine the final outcome.

We started out by seeking ways to restrict Arrow’s universal domain condition to see if there were narrower domains in which majority rule worked tolerably well. In one-dimensional choice situations, we saw that single-peakedness is sufficient. In multidimensional situations a radially symmetric distribution of ideal points is sufficient. But, small departures from the latter throw everything into chaos. No point is the “king

\textsuperscript{12}When we say that one result “generalizes” another, we mean that the latter is a special case of the former. Thus, Black’s median voter result is the one-dimensional version of Plott’s Theorem, in which the median voter’s ideal is the distinguished point and pairs of voter ideal points, one from each side of the median, are distributed around it in a radially symmetric fashion.

\textsuperscript{13}The sensitivity is not quite so severe when the number of voters is even. In this case the distinguished point is not a voter ideal point. Some shifts in voter ideal points are possible without disturbing the empty winset property of this distinguished point.

of the mountain" in the sense that it is preferred by a majority
to all contenders, so it is difficult to justify any particular
choice (since for any proposed choice there is some
alternative a majority prefers to it). This, in turn, means that
there will always be majority cycles.

Indeed, Mc Kelvey establishes that all the points are in
one great big cycle. What this means, practically speaking, is
that the situation is ripe for manipulation by whomever con-
trols the agenda. What Mc Kelvey shows is this: Pick any
two points in the policy space—call them s (starting point)
and t (terminating point). Then there is a sequence of points—
z₁, z₂, . . . , zₖ (for some finite number, k) such that z₁PCₘₕ, z₂PCₘₖ, 
zₖPCₘₖ, . . . , zₖ₊₁PCₘₖ₊₁, and tPCₘₖ₊₁. That is, from any starting
point, there is a sequence of votes by which a majority will
move the outcome to any terminal point (including, say, the
ideal point of the agenda setter).

This is illustrated in Figure 5.9 for a three-person legis-
lature. The ideal points of the three legislators are x₁, x₂, 
and x₃. The point s is the status quo ante. If Mr. 3 were
the agenda setter empowered to make motions and order
them in a voting sequence, then he could, in a small
number of steps—in fact, in only three steps—drive the outcome
to x₃, his ideal point. First he proposes z₁, which both Mr. 1
and Ms. 2 prefer to s. So z₁PCₘₕ. Then he proposes z₂ which both he and Mr. 1
prefer to z₁; so z₂PCₘₕ. Then, in the final step, he proposes his ideal
point, x₃, which both he and Ms. 2 prefer to z₂. Voila! He has
driven the legislative process, by artfully choosing the alter-
natives upon which to vote, to a terminal outcome located at
his ideal policy: t = x₃.¹⁵

¹⁵It should be noted that the members of each majority coalition in this ex-
ample blindly vote their preferences, like lambs following the Judas goat to
slaughter. The legislators seem like passive putty in the hands of the wily
agenda setter, Mr. 3. In the next chapter, we will endow "followers" with
some sophistication by which they might be able to control their "leader."

Applications

Applications of the spatial model are so plentiful and rich that
it is hard to know where to start. Since we do not have time
to daily, and since we shall make subsequent use of the spatial
model in a variety of contexts, we will content ourselves here
with a fairly limited set of applications. We begin at the be-
inning, so to speak, with Downs's model of electoral com-
petition. Anthony Downs was one of the first scholars to use the
spatial model for political analysis. This application also de-
monstrates both the strengths and weaknesses of the simplify-
ing assumption that the political world can be modeled as one-dimensional. Then we will turn our spotlight on institutional analysis, looking at both a one-dimensional and multidimensional analysis of legislative politics.

Spatial Elections

The real origins of the spatial model are found in a famous paper written in 1929 by Harold Hotelling. An economist interested in the locational decisions made by firms, Hotelling was especially fascinated by the stylized fact—true then, and still true today—that competitor firms regularly locate their retail shops next door to or just across the street from one another. Gasoline stations are found on opposing corners of an intersection, a pair of major department stores "anchor" a suburban shopping mall, and, in small-town America in the good ol' days, competing "five and dime" stores like Woolworth's and Kresge's were located just opposite one another. Why would nominal competitors, who have a great big geographic market to divide up between themselves, locate in such close proximity?

We leave the economic location question to one side, but not without noting that Hotelling mused that political parties seemed to behave in much the same fashion as economic competitors. This musing became the major focus of the now-classic study by Anthony Downs, An Economic Theory of Democracy, where he gave the "spatial model of electoral competition" its fullest development and exposure.

The "spatial" part of Downs's spatial model consists of a one-dimensional ideological continuum, [0, 100]. The continuum is scaled by the proportion of economic activity left in the hands of the private sector, so that the left endpoint reflects a fully socialized economy while the right endpoint is identified with a totally private-enterprise economy. While political competition in real life consists of taking positions on and articulating visions about a host of political issues, Downs supposes that, when all is said and done, political debate boils down to ideology—do you want some good, service, or purpose provided by government or by the private sector? Political competition, then, is a contest between politicians intent upon capturing control of government by appealing to voters with offers of alternative plans, platforms, programs—indeed visions. These appeals are identified with different points on the left-right ideological continuum.

As a first approximation for the hurly-burly of campaigning, electioneering, and voting, this is not a bad one. Politicians are conceived of as single-minded seekers of election. They are graduates, so to speak, of the Vince Lombardi School of Politics, whose motto is, "Winning isn't everything; it's the only thing." Downs assumed politicians seek to maximize votes, although in variations on his model, politicians alternatively maximize their vote plurality (the difference between their vote and that of their closest competitor) or their probability of winning. In any event, most early spatial models of electoral competition took votes to be the coin of the realm, regarded politicians as focused exclusively on winning elections, and suggested that they did so by promising policies, platforms, and programs that attracted voters. In this spatial context, a candidate is represented by some location on the ideological continuum, some point in the [0, 100] interval.

17 Even more spectacular in many cities is a small stretch of a major highway along which dozens of automobile dealerships locate (in Boston, for example, "automile" holds more than thirty competitors.)

19 For those too young to remember, Vince Lombardi was the legendary football coach of the Green Bay Packers and, at the end of his career, the Washington Redskins. To Lombardi, nothing was more important than winning. While not exactly an uplifting imperative, Lombardi's maxim is a pretty good first approximation for what it takes to succeed in the national politics of most countries, the business world, and the National Football League.
Voters, Downs assumed, were single-mindedly interested in policy: the goods and services produced by government (or left to the private sector); the form and content of government regulation of the private sector; the distribution of tax, unemployment, and inflation burdens; government policies on social issues like abortion and divorce; and matters of war and peace. Voters care mightily about these matters and base their assessments of candidates accordingly. Voters, however, are heterogeneous in their tastes so that, just as there are left-wing and right-wing politicians, so there are left-wing and right-wing voters. Specifically, each voter is identified with some point in the [0, 100] ideological space—the voter’s ideal point—and his or her preferences are assumed to decline for points more and more distant from this ideal. That is, the set of voters may be represented by single-peaked preferences. Figure 5.10 displays an electorate of 625 voters (actually, five different voter “types” with 125 voters of each type). A voter of type \( t \) \((t = 1, 2, 3, 4, 5)\) has ideal point \( x_t \), and preferences declining in distance from \( x_t \).

The most famous version of the Downsian model involves two-candidate competition. The question Downs asks is, given a distribution of voters like that in Figure 5.10, where will two single-minded seekers of election locate themselves? We can gain some intuition on this question by fixing the position of one of the candidates. Let’s fix the position of \( L \), the left candidate, at \( l \) as shown in the figure. What position, \( r \), should \( R \), the right candidate, adopt so as to maximize his votes? To answer this question we need a rule of calculation. The Downsian rule is that each voter votes for the candidate whose location is closest to his or her ideal point.\(^{20}\)

We can now answer the questions posed in the previous paragraph. Candidate \( R \) should snuggle up infinitesimally close to the right-hand side of \( L \). That way, \( R \) gets all the votes to the right of \( l \) and, since \( l \) is to the left of the midpoint of the voter distribution, that means that \( R \) gets more than half of all the votes.\(^{21}\) That is, \( R \) gets the 375 votes from voters of type 3, 4, and 5; \( L \) gets the 250 votes of types 1 and 2. Put more generally, \( L \)’s location divides the electorate into two groups: those with ideals less than \( l \) and those with ideals greater than \( l \). \( R \)’s optimal response is an \( r \) just next to \( L \) on the side of the larger group. We have thus figured out how \( R \) will respond to any move made by \( L \). \( L \) thus knows that she will get the smaller group and, given that she too wants to maximize votes, she should try to make this smaller group as large as possible. She can do this, the reader may have guessed, by setting \( l \) equal to the ideal point of the median voter, since then the groups to the left and right are equal in size. If \( l \) and \( r \) just straddle the ideal point of the median voter, \( x_o \), then each location is optimal against the other’s and the election ends in a virtual tie.

\(^{20}\) For any two candidate positions, say \( \alpha \) and \( \beta \) in \([0, 100]\), where \( \alpha \) is to the left of \( \beta \), the midpoint is \((\alpha + \beta)/2\). The candidate located at \( \alpha \) receives the votes of all voters with ideals to the left of this midpoint, whereas the candidate located at \( \beta \) gets the votes of all voters with ideals to the right of this midpoint. Voters at the midpoint are indifferent between the two candidates since their positions are an identical distance from these voters’ ideals; these voters flip coins to decide for whom to vote.

\(^{21}\) If \( l \) happened to be to the right of the midpoint of the voter distribution, then \( R \) would maximize his votes by squeezing up against \( L \) on its left side, thereby getting a majority of the votes.
We draw precisely the same conclusion if we fix \(R\)'s position first and let \(L\) optimally respond. For any \(r\) chosen by \(R\), \(L\) will set \(l\) just next to \(r\) on the side of the larger group. Under these circumstances, the best \(R\) can do is to "move to the median."

Finally, suppose \(L\) and \(R\) must announce their policy platforms simultaneously. If once announced, a candidate is "stuck" with the position for the duration of the campaign, then a candidate is likely to worry that his or her position is vulnerable. A position is vulnerable if the opponent's position lies between it and the median of the voter distribution since, by the Downsian rule of calculation, the opponent will then get more than half the votes. The only position that cannot be vulnerable is one that actually is at the median ideal. If, on the other hand, candidates are not stuck with their announced positions, but can revise their policy platform during the course of a campaign, then one will observe one of two patterns. If both initial announcements are on the same side of the median ideal, then there will be a "hopscotching" converging pattern as the vulnerable position (as just defined) hopscots over her opponent's position in order to be closer to the median, that position in turn is hopscotched over by the now-vulnerable opponent, and so on until there is no more hopscotching to do—namely when both positions have converged upon the median. If, on the other hand, initial announcements are on opposite sides of the median ideal point, then there will be a homing in on the median from each side as the one more distant moves closer.

In all of these circumstances, each a slightly different modeling assumption about the sequence in which various events take place in the course of a campaign, there is a common convergence on the ideal point of the median voter. And this centripetal tendency is precisely what is predicted by Black's Median Voter Theorem. In effect, Downs's model provides a rationale for why majoritarian politics is centripetal.

The logic of Black's theorem, as elaborated in the electoral context by Downs, reminds one of those occasions when someone says something very intelligent and quite obvious (once it is said!), causing you to reflect, "Now why didn't I think of that?" Downs was motivated by the fact that so many foreign observers of American life had, since practically the beginning of the Republic, noted how similar America's political parties were: "Tweedledum and Tweedledee," empty bottles differing only in their labels. More recently, observers of British politics have begun to notice that the losing party ultimately transforms itself to look at least a bit like its more successful opponent. Thus, in the postwar period British Tories have accepted a good deal of the welfare state championed by the Labor Party, whereas, in recent days, the Labor party has trimmed its more socialist sails in order to look to voters a bit more like Margaret Thatcher's and John Major's Conservative Party.

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24 Notice that the rationale is not that the middle is "where the votes are." Certainly this may be true; in many circumstances the middle of the spectrum is where most persons' preferences lie, with the numbers getting smaller as one moves toward the more extremist tails of the distribution. But go back to Figure 5.10 and suppose that the extremists are the more plentiful. That is, suppose types 1 and 5 have 250 voters each, types 2 and 4 have 62 voters each, and type 3 consists of a single voter. Will the Downsian logic we have recounted above any different here? We think not. The centripetal pull is the same, even though the "center" is least populated with voters!

25 It might interest the reader to know that Downs's book originated as a doctoral dissertation in economics at Stanford University, where a member of Downs's dissertation committee was Kenneth Arrow. So, Downs had both cycles and instability à la Arrow's theorem on one side and their opposite — stylized facts about stable party configurations — on the other. His research sought to make sense of these seemingly incompatible matters. Single-peakedness did the job.
The centripetal forces Downs identified are certainly plausible, yet it is clear that parties do not converge all the time. Why might this be? Downs’s spatial model is quite user-friendly as a “discovery tool,” so we can vary some of its assumptions and see what happens. Suppose, for example, we do not foreordain that there are two candidates. What if Leftie (L) and Rightie (R) are not the only two kids on the block? There is a third candidate, call her Trey (T), who may enter the race if she thinks she has a chance. Well, if L and R locate at the median (call it $m^*$)—$l = r = m^*$—and if, when there are more than two candidates the one with the most votes (not necessarily a majority) wins the election, then T certainly does have a chance. She can locate close on one side or the other of the median, win nearly all the votes on that side, and thus defeat L and R who end up splitting the remaining votes (Figure 5.11). On the other hand, if the positions of L and R are sufficiently widely dispersed, then T can enter between them at some position $t$. She will get the votes of voters whose ideal points lie in the interval $[(l + t)/2, (t + r)/2]$. The left boundary of this interval is the midpoint between the positions of L and T, whereas the right boundary is the midpoint between the positions of T and R. By the same Downsian rule of calculation, L gets all the voters in the interval $[0, (l + t)/2]$, and R gets all the voters in $[(t + r)/2, 100]$. If there are more voters in the first interval than in the second or in the third, then T wins. So, when there is the possibility of entry L and R can locate neither too closely together nor too far apart.

In fact, there may be a set of entry-deterrence locations for L and R, with these two getting roughly the same number of votes, and no third candidate able to locate in any place that would give her a victory (thereby discouraging her from entering at all). The point here is that when we broaden Downs’s initial model to take account of some factor he had omitted—the possibility of entry by a third candidate—we discover that there may be occasions and circumstances in which the established parties (L and R) are ill-advised to converge toward the median.

Research has, in fact, been conducted on precisely the issue of Downsian candidate competition with (prospective) entry.26 As noted, it is clearly one extension of the original Downsian assumptions that produces the possibility of nonconvergent candidate locations. But there are other possibilities. Candidates, for instance, may have their own policy preferences, ones often known to the voters. Thus, suppose L and R have their own policy ideal points at $l^*$ and $r^*$, respectively (shown in Figure 5.12). They may declare policy programs at other locations, say $l \neq l^*$ and $r \neq r^*$. But why should the voters believe these policy declarations? One doesn’t need to be altogether cynical to believe that once one of them wins it will be sorely tempted to implement its preferred policy ($l^*$ or $r^*$), not its declared policy ($l$ or $r$); politicians cannot be trusted to do what they say when they have preferences of their own. Effectively, then, candidates once again will not converge, this time because there is no point to doing so (they won’t be be-

26 The interested reader may consult Kenneth A. Sheplee, Models of Multiparty Electoral Competition (Chur, Switzerland: Harwood, 1991) for a summary of much of this research.
liesed by voters), even if they were willing to implement what they promised. The “commitment technology” is simply not up to the task.

What if it were? What if candidates had policy preferences, as in the previous paragraph, but had available to them means of making promises stick. Perhaps all they need to say is “Cross my heart,” and the voters will believe them. Perhaps voters believe policy promises because they know that politicians know that a reputation for deception and misrepresentation is a serious electoral obstacle in future electoral campaigns. So, for any of a number of reasons, suppose that candidate promises are credible, on the one hand, but that candidates still care about what policies are implemented, on the other hand. What will the candidates do in this circumstance? In a lovely paper, Randall Calvert,27 demonstrates that, just as in the case where candidates didn’t care a whit about policy, these two candidates will converge to the median voter’s ideal. Referring again to Figure 5.12, L wants an outcome closest to 1* and R wants the final policy to be closest to r*. If these two points happen to be equidistant from m*, and if each candidate (credibly) announced his or her ideal policy, respectively, then the election would end in a tie (and, presumably, the winner would be determined by something like a flip of a fair coin). But L, by moving just a tad toward the center, could win the election outright at a very small cost to herself in terms of policy. But this would be terrible for R—not that he lost the election but that a policy near 1* is so awful. He could avoid all this by moving in toward the center a bit more than L had, which, in turn, encourages L to move in a bit more, and so on and so forth. In the end, even though both candidates had policy preferences and, in fact, did not care at all about who won the election but only about what policy would be implemented, they converge to the median voter’s ideal anyhow.

Needless to say, we could play with Downs’s model in a variety of interesting ways. Many have.28 What we have shown in this section is that the stripped-down spatial model of Downs, with competition on an ideological dimension between two election-oriented candidates, leads to policy convergence. The policy that emerges from the competitive forces captured by this model is the ideal point of the median voter. This result, to the casual observer, describes what often happens in real elections, as candidates try to smooth down their more extremist edges in order to curry favor with voters in the center of things. Thus, once Bill Clinton vanquished his liberal opponents within the Democratic Party in 1992 (Jesse Jackson and Mario Cuomo), he headed toward the ideological center, running in the general election as a more conservative “new Democrat.” Incumbent president George Bush, on the other hand, tried to shed some of his hardline conservative attributes, also moving toward the center as he compromised on his


28 For a summary of the extensive literature the interested reader may turn to the following two volumes: James M. Enelow and Melvin J. Hinich, The Spatial Theory of Voting (New York: Cambridge, 1984); and James M. Enelow and Melvin J. Hinich, eds., Advances in the Spatial Theory of Voting (New York: Cambridge, 1980).
"no new taxes" pledge. In many other elections one sees a similar dynamic—partisan candidates of the left and the right hedging, qualifying, and compromising in order to appear more centrist.

This convergence is not always complete, however. Sometimes a candidate applies brakes on convergence for fear of alienating his or her base, or even stimulating a third-party entrant. Thus, civil rights activists, unions, and government workers—elements of the Democratic base—made it virtually impossible for candidate Walter Mondale to converge toward the center in the 1984 presidential election. Elements of the conservative movement kept Ronald Reagan ideologically true in that same election. Third-party candidates entered the presidential races of 1968, 1980, and 1992 (George Wallace, John Anderson, and Ross Perot, respectively), sometimes because the candidates were thought to have converged too much,20 sometimes because they were thought to have stayed too close to their more extremist supporters.21 Thus, both too much convergence and too little convergence may provide the impetus for a third-party challenge.

We have clearly only scratched the surface of Downs’s spatial model of party competition, and only covered some of the many mechanisms and rationales according to which competitors converge toward the median voter’s ideal policy, on the one hand, or maintain distinctive policy profiles, on the other. This, in sum, suggests the richness of Downs’s approach.

Electoral phenomena, however, are not the only focuses of the spatial model. A twin enterprise, a kind of "elections writ small," has employed the spatial model to study the selection of policy in legislative settings. We turn to those now, and examine both one-dimensional and multidimensional versions of the spatial model.

Spatial Models of Legislatures

We shall have a much more thorough look at legislatures in Part IV, so here we are primarily interested in seeing what the spatial model can do. We shall see that it is a quite powerful analytical tool for representing the ways in which preference-based (rational) behavior and structural features of institutions interact to produce final outcomes. It suggests that legislative outcomes depend in essential ways not only on what legislators want, but also on how they conduct business in the legislature.

To keep things as simple as possible, we take the legislature to be a set of $n$ individuals, where $n$ is an odd number, and where everyone casts a vote. It makes decisions by majority rule. The most elementary situation, one we examine first, is the unidimensional case in which the legislature must choose a point on a line. Each legislator, $i$, has an ideal point $x_i$, and single-peaked preferences. The median voter is legislator $m$ with ideal point $x_m$. We know in this circumstance that $x_m$ can defeat any other point on the dimension in a majority contest (Black’s Theorem). Perhaps more amazing is the fact that the median preferences prevail in a comparison between any two alternatives, so that if $m$ prefers $x$ to $y$ then so does a majority.31

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20 In 1968, Wallace entered on the right, thinking "there’s not a dime’s worth of difference" between Democrat Hubert Humphrey and Republican Richard Nixon.

21 Both Anderson and Perot sought to capture the center, which they believed had been conceded by Carter and Reagan in 1980 and Clinton and Bush in 1992, respectively.

31 This may be proved as follows. Suppose $x_m$, $x$ and $y$ are all points in the dimension, and that $x_y \preceq x_m$. Legislator $m$ clearly prefers $x$ to $y$. But then so does every legislator to the left of $m$. Together these legislators constitute a majority, so $x$ is preferred by a majority to $y$. Likewise, by the same reasoning, if $x \preceq x_y$, then both $m$ and a majority (all the legislators to the right of $m$) prefer $x$ to $y$. So, we have shown that whenever $x$ and $y$ are on the same side of the median, a majority always agrees with the preferences.
In addition to the preferences of the median legislator, \( x_m \), we identify two other distinguishing features of the situation. Whenever a legislature faces a decision-making opportunity, there is always a status quo in place, labeled \( x^0 \). This is the current policy at the time of legislative choice. We assume it remains in place if the legislature chooses not to change it. The second feature of interest common to most legislatures is a division-of-labor arrangement known as a committee system. In such a system, a committee is a subset of the \( n \) legislators (momentarily, we describe some of its specific powers). The median ideal point of the committee members is labeled \( x_c \). Just as majority preferences in the entire legislature are identical to the preferences of the legislature’s median voter, majority preferences inside a committee are a copy of the preferences of the committee’s median member. Because of these identities, much of our analysis need only consider \( x^0 \), \( x_m \), and \( x_c \). In what follows, then, we will put the spatial model through its paces in examining the making of policy choices by an \( n \)-member legislature possessing a committee system.

We consider here three decision-making regimes, or institutional arrangements. The first is pure majority rule. There is a status quo and any legislator can offer a motion to change it. A motion, once proposed, is pitted against the status quo. If it wins it becomes the new status quo; if it loses it goes to the place where all losing proposals go (a sort of elephant’s burial ground). The floor is once again open for some new motion (against the old status quo, if it survived, or the new status quo, if the previous proposal prevailed). This procedure of motion-making and voting continues until no member of the legislature wishes to make a new motion.\(^3\)

The second regime is the closed-rule committee system. In this system, a (previously appointed) committee first gets to decide whether the legislature will consider changes in the status quo; that is, it has gatekeeping agenda power, and can decide whether to open the gates to enable policy change or not. Second, if the gates are opened only it gets to make a proposal (monopoly proposal power). Third, the parent legislature may vote the committee’s proposal either up or down; the proposal is closed to amendments. Hence, the proposal is said to be considered under a closed rule, and the committee is said to offer its parent body a take-it-or-leave-it-proposal.

The third regime we examine is the open-rule committee system. This system is identical to the one described in the previous paragraph, except for the third feature. Under an open rule, once the committee has made a proposal, the parent legislature may open the floor to amendments to the committee’s proposal. Once the committee has opened the gates and made a proposal, it concedes its monopoly access to the agenda.

We will examine each of these systems in both the one-dimensional and the multidimensional setting. We want to know if there is anything regular or routine that we can expect from these alternative majority-rule regimes. In conclusion, we will offer some brief comparative observations on these regimes, leaving a full-blown consideration for Chapters 11 and 12, where we will take up institutions more systematically.

\(^3\)A variation on this “stopping rule” is to allow a motion to be in order at any time to close the floor to new motions (in effect, a motion to take a final vote and then to adjourn the legislature, at least on the subject matter at hand).
Figure 5.13

are the same as a majority's preferences, this interval is the set of motions that would prevail over $x^0$ in a majority contest. So, if someone is recognized and makes a motion outside this set, it will go down in flames, whereas any motion in this set will be victorious and become the new status quo. It is evident that the political process defined this way will produce outcomes that either leave the status quo unchanged or move it closer to $x_m$ (since every point in $P_m(x^0)$ is closer than $x^0$ to $x_m$). Ultimately it will converge on $x_m$. Moreover, it will not depart once it reaches $x_m$ (since, as we showed above, the status quo cannot move further from $x_m$ in any vote). So, just as in the Downsian model of electoral competition, there is a centripetal tendency in the pure majority rule legislative regime. It is for this reason that we think of pure majority-rule legislative choice as an “election writ small.”

The great utility of these spatial models of legislative choice is they permit the analyst to do what in economics is called comparative statics—we can ask “what if” questions. Having derived an equilibrium outcome from our basic setup, as we did in the previous paragraph, we may now ask how that equilibrium changes as relevant parameters change. We have already seen that there are really only two relevant parameters—$x^0$ and $x_m$. Holding the latter fixed, we first ask what happens if the former changes—that is, what would happen to the final outcome if the status quo were closer to or further from the median legislator's ideal? The answer is: nothing! Although different locations for $x^0$ will affect $P_m(x^0)$, and hence what motions can succeed at any point in time, we know that ultimately the result converges to $x_m$, no matter what $x^0$ is. So one interesting conclusion we draw from the pure majority rule model is that it does not possess a conservative bias, weighting past decisions unduly. The past (as reflected in the status quo) will influence the “path” (by restricting what motions can succeed at different stages of the process), but will not affect the ultimate destination.

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34 Since we assume that legislative preferences are distance-based, we know that legislator $m$ prefers to $x^0$ all points closer than it to $x_m$. This determines the set $P_m(x^0)$ pictured in Figure 5.13.
Reversing emphasis and holding \( x^0 \) fixed, we now ask what happens if \( x_m \) were different. The answer is graphed in the lower panel of Figure 5.13 for \( x_m \) located on a line between 0 and 1. The location of \( x_m \) in the [0, 1] interval is given on the horizontal axis and the equilibrium outcome in this interval is given on the vertical axis. The graph is a 45° line showing (for any \( x^0 \)) that the equilibrium outcome perfectly tracks the identity of the median ideal point. This is centripetality in the extreme! Not only does pure majority rule legislative choice converge to the median ideal; but also, if that median should change, then so will the equilibrium outcome. So a second interesting conclusion we can draw from pure majority rule is that it is perfectly responsive to central tendencies: The median legislator’s ideal is, by definition, the central point in the distribution of preferences; pure majority rule produces an outcome at this point; and, were this point to change, the legislative outcome would “track” it.

**CLOSED-RULE COMMITTEE SYSTEM** Most legislatures are not pure majority-rule institutions. Even town meetings and other approximations to pure majority rule about which observers occasionally wax romantic require some mechanism to determine the content of agenda items and the order in which they will be taken up. Some legislatures establish a single agenda committee to decide these matters. However, most legislatures (certainly in the United States) employ a division-of-labor committee system that divides up agenda power by policy area. Subsets of legislators have disproportionate influence over the agenda in specific policy jurisdictions. The committee serves, in its jurisdiction, as an agenda agent for its parent legislature.

We will have much more to say about these things in Part IV. For now, we need focus only on the fact that what distinguishes the closed-rule regime from pure majority rule is that there is, in addition to \( x^0 \) and \( x_m \), a third parameter of interest, namely the median ideal point of an agenda-setting committee, \( x_t \). Many of the conclusions we draw about this regime depend upon the relative locations of \( x^0 \), \( x_t \), and \( x_m \).

The decision-making procedure, as we suggested earlier, is for the committee either to make no proposal at all, in which case \( x^0 \) remains in place, or to make a motion to change the status quo, which the parent body must accept or reject as is. What will such a committee do? To answer this question, we once again determine \( P_m(x^0) \), as in the top panel of Figure 5.13. This is a set whose boundary points are \( x^0 \) itself and \( x^* \); it contains the only points a legislative majority prefers to \( x^0 \). The committee, as personified by its median voter, \( c \), treats these points as its “opportunity set,” picking its favorite as the motion it makes (if it makes any motion at all). We look at three orderings of the relevant parameters (there are six orderings in all, but the omitted ones are simply mirror images of the ones we consider):

**CASE 1** (\( x^0 \leq x_t \leq x_m \)). Here the median legislator is between the status quo and the median committee member. In this case \( x^* \) is the right boundary of \( P_m(x^0) \), just as shown in Figure 5.13. If \( x_t \leq x^* \), then the committee will propose its median ideal point which then will be approved by a legislative majority (since it lies inside \( P_m(x^0) \)). If, on the other hand, \( x^* \leq x_t \), then the best the committee can do is to propose \( x^* \), which is approved by a legislative majority.\(^{39}\) In either case, both committee and parent legislature wish to

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\(^{38}\) Since we are elaborating the one-dimensional model here, we are only interested in the median ideal of a single committee. In multidimensional contexts, where there are many jurisdictions into which the dimensions of the policy space are arranged, we will need to know the policy preferences of different committees, each responsible for its own bundle of policy dimensions. More on this will be developed in Part IV.

\(^{39}\) Actually a legislative majority is indifferent between \( x^0 \) and \( x^* \). We assume that an indifferent voter votes for the motion on the floor. (Alternatively, the committee could propose a point just to the left of \( x^* \), which secures a majority outright.)
move away from the status quo in the same direction. The final outcome will move $x^0$ in that direction, further than the median voter would want, but not always as far as the committee median wants.

CASE 2 ($x^0 \leq x_m \leq x_c$). Here the median committee member is between the status quo and the median of the whole legislature. In this case $x \in P_m(x^0)$ automatically. So the committee can get majority legislative approval for $x_c$.

CASE 3 ($x_m \leq x^0 \leq x_c$). In this last setting the status quo is between the two medians. This is a particularly interesting case, because committee and legislative majority are at loggerheads. The committee wishes to move right, while a majority of the parent legislature wants to move left. The committee’s gatekeeping authority pays off for it in a big way here, because it will choose simply to keep the gates closed.\(^7\)

So, the first thing we learn about the closed-rule regime is that only a very limited number of things can happen—three things, in particular. If $x_c$ is interior to the legislative median’s preferred-to-$x^0$ set, then the outcome is $x_c$. If it is not, then either of the two end-points of $P_m(x^0)$ are possible—$x^0$ if committee and legislative median are at loggerheads; $x^*$ otherwise. In the pure majority rule regime, in contrast, only one thing can happen—$x_m$—something that never happens under the closed rule regime (unless, by coincidence, $x_c=x$ or $x_m=x^0$). This suggests that endowing a privileged group with agenda power is not without its consequences: agenda power discour-

\(^7\) The committee could move a proposal (some point to the right of $x^0$), but it would be defeated. So it might as well not bother and simply keep the gates closed (especially if the bother were at all costly). On the other hand, if outside interests took heart in the fact that the committee was at least putting up the good fight, and rewarded the committee accordingly, then the committee might wish to “bother” (though the result would be unchanged—$x^0$ would stay in place).

Spatial Models of Majority Rule

ages centripetal outcomes as it tugs the process in the direction of the privileged group.

There are a variety of comparative statics exercises one might do. We focus on one: for a fixed legislative median and committee median, what happens as $x^0$ changes? (When we ask this question, we don’t literally mean that the status quo suddenly changes. Rather, we are asking what would happen if the status quo were more or less extreme.) In case 1, for example, if $x^0$ were further to the left, then $P_m(x^0)$ would get bigger ($x^*$ moves to the right). At some point it contains $x_c$ (if it doesn’t already). So, as $x^0$ moves away from the chamber median, there will be a discontinuity when $x_c$ jumps from being outside m’s preferred-to-$x^0$ set to inside that set. Put crudely, the worse the status quo, from m’s perspective, the more likely c can get her way.\(^8\) The same pattern prevails as $x^0$ moves to the right. At first it moves toward $x_m$, so m’s preferred-to-$x^0$ set contracts. Once it “passes” $x_m$, the preferred-to set begins expanding again.\(^9\)

CASE 5.1
SUNSET PROVISIONS AND ZERO-BASED BUDGETING

In the 1970s public policy analysts developed two ideas as an attempt to counter rising budget pressures. The first idea was called a sunset provision. The identified problem was the persistence of expenditures that may have outlived their usefulness. It seemed that once a project was on the

\(^8\) The classic statement of this result, plus a derivation of some of the political consequences of it, is found in Thomas Romer and Howard Rosenthal, “Political Resource Allocation, Controlled Agendas, and the Status Quo,” Public Choice 33 (1978): 27–43.

\(^9\) The reader might try to see what happens as $x^0$ changes in cases 2 and 3.
books, it never went away. With a sunset provision as part of the enabling legislation, the project would have to be renewed after a specified time period in order to extend its life. In other words, the sun would automatically set on a project, unless the legislature took further action.

The second idea was called zero-based budgeting. Also associated with the problem of expenditures that were growing out of control, this concept required bureaucratic agencies to justify a project budget "from zero," rather than merely justifying the growth in proposed expenditures over the previous year's budget. It was alleged that this procedure would reduce accumulating and persisting inefficiencies in agency budgets.

For our purposes, sunset provisions and zero-based budgeting are similar because they create situations in which the status quo alternative to a proposal is zero. Consider the case of zero-based budgeting for an agency. The legislative median is at \( x_m \) and last year's agency budget is at \( B \). Now we let the agency make a proposal for next year's budget, a proposal which the legislature may accept or reject by majority rule. Under ordinary procedures, we assume that legislative rejection of the agency proposal results in last year's budget, \( B \), continuing in place next year. Under zero-based budgeting, on the other hand, we assume that legislative rejection leads to a zeroing out of the agency budget altogether.

At first glance, it would seem that the zero-based budgeting procedure is pretty tough on the agency. That's the whole idea, since this method was designed to limit an agency's power in budget negotiations. However, zero-based budgeting actually increases agency discretion. This is seen in the figure below. If, under ordinary procedures, \( B \) is the reversion outcome (the outcome if the legislature rejects the agency proposal), then as long as the agency proposes a budget in the gray region, the legislature will approve it (any such proposal is in \( P_m(B) \)); that is, under ordinary procedures, the agency could extract a budget as large as \( B^* \). If, on the other hand, the zero-based budgeting procedure were in effect, then the agency could get a budget as large as \( N \) (since \( N \) is in \( P_m(0) \)). If only the policy wonks who invented zero-based budgeting had an analytical model of the legislative process, they would have appreciated the perverse incentives such an arrangement provides.

In concluding this brief treatment of the closed-rule regime, let us reemphasize the fact that the key parameters are \( x_0, x_m \), and \( x_m \). An electoral earthquake that fails to change relationships among these parameters will not change policy outcomes (a fact that may puzzle those not equipped with the theory we have been developing here). If, for instance, a legislative election caused massive turnover in incumbents, but did so symmetrically so as to leave \( x_m \) unchanged, then "the more things change, the more they stay the same." Likewise, if before an election legislator \( c \) and \( m \) are at loggerheads, as defined in case 3 above, then electoral change, no matter how massive, that leaves the (possibly newly determined) \( c \) and \( m \) at loggerheads, will simply maintain the status quo ante. The institutional impediments implicit in the closed-rule regime stand in stark contrast to the hypersensitivity of pure majority rule.

OPEN-RULE COMMITTEE SYSTEM We've seen thus far that, although there is an entire continuum of possible final outcomes, only one thing (\( x_m \)) can occur under the pure majority rule
regime, and only one of three things \((x, x', x^*)\) can possibly happen under the closed-rule regime. In our treatment of the open-rule regime, we will discover that only two possibilities exist. Either the gates remain closed and \(x^0\) prevails or the gates are opened and \(x_m\) is the final outcome. Nothing else is possible. We will consider all the cases as we did in the previous regime.

In the open-rule regime the committee once again has the first move. If it makes no motion, then \(x^0\) persists. If it makes a motion, then that motion is open to amendment (hence the term open rule). We assume here that alternative amendments continue to be offered until no legislator wishes to offer another. So the committee proposal is initially pitted against the first amendment, the winner of that against the next amendment, and so on until all the amendments have been taken up; the survivor of that sequence is then pitted against the status quo (this last vote is often called the “vote on final passage”).

This procedure looks very much like the pure majority rule regime, except that the committee has the first move. Once it opens the gates, we’re in the world of pure majority rule. This means that once a proposal is made, it will be amended and amended again, successful amendments converging the process toward \(x_m\). Indeed, it doesn’t even matter what the initial committee proposal is. The reality is:

\[
\begin{align*}
\text{open the gates} & \Rightarrow x_m \\
\text{keep gates closed} & \Rightarrow x^0
\end{align*}
\]

The committee decision is really pretty simple. If the committee median voter, Ms. \(c\), prefers \(x_m\) to \(x^0\), then she makes a

---

An alternative procedure would be to allow, after a committee motion, an amendment which is directly voted on. The winner stays on the floor and is subject to another amendment. The process continues until no more amendments are forthcoming, after which there is a final vote between the alternative left standing on the floor and the status quo.

---

motion (any motion); if Ms. \(c\) prefers \(x^0\) to \(x_m\), then the committee keeps the gates closed. Thus, all we need to inspect is Ms. \(c\)’s preferred-to-\(x^0\) set, \(P_c(x^0)\), to see whether \(x_m\) is in it or not.

Recalling the three possible cases in the preceding section, for the parameter ordering of case 1 \((x^0 \leq x_m \leq x_c)\), the committee clearly prefers \(x_m\) to \(x^0\). For case 3 \((x_m \leq x^0 \leq x_c)\), the committee clearly has the opposite preference. It is the case 2 ordering \((x^0 \leq x_c \leq x_m)\) that is the interesting one. If \(c\)’s ideal policy is less than halfway between \(x^0\) and \(x_m\), then she keeps the gates closed; if it is more than halfway, then she makes a motion.

The first of these case 2 situations is shown in Figure 5.14. What makes this especially interesting is that it represents a very frustrating situation. The committee, because it prefers the status quo to the median legislator’s ideal, will keep the gates closed. But both a committee majority and a chamber majority prefer every point in \(P_c(x^0)\) to \(x^0\). That is, the open-rule environment, which at first blush appears to give a legislative majority potent authority, in fact penalizes both committee and legislative majorities. It gives the chamber too much authority—the right to amend whenever it wants. Its strength is its weakness, because it cannot promise not to use its authority; yet, it would be better off if it could credibly promise not to amend some proposal in \(P_c(x^0)\) made by the committee (for, if it could precommit in this fashion, then the committee would be prepared to open the gates).
Case 5.2
The Importance of Compromise and Strategic Thinking

Our discussion of the closed-rule and open-rule regimes addresses the general question of how politicians and interested others think about legislative possibilities. In one-dimensional situations, as we have seen, politicians locate a proposal on the policy dimension relative to their own preferences and the status quo that will otherwise prevail if the proposed change is rejected. When faced with a choice between the proposal and the status quo, the politician votes for the alternative closer to his or her ideal. We demonstrated that, with the open-rule regime, once a proposal is made the dynamic of amendment activity leads inexorably to a unique outcome—the ideal point of the median legislator. With the closed rule, a proposal wins only if it is closer than the status quo to the median voter’s ideal.

Failure to recognize these dynamics can lead to disappointment for principled, i.e., stubborn, lobbyists. Advocates of proposed legislation must take into consideration the preferences of the decision maker(s), the rules of procedure in effect, and the relative location of the status quo. An unwillingness to compromise in light of these strategic realities can keep the status quo in place, even though the possibility exists to defeat it with results satisfactory to the lobbyist. This is illustrated in the figure below, where the legislative median is $x_m$, the status quo is $x^0$, and a powerful lobbyist’s ideal policy is $I$.

Without going into any of the specifics concerning how powerful lobbyists exercise their power, suppose that lobbyist $I$ is in a position to undermine any change in the status quo if it finds the change not to its liking (perhaps by “bribing” influential legislators—that is, contributing to their campaign committees). Under the closed rule, the best $I$ could hope for is the compromise point, $C$ —a policy just a little bit closer than $x^0$ to $x_m$. If the lobbyist stubbornly refuses to accept $C$ by seeking something more extreme, it loses. Under the open rule, it must be prepared to accept $x_m$, for this is where the process of amendment will drive the final result. In either of these cases, the lobbyist must be able to anticipate the best deal it can cut and settle for it. In particular, it must be especially sensitive to the fact that “the best deal it can cut” depends upon the procedural rules for amendments. Even though it is powerful enough to undermine proposed changes in $x^0$, it cannot impose its own will. It needs a little help from its (legislative) friends.

Some observers have cited the absence of such strategic thinking as a reason for the failure of the Equal Rights Amendment* and Proposition 174 in California, which would have implemented school choice as a voucher system.† Unwilling to compromise, lobbyists unwittingly kept their proposals further from the status quo than the compromise point required by the strategic realities. Politicians or voters voted against their proposals when more moderate versions very probably would have passed. The importance of such strategic thinking will be covered in greater depth in the next chapter.

* Jane Mansbridge, Why We Lost the ERA (Chicago: University of Chicago Press, 1986).
MULTIDIMENSIONAL EXTENSIONS Once we move into multiple dimensions, matters get a bit more dicey. In a pure majority rule regime, the results of the McKelvey Chaos Theorem loom large. Putting to one side the highly unlikely circumstance that legislator preferences are distributed in a radial symmetric manner, we know that \( W(x) \neq \emptyset \) for any \( x \) in the policy space. Anything can be beaten. In particular, any status quo, \( x^0 \) has a nonempty winset, \( W(x^0) \). So long as a motion is made from that set, the status quo will be replaced. But then \( x^1 \in W(x^0) \), in turn, has a nonempty winset of its own, \( W(x^1) \). A motion \( x^0 \in W(x^1) \) will replace \( x^1 \). Under the assumptions we have made about legislative voting, an existing status quo is continually replaced.

Suppose we alter the setup ever so slightly. We retain the condition, from pure majority rule, that anyone is free to make a motion to change the status quo. But we assume that decision making takes place one dimension at a time, in some pre-set order. The first person recognized to make a motion on the initially designated dimension states his or her amendment to \( x^0 \); this amendment can only change \( x^0 \) on the dimension currently under consideration. The group continues to focus on amending the status quo on this dimension until no more amendments are offered. Once it completes its task, the group turns its attention to the next dimension. It continues in this manner until there is no dimension left on which any legislator wishes to alter the status quo level.

It is easy to see, as we show in Figure 5.15, that this multidimensional version of pure majority rule mimics the result of the one-dimensional setting. There are three legislators with ideal points \( x_0=(x_1^1, x_2^1) \), \( x_5=(x_1^4, x_2^4) \), and \( x_7=(x_1^7, x_2^7) \). For any status quo (not pictured), \( x_0=(x_1^0, x_2^0) \), motions are entertained, first on dimension 1 and then on dimension 2. At the

\[41\] Namely, that everyone votes their preferences rather than voting strategically (which we take up in the next chapter).
Thus, the multidimensional version of pure majority rule yields one of two possible conclusions, depending upon whether there is additional institutional structure or not. In the pure case, the status quo is continuously vulnerable to change. The group’s choices are never very durable, since it is always in someone’s interest to introduce a motion to change it, and it is always in some majority’s interest to comply. In the case of institutional structure in the form of dimension-by-dimension decision making, the result is both predictable and centripetal. The median ideal point on each dimension prevails under the procedure described above (although it need not be the same median voter each time, of course).

Since we will take up the multidimensional versions of the open-rule and closed-rule regimes in the chapter on legislatures in Part IV, we will be especially brief on this subject now. Imagine, in Figure 5.16 (a reproduction of the spatial positions in Figure 5.13), that Ms. c is an agenda-setter and the status quo is $x^0$. If her proposals are subject to amendment by the parent legislature, then we are back to the wild-and-woolly open-rule majority system. Under a closed rule, however, she can make a take-it-or-leave-it proposal, one that is not subject to amendment but only to an up-or-down vote. The petal-shaped shaded regions comprise c’s opportunity set—it is $W(x^0)$. The circles centered on $x_i$ are various of c’s indifference contours. Her objective is to move the final policy outcome onto the indifference contour of smallest radius (hence closest to her ideal point) that still lies in $W(x^0)$. The point in this figure (a big black dot!) at the tangency between one of the petals of $W(x^0)$ and the smallest indifference curve of Ms. c is the proposal she will make, which a majority ($a$ and $c$) will then support. With the closed rule, then, a monopoly agenda setter has considerable power, though constrained by majority preferences.

The spatial model will be used time and time again in the analyses of the remainder of the book. We’ve put forward the basic ingredients in this chapter and briefly explored majority rule in electoral and small group settings. But we’ve assumed a good deal of naïveté on the part of our voter/legislators (apparently, only candidates and agenda setters are wily). We want to relax this unrealistic feature in Chapter 6. In Chapter 7 we want to move beyond majority rule and examine the multitude of ways human creativity has manifested itself in devising sometimes bizarre and intricate ways for groups to arrive at decisions.
Spatial Models of Majority Rule

can produce only one of two possible results. It can, by "closing
the gates" and not permitting a motion to be proposed, keep
policy at the status quo. Or, if it should make a motion, the
sequence of amendments permitted under the open rule will
drive the outcome to the median legislator's ideal. These are
the only possibilities. Under a closed rule, there are three pos-
sibilities. If the gates are kept closed (possibly because the
committee and legislature are at loggerheads, with the status
quo between their respective median ideals), the status quo
remains intact. If the committee median's ideal lies between
the status quo and the median legislator's ideal, then the com-
mittee's ideal will be proposed and will pass. Finally, if the
median legislator's ideal lies between the status quo and the
committee's median ideal, then the outcome is the point closest
to the committee's median that leaves the median legislator of
the full legislature just indifferent between it and the status
quo. The details are found in this chapter. The surprise, how-
ever, is found in the conclusions: first, that only a small
number of items are possible under various legislative proce-
dural regimes and, second, that many small number of things
differ from regime to regime. Put differently, institutional
arrangements—the political ways of doing business—matter
profoundly for the outcomes that emerge from the political
process.

The spatial model also allows us to begin to assemble ex-
planations for why convergence to the center is not always
complete. The centripetal tendency is always present, to be
sure, but there may be countervailing tendencies as well. In
the context of Downs's model of elections, for example, we
noted that a politician may fear he will lose his extremist sup-
port (to abstention or to a third-party entrant) if he converges
too much toward his opponent. In the legislative arena, pow-
erful agenda setters may, through their control of motions and
amendments, prevent the process from converging on the me-
dian legislator's ideal policy, either because the agenda settler
can propose and get passed something she likes better or because she chooses to keep the gates closed.

Thus, the great advantages of the spatial model are its (relative) simplicity, its analytical power, and the “surprises” it produces. Not only do we begin to understand things that we may have long appreciated in an intuitive fashion (like the tendency toward moderation in majority-rule systems); but also, we develop a sophisticated understanding of new things. While surely not a perfect explanatory tool, it’s a pretty good start.

One of the matters that we touched on only briefly and unsystematically was strategic thinking. Many applications, especially early in the history of spatial modeling, assume that voters and legislators are “honest” in their voting behavior. When confronted with two alternatives, they simply vote for their favorite, doing so without regard for subsequent consequences. Yet there are many circumstances in which a rational person will think things through in a more sophisticated fashion, sometimes coming to the conclusion that, in a particular voting opportunity, she should not vote for her favorite alternative. We call this sophisticated or strategic behavior, the subject of the next chapter.

6

Strategic Behavior:
Sophistication, Misrepresentation,
and Manipulation

In our models of social choice and spatial decision making, voters vote their preferences. To some, this is the essence of rational behavior. To others, however, rationality is more subtle and nuanced. It entails doing the best one can with what one’s got, and this sometimes requires making strategic maneuvers, investments, sacrifices, and retreats. It is embodied, for example, in the Protestant work ethic, which encourages deferred gratification in order to harvest later returns. Some might claim that Protestants, in some perverse sort of way, like deferred gratification, but we think their ethic (an ethic common among Asians, Jews, and others, too) reflects the strategic decision to maximize over the long haul by resisting enslavement to short-term preference satisfaction. Our models need to reflect this possibility, for a failure to take strategic capabilities into account may result in disaster (as Case 6.1 demonstrates). This chapter is devoted to elaborating on the multiplicity of ways strategy rears its head.
To many readers of this book, the decade of the 1960s seems a long time ago—ancient history. Besides the Beatles, bell-bottom pants, granny glasses, afro hair styles, droopy moustaches, and love beads, this decade is perhaps remembered most vividly (through that haze of imperfect memory, for those of us old enough, or from documentary-film collages for younger folks) as a period of intense group protest and collective action. Early in the decade, first at the University of California at Berkeley and then throughout the country, students protested against the seemingly arbitrary and capricious authority of university officials. The Free Speech Movement and the Movement to Save People’s Park were two major protests aimed at carving out both personal and physical space within which to “do one’s own thing.” (“Movement” was the collective noun of choice at the time.)

This was not the silliness many elders portrayed it as; it was serious politics with a serious political agenda. Indeed, as the decade wore on, mass action moved beyond the college campuses and the agenda of protest became more explicitly political:

- protest in behalf of civil rights, culminating in a march on Washington that involved hundreds of thousands of participants, and ultimately producing landmark civil and voting rights legislation;
- protest against the war in Vietnam, culminating in a march on the Pentagon (also involving hundreds of thousands of people, as brilliantly described in Norman Mailer’s *Armies of the Night*), and ultimately causing an incumbent president to decline to seek reelection;
- protest against environmental degradation, culminating in a mass rally in Washington on Earth Day, and ultimately in landmark environmental-protection regulations and the creation of a cabinet-level agency devoted to the environment.

The seeds of mass protest were cultivated with loving care during this period, producing offshoots of mass protest in the seventies, eighties, and now the nineties, concerning women’s rights, gay and lesbian discrimination, and continuing environmental causes (global warming, ozone depletion, destruction of rain forests, strip mining, nuclear energy, toxic waste disposal, and endangered species, to name a few). Perhaps the most salient of these today involves both sides of the abortion issue—the pro-choice and the pro-life movements.

Having become used to reading about mass action on our campuses and in the streets of our cities, we may have taken it as customary and failed to appreciate that it is, in fact, a puzzling phenomenon. Mass action involves huge numbers of individuals deciding to participate. Yet what possible difference could any one person make to a final outcome by attending one of these rallies? His or her individual contribution is bound to be minute, while the cost of taking this action is far from trivial. Participation involves time, possibly expense, and perhaps risk to life and limb. Putting these together, it would appear that the instrumental benefit is small and the potential cost large. Participation sounds crazy, doesn’t it? We will want to explore this question in the next few pages.

We will also want to examine other manifestations of collective action and try to understand why it occurs. Why do
individuals in a community seem to follow conventions—like everyone driving on the right side of the road (except the English and Japanese, who drive on the left)? How are large numbers of people able to coordinate their behaviors—as when the members of a large symphony orchestra all manage to play together? How do we make sure that people do their fair share in collective undertakings—like cleaning up the common room in the dormitory or the TV room in the frat house? In short, much of what we do in life we do in groups, so much so that we often commit the fallacy of false personification and talk as though these groups had a life of their own. In fact, for much of this century, the study of politics was typically cast as the study of groups.

**The Group Basis of Politics**

It is no accident that much political discourse is conducted in terms of groups. In any large society it is simply impossible to think in highly disaggregated terms. Instead, we think about an issue in terms of the groups taking an interest in it, and a conflict in terms of the groups that line up on one side or the other of the divide. Farmers lobby both for price supports for their crops and for high tariffs to keep crops from other nations out of their domestic market; consumers, of course, are on the other side of these issues. Labor unions push for mandated wage increases and improvements in fringe benefits, which employer groups oppose. Minority groups urge passage of civil rights legislation, while those whose competitive advantage is eroded by it are in opposition. Economic producer organizations seek various protections from market competition, again at the expense of consumers. Professional groups want licensing authority, while those who use professional services want this authority regulated. Associations of colleges and universities seek large student aid allocations and government research budgets, only to be opposed by those who want those limited budget allocations devoted to their own activities. The list is endless.

In a pluralistic political system these groups are known as "lobbies," "interest groups" or more pejoratively as "pressure groups." At the highest level of aggregation these groups are actually collections of groups—so-called peak associations ranging from the AFL-CIO (whose members are unions), to the National Association of Manufacturers and the Business Roundtable (whose members are corporations), to the Farm Bureau Federation (whose members are local farm bureaus). At less august levels groups simply represent aggregations of individuals sharing a common interest—the Possum Hollow Rod and Gun Club, the Harvard-MIT Apple User Group, the Boston Policemen's Benevolent Society, the Massachusetts Federation of High School Basketball Coaches, or the New England Political Science Association.

The very ubiquity of groups in pluralistic political systems explains why, for most of the first half of the twentieth century, the study of politics was the study of groups. Political outcomes were seen as the result of struggles among groups. Indeed, in its most famous representation, Arthur Bentley wrote almost like a physicist about the "parallelogram of forces" that constituted group interactions and infighting. He thought of the status quo in any policy domain as a point on a page. Change occurs as this point gets pushed around by various forces impinging on it. Bentley treated each group in this political fray as consisting of a "direction" and a "magnitude." Direction indicated what changes in the status quo a group wanted; magnitude measured the group's political power. One group might "push" the status quo—that point on the page—far to the east; another to the southwest, but a shorter distance (reflecting its weaker political clout); still a third due north with yet another magnitude. The net effect of this pushing and shoving—the resultant of the various group forces applied to the existing status quo—is a new policy.

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status quo. Politics, in this view, becomes physics, each group is a “force vector,” and the political outcome of a struggle is simply the mechanical resultant of the various forces at play.

The pull and tug of group infighting was, to nineteenth-century observers like Alexis de Tocqueville, the definitive feature of American political life. Indeed, they admired the voluntaristic political pluralism that was absent in less liberal societies. In either its pluralistic or less liberal form, however, the group-based formulation of politics took groups as fundamental and assumed their existence. The essential axiom was: Common interest, however defined and however arrived at, leads naturally to organizations coherently motivated to pursue that common interest; politics is all about how these coherently motivated organizations support and oppose one another.

Case 9.1
Who Is Represented?

The pluralists believe that groups form naturally out of shared interests. If this belief is correct, groups should form roughly in proportion to people’s interests. We should find a greater number of organizations around interests shared by a greater number of people. The evidence for this pluralist hypothesis is quite weak. Kay Schlozman and John Tierney examined interest groups that represent people’s occupations and economic roles.* Using census data and listings of interest groups, they compared how many people in the United States have particular economic roles and how many organizations represent those roles in Washington. For example, they found that (in the mid-1980s) 4 percent of the population was looking for work, but only a handful of organizations actually represented the unemployed in Washington.†

There is a considerable disparity in Washington representation across categories of individuals in the population, as the table below suggests. Schlozman and Tierney note, for example, that there are at least a dozen groups representing senior citizens, but none for the middle-aged. Ducks Unlimited is an organization dedicated to the preservation of ducks and their habitats; turkeys, on the other hand, have no one working on their behalf. The pluralist’s inability to explain why groups form around some interests and not others led some scholars to investigate the dynamics of collective action. Mancur Olson’s work, discussed later in this chapter, is the most well-known challenge to the pluralists.

<table>
<thead>
<tr>
<th>Economic Role of Individual</th>
<th>% of U.S. Adults</th>
<th>% of Orgs.</th>
<th>Type of Org. in Washington, D.C.</th>
<th>Ratio of Orgs./Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managerial/ Administrative</td>
<td>7</td>
<td>71.0</td>
<td>Business association</td>
<td>10.10</td>
</tr>
<tr>
<td>Professional/ Technical</td>
<td>9</td>
<td>17.0</td>
<td>Professional association</td>
<td>1.90</td>
</tr>
<tr>
<td>Student/ Teacher</td>
<td>4</td>
<td>4.0</td>
<td>Educational organization</td>
<td>1.00</td>
</tr>
<tr>
<td>Farm Workers</td>
<td>2</td>
<td>1.5</td>
<td>Agricultural organization</td>
<td>0.75</td>
</tr>
<tr>
<td>Unable to Work</td>
<td>2</td>
<td>0.6</td>
<td>Handicapped organization</td>
<td>0.30</td>
</tr>
<tr>
<td>Other Non-Farm Workers</td>
<td>41</td>
<td>4.0</td>
<td>Union</td>
<td>0.10</td>
</tr>
<tr>
<td>At Home</td>
<td>10</td>
<td>1.8</td>
<td>Women’s organizations</td>
<td>0.09</td>
</tr>
<tr>
<td>Retired</td>
<td>12</td>
<td>0.8</td>
<td>Senior citizens organization</td>
<td>0.07</td>
</tr>
<tr>
<td>Looking for Work</td>
<td>4</td>
<td>0.1</td>
<td>Unemployment organization</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* Even in these less liberal societies, conflicts were often portrayed in group terms as struggles between large social aggregates: bourgeoisie versus proletariat; aristocracy versus merchant class; various racial, religious, linguistic, or regional groups in opposition to one another; and so on.


† Of course, the number of organizations is at best only a rough measure of the extent to which various categories of citizen are represented in the interest group world of Washington.
COOPERATION ACCOUNTS

Collective Action as Multiperson Cooperation

Groups of individuals pursuing some common interest or shared objective—maintenance of a hunting and fishing habitat, creation of a network for sharing computer software, lobbying for favorable legislation, playing a Beethoven symphony, or whatever—consist of individuals who bear some cost or make some contribution on behalf of the joint goal. Each member of the Possum Hollow Rod & Gun Club, for example, pays annual dues and devotes one weekend a year to cleaning up the rivers and forests of the club-owned game preserve.

We can think of this in an analytical fashion, somewhat removed from any of these specific examples, as an instance of two-person cooperation writ large. Accordingly, each of a very large number of individuals has, in the simplest situation, two options in his or her behavioral repertoire: “contribute” or “don’t contribute” to the group enterprise. If the number of contributors is sufficiently large, then a group goal is obtained. However, just as in Hume’s marsh-draining game of the previous chapter, there is a twist. If the group goal is obtained, then every member of the group enjoys its benefits, whether he or she contributed to its achievement or not. As long as the marsh is drained, neither farmer is bothered by mosquitoes, a benefit completely detached from contribution levels. In the next chapter we refer to a goal like this as a public good, since once it is provided it becomes available to all, whether they participated in its provision or not.

Although this may seem like a simple extension of the two-person cooperation problem of the previous chapter, there are several complications on which we must dwell. First, we need to designate whether the situation is dichotomous, in which case the group goal is either attained or it is not, or continuous, in which case the outcome varies quantitatively with the number of contributors. It is almost always possible to transform a dichotomous situation into a continuous one, though it is often easier to think in terms of a dichotomous outcome. For example, consider alliance behavior during wartime (or team behavior during the Super Bowl). Allies, depending upon the number of individual contributions (relative to contributions obtained by the other side), may either win the war or lose it (dichotomous outcome); but surely one can think of the “victory” as varying from total success to one barely better than a draw (or, even worse, a Pyrrhic victory), and “defeat” ranging from a scant last-minute loss to total humiliation. In the remainder of this chapter, to keep things sufficiently straightforward, we will stick with the dichotomous circumstance: the group goal is either achieved or not.

Second, in a multiperson situation, we need to specify how many contributors are necessary to attain the group goal. Put differently, we need to specify the relationship between each of the individual contribute/don’t contribute choices and the final outcome (what economists call the production function). At one extreme, unanimous participation is required: unless every person in the group contributes, the group goal remains

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2 A more complicated version of this situation, one we will not pursue here, enriches each person’s behavioral repertoire. Instead of a twofold choice, there is some continuously variable input, like effort or money, that the individual may choose to contribute.

4 Surely there are situations in which individuals may actually be denied the benefits of a group if they do not contribute to its production. If the benefit is highly valued, then this capacity to deny makes it easier for the group to elicit contributions. If you want to ride on the Massachusetts Turnpike, for example, you must make a contribution, called a toll. If you want to fish on the Possum Hollow River, then you must pay your club dues. If you want to hear the Boston Symphony play a Beethoven symphony, then you must purchase a ticket. These activities are not quite public goods, and we defer further consideration of them to the next chapter. In the present discussion we examine the polar case of a group good or goal, once produced, being available to all.
illusive. This is a particularly interesting situation to analyze. Suppose each individual in the group evaluated the group goal at some level, say $B$ utiles (where $B$ stands for “benefit”); assume that $B > 0$. Suppose further that the utility value of contributing to the group project is $-C$ utiles ($C$ stands for “cost”), where $C > 0$, too. If $C > B$, then no one will contribute, no matter how many others do. It’s just not worth the candle, since the benefit net of costs, $B - C$, is negative. Even if every other person in the group had contributed (for some perverse reason), the last person will not because the cost exceeds the benefit. On the other hand, if $B > C$, then we claim that every member of the group will contribute. Why?

Actually, there are two possible outcomes when $B > C$, but we argue that only one in which everyone contributes makes sense. Suppose everyone has chosen not to contribute, and, of course, the goal is not attained. Would any group member be so unwise as to reconsider her choice? Hardly, for if, say, Ms. $j$, decided to contribute, then her payoff would be $-C$ (the cost she bears) and there would still be no compensating benefit (since the latter is produced only if everyone contributes). So, it is possible for a group to be stuck in an “equilibrium trap” in which no one is contributing, even though everyone would be better off if everyone contributed.

But we don’t think this is very likely. Everyone will realize that everyone else benefits from achieving the group goal, and that the only way for this to happen is if everyone contributes. So, Ms. $j$, like every other group member, makes the following calculation:

If I don’t contribute, then I get a payoff of 0. If I contribute, and so does everyone else, then I get a payoff of $B - C > 0$. If I contrib-

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We could complicate our story by individualizing evaluations, so that Mr. $i$ values the group goal at $B(i)$ utiles, while Ms. $j$ values it at $B(j)$, where $B(i) > B(j)$. But this enrichment does not change the thrust of our story, so we will not employ it here. Conflict of interest among group members—that is, differential evaluation of group goals—will be explored below.

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That is, we suspect that individuals will manage to coordinate on contributing, because there is a net benefit to doing so relative to the equilibrium-trap outcome, because every person’s participation is absolutely essential, and because everyone knows this and knows that everyone else knows this. In short, there are a number of reinforcing factors causing individuals to see contribution as the sensible thing to do in this circumstance, and to believe that everyone else will see it as the sensible thing, too. The “everyone contribute” event is what Thomas Schelling has called a focal point.

Suppose, now, that a unanimous contribution rate is no longer necessary. Indeed, of the $n$ persons in our group, suppose that only $k$ contributors are necessary for the group objective to be obtained (where $k$ is a number greater than zero but less than $n$). Ms. $j$’s calculation is considerably different in this case, as may be seen in Display 9.1. If fewer than $k-1$ of her colleagues are contributing, or more than $k-1$, then it

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<table>
<thead>
<tr>
<th>Ms. $j$’s choice</th>
<th>Number of other group members contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>contribute</td>
<td>less than $k-1$</td>
</tr>
<tr>
<td></td>
<td>$-C$</td>
</tr>
<tr>
<td>do not contribute</td>
<td>0</td>
</tr>
</tbody>
</table>

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This idea was first developed in his famous book, The Strategy of Conflict (Cambridge, Mass.: Harvard University Press, 1960).
doesn’t pay for Ms. \( j \) to contribute. In either of these cases she
garners a higher payoff by not contributing (0 instead of \(-C\)
and \(B\) instead of \(B - C\), respectively). Only if exactly \( k - 1 \)
others are contributing is Ms. \( j \)’s contribution essential, in
which case she would obtain \( B - C > 0 \) instead of 0
by contributing. Ms. \( j \) does not have a clearcut course of action,
because she does not know in advance whether less than \( k - 1 \),
more than \( k - 1 \), or exactly \( k - 1 \) of her colleagues are going to
contribute.

This development suggests that there are two rational, or
equilibrium, outcomes possible. Either no one contributes or
exactly \( k \) do. In either of these cases, no group member will
have reason to reconsider his or her action. If no one is con-
tributing, then Ms. \( j \) (or any other member for that matter)
would be foolish to decide to contribute. On the other hand, if
exactly \( k \) people are contributing, then those not contributi-
ing have no need to contribute (and would be ill-advised to do so,
since they enjoy the group benefit even though they haven’t
contributed), while the \( k \) that are contributing know that each
and every one of them is absolutely essential.

Thus, for the group objective to be accomplished, it is clear
that something of a “knife-edge” condition must hold for suf-
cicient contribution to occur. Exactly \( k \) individuals will need to
believe that they, and only they, are likely to contribute. We
claim that this poses a much more complicated problem for
group members than the case where unanimity was required.
Indeed, we suggest that the “tipping point,” \( k \), is a crucial
determinant of whether or not this group is able to get its act
together.

Let’s take a concrete example. Suppose \( n = 100 \). We have
already analyzed the case of \( k = 100 \), the requirement of unan-
imous contribution, and concluded that unanimous contribu-
tion is a likely occurrence. What if \( k \) were a relatively large
number, but less than 100, say \( k = 95 \). Most group members,
Ms. \( j \) included, are bound to think that, if they are going to
achieve the group goal, then an awful lot of them are going to
have to contribute. The group cannot stand too many defectors
without losing the goal altogether. It seems to us that, as be-
tween the outcome of no one contributing and \( k \) of them con-
tributing, there will be a tendency for \( k \) (or possibly even more
than \( k \)) to end up contributing. What about \( k = 85 \)? Again,
there will be considerable psychological pressure on people to
contribute, although not so much as when \( k \) equals 95 or 100.
As \( k \) gets smaller, the pressure reduces.

Consider the case of \( k = 25 \). In this instance, there are
bound to be an awful lot of group members who calculate that
their contribution is just not needed. It’s not (necessarily) that
they are mean-spirited, but rather that they feel liberated to
make alternate uses of their effort, without risking the
achievement of the group goal. Instead of going out with 24
other members of the Possum Hollow Rod and Gun Club to
clean up litter along the Possum Hollow River, for example,
Ms. \( j \) may conclude that that particular Saturday afternoon is
best devoted to taking her children shopping for spring clothes.
It seems to us that cooperation is especially hard to elicit from
members of a group when it is patently evident that the mem-
ber’s cooperation is inessential; this evidence mounts as \( k \)
becomes small relative to \( n \).

When \( k \) gets very small, nearly everyone in the group will
bail out, devoting their energies to nongroup activities. The
“rational” forecast is that the group objective will simply not
be accomplished. Yet, we suspect that other factors may come
into play in these circumstances, factors not incorporated into
the analysis given in Display 9.1. In every group there are
always some people who “do the right thing” no matter what.
For one thing, they may secure utilities directly from the partic-
ipation itself (it feels good to tramp up and down the Possum
Hollow River on a beautiful spring afternoon). For another, as
we noted in the previous chapter on two-person cooperation,
they may have internalized a value system that encourages contribution to group life. Surely, as the psychological/strategic pressures to which we’ve alluded above decline, people will drop out of participation. But perhaps not all, and, if it only takes a few to secure the group goal, then it may well be achieved.

The general conclusion of this analysis is that the combination of strategic and psychological pressures that encourage contribution rise as \( k \) gets large relative to \( n \). Holding \( n \) fixed (as we did in the development above), the likelihood that there will be sufficient contribution declines as \( k \) declines—certainly a nonobvious conclusion, inasmuch as it would appear that as \( k \) declines it gets “easier” to secure the group goal; as a qualification, however, we suggested that for very small \( k \) there may be an uptick in the likelihood of group success, since there is often a “dependable few” who will contribute for nonstrategic reasons.

These general tendencies, we claim, get more pronounced as \( n \) gets large, as \( C \) gets large, or as \( B - C \) gets large, holding \( k \) fixed. As \( n \) gets large, the general conclusion reported in the previous paragraph holds—it is practically equivalent to holding \( n \) fixed and letting \( k \) get smaller. But not quite. As \( n \) gets large it seems to us that the psychological identification with the group, an identification that may well affect the benefit utilities one enjoys upon achieving a group goal, becomes more tenuous. It’s hard to feel part of a group of 10,000,000 others. Sure, all the residents of greater New York City have an obligation to keep its streets and parks litter-free; but it is hard to appeal to in-group feeling in urging folks to come out on a beautiful Saturday afternoon to clean up the shores of the Hudson River.

As \( C \) gets large, holding \( n, k \), and \( B - C \) fixed, there will be a tendency for the group to fail to secure its objective. The “no one contributes” equilibrium seems specially compelling in the case of large \( C \), even if \( B - C \) remains fixed, because the psychological risk of contributing (paying the cost of \(-C\)) but the group falling short of the \( k \) contributors, is inhibiting.

Finally, as \( B - C \) gets large, holding everything else fixed, the importance of the group goal grows and people are prepared to take psychological risks in these circumstances. For any size group \( n \), and decisive contribution level \( k \), the prospect of the group obtaining enough contributors grows as \( B - C \) grows.\(^7\)

**Multiperson Cooperation and Coordination**

In a sense we have just taken up the easiest kind of multiperson cooperation, since there is only one thing the group seeks—what we have been calling the group “goal” or “objective”—and everyone in the group shares an interest in achieving it. Into this analytical stew we now want to add a tablespoon of nonuniqueness and a pinch of conflict of interest.

\(^7\) As a first cut this analysis is plausible, we think. But it is not satisfactory as a fully strategic analysis. For example, we claimed in the text that as \( B - C \) grows, the prospects for group provision grow for every group size, \( n \), and decisive contribution level, \( k \). Surely it is correct to believe that, for any specific group member, the pressure to contribute grows as the net benefit of group provision \((B - C)\) gets large. On the other hand, that same individual will just as surely appreciate that the pressure will also be growing on all her group colleagues. Thus, the large net benefit tugs her toward contributing, but the certain knowledge that others will also feel this way may allow her to rationalize letting them do all the heavy lifting. Weighing the relative force of these countervailing effects is the sort of consideration that is part of a deeper game-theoretic treatment.
as to which, so long as they do it together. Suppose then that a typical group member, Ms. \( j \) again, has two choices: go to the opera house or go to the ballet theater. If every group member makes the same choice, then they each realize a benefit of \( B \) utiles (everyone’s attendance is required for those utiles because the group qualifies for a group ticket price and gets premium seating). Failure to coincide on a common choice yields a positive payoff smaller than \( B \), say \( b \) utiles (where \( b < B \)), though with an exception. If everyone else coordinates on a common choice, but Ms. \( j \) does not, then her payoff is 0. The situation facing Ms. \( j \) is given in Display 9.2.

The last column of the display is irrelevant for Ms. \( j \); her payoff is the same no matter what she does, since there is already division among her prospective companions. So, for analytical purposes, it is only necessary to look at the two-by-two part of the display consisting of the first two columns and rows. Game-theoretic analysis tells us the obvious—that there are two “rational” or “equilibrium” outcomes to this group activity. Thus, about the only thing game theory can tell us is that the group should coordinate. It doesn’t tell us how, nor what Ms. \( j \) should do. To be more precise, it tells us no more than that each person should “flip a coin.”

<table>
<thead>
<tr>
<th>Ms. ( j )’s Choice</th>
<th>Everyone else chooses opera</th>
<th>Everyone else chooses ballet</th>
<th>No consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>opera</td>
<td>( B )</td>
<td>0</td>
<td>( b )</td>
</tr>
<tr>
<td>ballet</td>
<td>0</td>
<td>( B )</td>
<td>( b )</td>
</tr>
</tbody>
</table>

In this situation, then, the nonuniqueness of desirable goals for the group means that it will be problematic for the group actually to achieve one of them. If there were only two people, for example, each of whom flipped a coin, then there would be a fifty-fifty chance that they would coordinate choices—one chance in four that both would go to the opera house, one chance in four that both would go to the ballet theater, and two chances in four that they would go their separate ways. For three people, the chances of all coordinating drop to one in four, and for four people, to one in eight. Generally, for an \( n \)-person group, the chances that all will choose ballet or all will choose opera is \((\frac{1}{2})^{n-1}\), a number that rapidly approaches zero as \( n \) gets large. (If \( n = 10 \), for example, the probability of successful coordination is .00195.) As we shall shortly argue, it is difficult for groups to obtain the dividends of cooperation when there are alternative directions in which its members may head, absent some sort of coordination mechanism.

Although we will not develop the analysis at length, it would appear that repeat play of this kind of group interaction may have the same sort of salutary effect it had in the twoperson world. People would probably coordinate on which side of the road to drive, even in the absence of a traffic cop, just by virtue of doing it over and over again. If an alien plopped down in the middle of Beacon Street in Boston, we expect it would learn to stay to the right quite quickly (and there would be all manner of Boston drivers to let it know if it did otherwise). Similarly, we could imagine our social group, after some trial and error, implicitly coordinating—for example, going to the opera in even-numbered months and to the ballet in odd-numbered ones.\(^8\)

\(^8\) We have said nothing about communication, and the curious reader may have begun to wonder why the members of this allegedly social group seemed incapable of talking to one another! Communication surely is an option, but it adds an additional layer of complexity that we’d just as soon not tackle.
cooperation among group members is exacerbated as members not only have to overcome the normal difficulties of coordination associated with nonuniqueness (as discussed just previously), but also must overcome inherent intragroup differences of opinion about where to go.

It is conceivable that, in some specific situations, the conflict of interest is resolvable in a relatively painless way. If, for instance, five of the six members of a group strongly prefer opera to ballet, then it doesn’t take much figuring by the one ballet lover that, if the group is to obtain either of its goals, it’s going to end up at the opera. But what about the situation in which a fifteen-person group is hopelessly divided into five intense opera lovers, five intense ballet lovers, three mildly opera-oriented members, and two mildly ballet-oriented members. This situation is sufficiently complicated that it requires some sort of institutional solution, as indeed are most situations that involve both nonuniqueness and conflict of interest. We are not saying that groups, even large groups, don’t manage to overcome these difficulties in interesting, often idiosyncratic, ways. Repeat play, for example, might help here as it has in other situations we have examined. But the reality is that, rather than depending upon the problem to resolve itself in some fashion, a group will typically institutionalize a solution. This, we believe, is the important insight of Mancur Olson in his seminal book, The Logic of Collective Action.9

**OLSON’S LOGIC OF COLLECTIVE ACTION**

Olson, writing in 1965, essentially took on the political science establishment. He noted that the pluralist assumption of the time, that common interests among individuals are automatically transformed into group organization and collective ac-

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tion, was problematic. Individuals are tempted to “free-ride” on the efforts of others, have difficulty coordinating on multiple objectives (nonuniqueness), and may even have differences of opinion about which common interest to pursue (conflict of interest). In short, the group basis of politics is a foundation of jello: one cannot merely assume that groups arise and are maintained; rather, formation and maintenance are the central problems of group life and politics generally.

Olson is at his most persuasive when talking about large groups and mass collective action. In these situations, like many of the demonstrations and rallies of the 1960s, \( n \) is very large and \( k \) is relatively small. This is but another way of saying that no one individual is very significant, much less essential, to the achievement of a group goal. In these circumstances, the world of politics is a bit like Hume’s marsh draining game writ large, where each individual has a dominant strategy of not contributing.

Olson claims that this difficulty is severest in large groups, for three reasons. First, large groups tend to be anonymous. Each household in a city is a taxpaying unit and may share the wish to see property taxes lowered, but beyond that, it is difficult to forge a group identity on such a basis. Second, in the anonymity of the large-group context, it is especially plausible to claim that no one individual’s contribution makes much difference. Should the head of a household kill the better part of a morning writing a letter to his city council member in support of lower property taxes? Will it make much difference? If hardly anyone else writes, then the council member is unlikely to pay much heed to this one letter; on the other hand, if the council member is inundated with letters, would one more have a significant additional effect? Finally, there is the problem of enforcement. In a large group, are other group members going to punish a slacker? By definition, they cannot prevent the slacker from receiving the benefits of collective action, should those benefits materialize. (Every property owner’s taxes will be lowered if anyone’s is.) But more to the point, in a large, anonymous group it is often hard to know who has and who has not contributed, and, because there is only the most limited sort of group identity, it is hard for contributors to identify, much less take action against, slackers. As a consequence, many large groups that share common interests fail to mobilize at all—they remain latent.

This same problem plagues small groups, too, as Hume’s marsh draining game in Display 8.1 reveals. But Olson argues, much as we have in this text, that small groups manage to overcome the problem of collective action more frequently and to a greater extent. Small groups are more personal, therefore their members are more vulnerable to interpersonal persuasion. In small groups, individual contributions may make a more noticeable difference (\( k \) is large relative to \( n \)) so that individuals feel that their contributions are more essential. Contributors in small groups, moreover, often know who they are and who the slackers are. Thus, punishment, ranging from subtle judgmental pressure to social ostracism, is easier to effectuate. Finally, small groups often engage in repeat play and, therefore, can employ tit-for-tat strategies to induce contributions.

In contrast to large groups that often remain latent, Olson calls these small groups privileged because of their advantage in overcoming the free-riding, coordination, and conflict-of-interest problems of collective action. It is for these perhaps ironic and counterintuitive reasons that small groups often prevail over, or enjoy privileges relative to, larger groups: producers over consumers, owners of capital over owners of labor, a party’s elites over its mass members.

Olson elaborates on this asymmetry between large and small in suggesting that it applies within groups as well. If group members are unequal in important ways, these inequalities may actually help the group achieve its goals. But, in doing so, it often leads to inequality at the level of contri-
bution, with the *larger or more powerful* members being exploited by their smaller, weaker colleagues. Because a large, powerful group member is likely to "make a difference" in many situations, he or she will be under intense pressure to contribute. The enterprise may succeed, even if one of the weaker members opts not to contribute, but it is more apt to fail if one of the powerful members does not contribute. Could the United States "free-ride" on its NATO allies, or the former Soviet Union on the former Warsaw Pact? There is evidence, in fact, that both the United States and Soviet Union paid more than their "fair share" to support their respective alliances, and that many of their smaller partners paid much less than their fair share.

**CASE 9.2 THE LARGE AND THE SMALL**

In the case of NATO and the Warsaw Pact, the large participants, the United States and the Soviet Union respectively, subsidized the other members of their alliances. Their large size and their belief in the necessity of the alliance structure handicapped them in negotiating with their allies over a more equitable division of alliance costs.

David Marsh's research on corporations in Great Britain belonging to the Confederation of British Industry (CBI) suggests a similar exploitation of the large by the small. Large firms are more dependent on the group and small firms are more likely to free-ride. The managing director of one large firm said, "If the CBI didn't exist we would need to create it. We need someone to stand up and talk for industry" (p. 264). An executive at a small firm said, "Whether we were members of the CBI or not we would derive some benefit from the part it plays for industry. You get that type of benefit whether you are a member of not" (p. 264). In support of Olson's theory, smaller group members often free-ride on the efforts of larger members whose participation is more critical to the group's existence.

**Olson's By-Product Theory and Large Scale Collective Action**

The politically powerful conclusions of Olson's argument are, first, that groups are difficult to create and maintain, and, second, that smaller groups seem less afflicted by these difficulties than larger groups. In rejecting the group basis of politics that much of twentieth-century political science took as its foundation, Olson provides a cogent explanation for the power of small numbers, even in political democracies that nominally count noses and reward size.

Let us not, however, cast a blind eye to the reality of large-scale collective action. The free speech movement, the civil rights movement, and other mass-action activities do, in fact, arise, and sometimes change the course of history. Olson would not want to deny these powerful facts; he does, however, claim that they require explanation. The existence of groups cannot merely be assumed. Olson's explanation for this large-scale collective action is known as the by-product theory.

Olson argues that large groups are able to elicit contributions from members by providing them more than just the successful achievement of group objectives. Remember that individuals enjoy successfully achieved group goals, whether

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they contribute or not. So, the prospect of the goal itself is often not sufficiently compelling to induce contribution. But what if members are given other things, conditional on whether they contribute? That is, what if one of the reasons members join groups is for the private things that they get only by making their contributions? If this is the case—if the motivational force for contribution is the private goodies in addition to the collective goals—then the goals that are achieved are, in a manner of speaking, achieved as by-products. The contributions to large groups are forthcoming because of the benefits that contributors, and only contributors, enjoy. These benefits operate as selective incentives to contribute.

Why, for example, would minimum-wage earners contribute time and money to lobby the state legislature to raise the minimum wage? If the wage is raised, then all benefit, whether they contribute or not; and no single contribution makes much difference anyhow. The problem for a large group with a common interest is that it cannot deny successes to noncontributors. Suppose, however, that only contributors (who contributed by joining the group and paying annual dues) received such selective benefits as low-cost term life insurance, a group rate for membership in a health maintenance organization, special airfares to Florida in the winter, drug and alcohol counseling services, and a Wednesday night bowling league. These selective incentives may be sufficient to induce contribution. Over and above these tangible benefits that may be denied to noncontributors, any individual member may assert further that what he or she really values is the solidarity that being part of the group allows—another selective incentive.

In sum, the by-product theory suggests that a group that provides only collective group goals may have a hard time. Especially if the group is large and anonymous, it simply may not be possible for the goal itself to elicit enough contribution from prospective members to permit the goal to be achieved. The group, in effect, remains latent. So, groups search for things separate from the main group mission that can be withheld from those who do not contribute:

- worker groups, nominally organized to raise wages and improve working conditions, offer Wednesday night bowling;
- those organizing donation campaigns for National Public Radio give donors coffee mugs and sweatshirts identifying them as contributors to public radio;
- trade associations, officially organized to lobby Congress for policies beneficial to their entire industry, offer members (contributing companies in the industry, in this case) specialized access to trade statistics and other industry-relevant data;
- environmental groups, campaigning for public action in behalf of the environment, offer contributors discounts in the purchase of camping equipment, inexpensive fares to exotic environmentally unique destinations, and reduced prices on books about the environment.

This list could be multiplied endlessly, which only gives further testimony to the plausibility and persuasiveness of Olson's by-product theory. Most mass associations and organizations do precisely these sorts of things to attract and retain members. And yet, the by-product theory seems incomplete in several respects. To some, the by-product theory does not take ample account of the role played by leaders. To others, it strikes a rather cynical chord in its failure to incorporate genuinely nonmaterialistic motivations. Don't some people join groups and make contributions because they believe in the
group’s cause and require nothing more than the good feeling that they have made a contribution to it? In the next two sections we take each of these up in turn.

**Political Entrepreneurs**

It is very unusual in the academic world for a book review to become an important part of the literature on a subject. But this is precisely what happened to Richard Wagner’s review of Olson’s book. Wagner noticed that Olson’s arguments about groups and politics in general, and his by-product theory in particular, had very little to say about the internal workings of groups. In Wagner’s experience, however, groups often come into being and then are maintained in good working order not only because of selective incentives, but also because of the extraordinary efforts of specific individuals—leaders, in ordinary language, or political entrepreneurs in Wagner’s more colorful expression.

Wagner was motivated to raise the issue of group leaders because, in his view, Olson’s theory was too pessimistic. In the real world, labor unions, consumer associations, senior-citizen groups, environmental organizations, and so on all exist, some persisting and prospering over long periods. Likewise, mass activities like those described at the beginning of the chapter seem to get jump-started somehow in the real world. Wagner suggests that a special kind of by-product theory is called for. Specifically, he argues that certain selective benefits may accrue to those who organize and maintain otherwise latent groups.

Senator Robert Wagner (no relation) in the 1930s and Congressman Claude Pepper in the 1970s each had private reasons—electoral incentives—to try to organize laborers and the elderly, respectively. Wagner, a Democrat from New York, had a large constituency of working men and women who would reward him by reelecting him—a private, conditional payment—if he bore the cost of organizing (or at least of facilitating the organization of) workers. And this he did. The law that bears his name, the Wagner Act of 1935, made it much easier for unions to organize in the industrial north. Likewise, Claude Pepper, a Democratic congressman with a large number of elderly constituents in his South Miami district, saw it as serving his own electoral interests to provide the initial investment of effort for the organization of the elderly as a political force.

In general, a political entrepreneur is someone who sees a prospective cooperation dividend that is currently not being enjoyed. This is another way of saying that there is a latent group which, if it were to become manifest, would enjoy the fruits of collective action. For a price, whether in votes (as in the cases of Wagner and Pepper), or a percentage of the dividend, or the nonmaterial glory and other perks enjoyed by leaders, the entrepreneur bears the costs of organizing, expends effort to monitor individuals for slacker behavior, and sometimes even imposes punishment on slackers (such as expelling them from the group and denying them any of its selective benefits).

To illustrate this phenomenon, there is a story about a British tourist who visited China in the late nineteenth century. She was shocked and appalled upon noticing teams of

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11 The Wagner Act made it possible for unions to organize by legalizing the so-called closed shop. If a worker took a job in a closed shop or plant, he or she was required to join the union there. "Do not contribute" no longer was an option, so that workers in closed shops could not free-ride on the efforts made by others to improve wages and working conditions.
men pulling barges along the Yangtze River, overseen by whip-wielding masters. She remarked to her guide that such an uncivilized state of affairs would never be tolerated in modern societies like those in the West. The guide, anxious to please in any event, but concerned in the present circumstance that his employer had come to a wildly erroneous conclusion, hastily responded, “Madam, I think you misunderstand. The man carrying the whip is employed by those pulling the barge. He noticed that it is generally difficult, if you are pulling your weight along a tow path, to detect whether any of your team members are pulling theirs or, instead, whether they are ‘free-riding’ on your labors. He convinced the workers that his entrepreneurial services were required and that they should hire him. For an agreed-upon compensation he monitors each team member’s effort level, whipping those who shirk in their responsibilities. Notice, madam, that he rarely ever uses the whip. His mere presence is sufficient to get the group to accomplish the task.”

Thus, political entrepreneurs may be thought of as complements to Olsonian selective incentives in motivating groups to accomplish collective objectives. Indeed, if selective incentives resolve the paradox of collective action, then political entrepreneurs dissolve the paradox. Both are helpful, and sometimes both are needed, to initiate and maintain collective action. In this respect, groups that manage, perhaps on their own, to get themselves organized at a low level of activity often take the next step of creating leaders and leadership institutions in order to increase the activity level and resulting cooperation dividends. Wagner, in other words, took Olson’s by-product theory and suggested an alternative explanation, one that made room for institutional solutions to the problem of collective action.

Political Ideology and Belief Systems

We noted just before the previous section, as we noted in our earlier discussion of multiperson cooperation, that some people contribute to collective undertakings because of neither selective incentives nor leaders staring over their shoulders. Some, that is, have internalized a value system that makes contributing to group life a priority, whether or not it is accompanied by material incentives or overseers. This value system is often referred to as an ideology or belief system.

Rational choice explanations of group phenomena—of which our analysis of multiperson cooperation, Olson’s by-product theory, and Wagner’s theory of political entrepreneurs are standard instances—tend to give short shrift to ideological explanations, principally because they beg the question of where a particular ideology originates. That is, why would an ideology or belief system that disposes one toward cooperative/contributory behavior survive in a population and be sufficiently numerous to overcome all the problems of multiperson cooperation that we have discussed? These are important issues, so important that an ideological explanation, in our view, is bound to fall short unless it can satisfactorily account for them.

Nevertheless, we should point out (and will do so more extensively in the next section) that behavior may be thought of in either of two ways. Most rational analysis takes behavior to be instrumental—to be motivated by and directed toward some purpose or objective. But behavior may also be experiential. People do things, on this account, because they like doing them—they feel good inside, they feel free of guilt, they take pleasure in the activity for its own sake. We maintain that this second view of behavior is entirely compatible with rational accounts. Instrumental behavior may be thought of as investment activity, whereas experiential behavior may be thought of as consumption activity. We still will not have an-
answered the question of where such beliefs and values originate nor why they survive. But economists do not tell us where consumer tastes originate either, and yet make central use of those tastes in constructing their theory of price. The key thing to appreciate here is that we can still make precise statements about how dispositions toward both investment and consumption affect the prospects of collective action. We shall do this in more detail when we discuss voting, our next topic.

But before leaving this section, let us briefly note one other aspect of experientially-oriented behavior: it is the behavior itself that generates utility, rather than the consequences produced by the behavior. To take a specific illustration of collective action, many people certainly attended the 1964 march on Washington because they cared about civil rights. But it is unlikely that many deluded themselves into thinking their individual participation made a large difference to the fate of the civil rights legislation in support of which the march was organized. Rather, they attended because they wanted to be a part of a social movement, to hear Martin Luther King speak, and to identify with the hundreds of thousands of others who felt the same way. Also, and this should not be minimized, they participated because they anticipated that the march would be fun—an adventure of sorts.

So, experiential behavior is consumption-oriented activity predicated on the belief that the activity in question is fulfilling apart from its consequences. Individuals, complicated things that they are, are bound to be animated both by the consumption value of a particular behavior that we just described and its instrumental value, the rational (investment) explanation that we have used throughout this book. To insist on only one of these complementary forms of rationality, and to exclude the other, is to provide but a partial explanation. This is no more apparent than in the activity of voting, the centerpiece of democratic politics.

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**CASE 9.3**

**WHAT DOES THE EVIDENCE SAY?**

What does the evidence say about these different explanations of collective action: Olson's by-product theory, Wagner's theory of political entrepreneurs, and the rationality of ideology and experiential behavior? In various studies group members have been surveyed to determine why they become members. The survey results indicate people join for a combination of reasons. In support of Olson's theory, members of economic groups are more likely to join for selective, material benefits than for collective benefits. Economic groups include unions, farm groups, and business associations. Members of these groups often disagree with the political goals of the group, suggesting that the latter are not the chief reason for joining.*

In opposition to the by-product theory, some studies have found that members of noneconomic groups are motivated primarily by collective benefits. Individuals often join noneconomic groups such as Common Cause or the Sierra Club primarily because they agree with the group's political goals.† Overall, the evidence indicates that the motivation for membership in interest groups is a combination of selective and collective benefits, differing slightly for economic and noneconomic groups. Members of economic groups join primarily for the selective benefits (instrumental behavior), while members of noneconomic groups join primarily for the collective benefits (experiential behavior).

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Whether they join for the selective or the collective benefits, members appear to be behaving rationally. A study of members in thirty-five national organizations in the United States found that “members are attracted to, or seek out, those inducements that are most closely related to their central interests in an organization.” The study is important because it shows that ideology can be incorporated into a rational choice account of political behavior. Individuals committed to saving endangered species, an instance of a collective benefit, may “shop around” among different groups in order to find the one they believe will best serve their objectives.

Wagner’s theory of political entrepreneurs is also supported by social science research. Two studies have found that outside support is often vital to forming and maintaining a group. In addition to Hansen, cited above, Walker found that most political action is supported by large, wealthy institutions, such as charitable foundations. Thus, the collective action problem for some interest groups is overcome by political entrepreneurs in the form of patron institutions. What about these latter institutions—how do they solve their collective action problem? Robert H. Salisbury points out that these institutions are, in Olson’s terms, privileged groups small enough to overcome the collective action obstacles they face. If we expand the concept of political entrepreneur to include patron institutions, Wagner’s argument holds up quite well.


THEORIES OF VOTING AND COLLECTIVE ACTION

The kind of collective action with which nearly all citizens of democracies are most familiar is that of choosing leaders. Indeed, Americans elect more officials at all levels of government than any other democracy in the world. Rarely a year goes by for the typical American eligible to participate in elections without there being a race for the House or Senate, a presidential election, a state legislative or gubernatorial race, or even a contest for the proverbial town dog catcher. Involvement in the electoral process, whether attending campaign rallies, contributing money to a favorite candidate or distributing her literature door to door, helping to “get out the vote,” or voting itself, is collective action par excellence. Participation in election activity, then, like any other group activity, cannot be assumed, but rather must be explained. Why participate? That is the question. A strictly instrumental analysis is the appropriate starting point but, as we shall see, does not provide the last word. In one of the most famous articles on voting in the political science literature, William Riker and Peter Ordeshook supply the following analysis.

Suppose there are two candidates for a public office, Jackson and Kendall. A typical citizen eligible to vote in this election, Ms. j again, must decide whether to vote and, if so, for whom to vote. The act of voting costs Ms. j C utiles, reflecting the time and energy, and perhaps the financial expense, of informing herself and actually going to the polls. Suppose, without loss of generality, that Ms. j prefers the election of Jackson to that of Kendall. That is, u(J) > u(K), where u is Ms. j’s utility function and J and K stand for the election of Jackson and Kendall, respectively. Put equivalently, if Jack-

son should win rather than Kendall, then Ms. $j$ gets a benefit $B = u(J) - u(K) > 0$. If Ms. $j$ were the only voter, then the answer to the question of participation is straightforward. If the benefit of picking the winner, $B$, exceeds the costs of doing so, $C$, then she should do so, picking Jackson; if, on the other hand, $C > B$, then she shouldn’t bother (allowing the choice to be made randomly instead), since the utility difference between the candidates is not worth the cost Ms. $j$ would bear to make the choice. But of course Ms. $j$ is not the only voter, so she must take the intentions and capabilities of others into account.

Ms. $j$, we shall suppose, lives in a district in which there are $n$ eligible voters in total, each of whom has a preference between the two candidates, bears costs if he or she exercises the franchise, and hence must go through essentially the same kind of analysis as Ms. $j$. The task must seem daunting, even for moderately sized $n$, if one must try to scope out, for each and every other eligible voter, who is going to vote and for which candidate. In fact, however, the task simplifies quite naturally. There are really only five circumstances that Ms. $j$ (or any other voter) needs to consider. These involve how the other $n-1$ voters (excluding Ms. $j$) behave in the aggregate, and may be partitioned into five “states of the world” (labeled $S_1$ through $S_5$). We emphasize that these “states” are the outcomes that would transpire if Ms. $j$ abstained.

- $S_1$: Jackson loses to Kendall by more than one vote.
- $S_2$: Jackson loses to Kendall by exactly one vote.
- $S_3$: Jackson and Kendall tie.
- $S_4$: Jackson beats Kendall by exactly one vote.
- $S_5$: Jackson beats Kendall by more than one vote.

If Ms. $j$ believes $S_5$ prevails, then her vote will have no effect on the final result, no matter how she casts it, since Kendall wins in any case. If she believes that $S_4$ is the prevailing state, then she knows that she can cast a vote for Jackson that produces a dead heat. With $S_4$ she can break what would otherwise be a tie. In state $S_5$ her vote for Kendall would produce a tie (though why she would ever want to do this is beyond us, since she prefers Jackson). Finally, if $S_3$ is the prevailing state, then, like in $S_1$, her vote, however she casts it, will have no effect since Jackson wins regardless. Display 9.4 gives the complete picture.

Each cell of the display gives the utility payoff to Ms. $j$, which depends both on the state of the world (what everyone else is doing) and her own choice. Notice that if Ms. $j$ votes, then her utility for the outcome, whatever it is, is always reduced by $C$, the utility cost of her participation. Of course, if she abstains, then she does not pay this cost. The only term in this display requiring further explanation is $L$, which enters once in each row. $L$ stands for “lottery,” and reflects the fact that the election ends in a tie. In this case, we assume that some random device is used to determine the winner; the lottery is a fifty-fifty chance of either Jackson or Kendall. The expected utility theorem (see Chapter 2) implies that $u(L) = 1/2 u(J) + 1/2 u(K)$.

A glance at Display 9.4 reveals that Ms. $j$ should never vote for Kendall, since in each state of the world the payoff to her in the “vote for Jackson” row is at least as big as its counter-

<table>
<thead>
<tr>
<th>Ms. J's Choice</th>
<th>State of the World</th>
<th>$S_1$</th>
<th>$S_2$</th>
<th>$S_3$</th>
<th>$S_4$</th>
<th>$S_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vote for Jackson</td>
<td>$u(K) - C$</td>
<td>$u(L) - C$</td>
<td>$u(J) - C$</td>
<td>$u(J) - C$</td>
<td>$u(J) - C$</td>
<td></td>
</tr>
<tr>
<td>Vote for Kendall</td>
<td>$u(K) - C$</td>
<td>$u(K) - C$</td>
<td>$u(K) - C$</td>
<td>$u(L) - C$</td>
<td>$u(J) - C$</td>
<td></td>
</tr>
<tr>
<td>Abstain</td>
<td>$u(K)$</td>
<td>$u(K)$</td>
<td>$u(L)$</td>
<td>$u(J)$</td>
<td>$u(J)$</td>
<td></td>
</tr>
</tbody>
</table>
part in the “vote for Kendall” row. 13  Undoubtedly the reader is thinking, “I didn’t need a fancy analysis to tell me that!” Indeed, it should be obvious that when there are only two candidates, you either vote for your preferred candidate or don’t bother voting at all. There’s never anything to be gained by voting for your less-preferred candidate.

The analysis will have something to tell us that’s not so obvious when we ask the fundamental question: Does the payoff from voting for Jackson exceed the payoff from abstention? This requires us to compare the first and third rows of the display. Unlike the comparison of rows 1 and 2, however, in some states “vote for Jackson” gives the larger payoff while in others “abstain” is more attractive. In order to sort this out, we must incorporate into the analysis Ms. j’s beliefs about the likelihoods of the various states. Then we must use some simple algebra to figure out what Ms. j should do.

To simplify things, let us set $u(J) = 1$ and $u(K) = 0$.14 Moreover, let us represent Ms. j’s beliefs by probability numbers. In particular, Ms. j believes $S_1$ occurs with probability $p_1$, $S_2$ with probability $p_2$, $S_3$ with probability $p_3$, $S_4$ with probability $p_4$, and $S_5$ with probability $p_5$ (where each probability number is 0 or larger and together they sum to 1). This information is contained in Display 9.5, which is simply Display 9.4 with the “vote for Kendall” row deleted and the above revisions incorporated—$u(J)$ set to 1, $u(K)$ set to 0, and $u(L)$ set to 1/2.15

We may apply the expected utility theorem from Chapter 2 directly to this display as follows:

$$EU \text{ (vote for Jackson)} = p_1 (-C) + p_2 (1/2 C) + p_3 (1-C) + p_4 (1-C) + p_5 (1-C)$$

$$= 1/2 p_2 + p_3 + p_4 + p_5 - C$$

$$EU \text{ (abstain)} = p_1 (0) + p_2 (0) + p_3 (1/2) + p_4 + p_5$$

$$= 1/2 p_3 + p_4 + p_5$$

Ms. j should vote Jackson rather than abstaining if and only if $EU \text{ (Jackson)} > EU \text{ (abstain)}$. With a little more algebra, this means that Ms. j should vote for Jackson if and only if $p_2 + p_3 > 2C$. In words, she should vote if the sum of the probabilities that she either makes a tie (voting for Jackson in $S_2$) or breaks a tie (voting for Jackson in $S_3$) exceeds twice the cost of voting.

This is certainly not obvious, and is a good deal more complicated than the reader may have thought at the outset. What

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13 In the first and fifth states, the payoffs are identical. In the third state, since $u(J) > u(K)$, the statement in the text holds. The only places in which there may be some confusion is when L is involved. In the second state, a fifty-fifty chance of getting your preferred candidate is surely better than the certainty of getting your worst choice. In the fourth state, the certainty of getting your best candidate is surely better than a lottery in which your chances of getting him are only fifty-fifty. So, the conclusion holds that Ms. j does at least as well voting for Jackson as she does voting for Kendall.

14 In our discussion of utility functions in Chapter 2, we mentioned that it is often convenient to “normalize” the analysis, without doing any logical damage, by setting the utility of the most-preferred alternative to unity and that of the least-preferred to 0.

15 The lottery giving a fifty-fifty chance of Jackson or Kendall is, given the normalization, a fifty-fifty chance of getting a utility of 1 or of 0. Thus, the expected utility of this lottery is equal to 1/2.
does this implication for Ms. j's participation mean? This
deduction is actually quite rich in implications. First, it says that
the costlier it is to participate, the less likely Ms. j will be to
do so. This follows because the inequality of $p_2 + p_3 > 2C$ is
more difficult to satisfy as $C$ gets large. Indeed, if $C$ is suffi-
ciently large (specifically if $C \geq 1/2$), she should never partici-
part. Second, it says that Ms. j should be most disposed to
participate if she believes the election is going to be close. This
follows because $p_2 + p_3$ — the likelihood of “making or breaking
a tie”—is a serviceable definition of a close election; the larger
those probabilities get, the more likely the inequality will be
satisfied.

In sum, the Riker-Ordeshook calculus of voting provides a
rationale for participation based, first, on the cost of participat-
ing and, second, on the likelihood a prospective participator
will make a difference. But there is a third, most disturbing,
implication of this analysis. Suppose $C$ were very small rela-
tive to $u(Jackson) - u(Kendall) = 1$; say, $C = 1/1000$. This is
not an unreasonable supposition in important elections like
presidential contests, since it asserts that the cost of voting to
the average citizen is quite small relative to the difference it
makes to them whether, say, Bush or Clinton wins. So the
inequality $p_2 + p_3 > 2C$ now says that Ms. j should vote if and
only if her probability of making or breaking a tie ($p_2 + p_3$)
were larger than $2/1000$. What is the likelihood of making or
breaking a tie in mass election in the United States, where
there are approximately $125,000,000$ prospective voters. It is
infinitesimal, and certainly much smaller than $2/1000$. So it
is very unlikely that a sensible person, like Ms. j, will believe
that $p_2 + p_3$ exceeds $2/1000$. Thus, when all is said and done,
most sensible persons, according to this analysis, will conclude
that they should not vote.

One interpretation of this strictly instrumental analysis of
Riker and Ordeshook is that instrumental calculations are
simply insufficient to induce participation in large-scale elec-
tions of the sort that occur in most modern democracies. The
fact that in the real world of mass elections there is consid-
erable participation proves embarrassing. Noting this, Riker
and Ordeshook salvage their own analysis by conceding that
there is more to a calculus of voting than computing the con-
sequences of voting versus abstaining. They suggest, though
not in the words we use, that there is an experiential as well as
an instrumental basis for voting—that voting has con-
sumption as well as investment value.

For one thing, individuals in democratic societies possess
a belief system or ideology in which great stock is placed in
participation. Abstention is frowned upon—by one's neigh-
bors, by one's spouse, even by one's children.\footnote{One of the authors
remembers all too keenly how painful it was to face his
children after returning home from work on the evening of an
election and confessing that he "just didn't have the time to vote." That
experience, seared in his memory, has factored into all subsequent}

For another thing, there are often punishments inflicted on
nonparticipants. In some societies, a fine is imposed. In others
there are "watchdogs": the neighbor who goes door to door or
leans over her fence, imploring her neighbors to vote; the shop
steward who makes it clear to the men on the shop floor that
they had better make time at lunch hour to vote; the party
activists who, late in the day, check with pollwatchers to see
who has not yet voted.

Finally, it must be said that individuals participate in elec-
torial activities not only to avoid feelings of guilt or to dodge
the "punishments" inflicted by others, but also because it can
be fun. A voter may find satisfaction in standing in line at the
polls chatting with neighbors. One enjoys the next-day con-
versations at the office, or over coffee with neighbors, not only
about the election but about one's own participation in it.

Riker and Ordeshook account for this experiential source
of utility by altering the payoffs in Displays 9.4 and 9.5. In

\footnote{One of the authors remembers all too keenly how painful it was to face his
children after returning home from work on the evening of an election and
confessing that he "just didn't have the time to vote." That experience,
seared in his memory, has factored into all subsequent participation deci-
sions for him!}
the participation rows—"vote for Jackson" and "vote for Kendall"—but not in the "abstain" row, an additional consumption payoff is added. That is, while there surely are costs associated with participation (measured by the −C), there are also benefits, like those just discussed above. These benefits may be sufficiently large to induce some who would not otherwise participate on purely instrumental grounds.\footnote{We will not burden the reader further with an analytical demonstration. Interested readers may consult the original analysis by Riker and Ordeshook. For a broad discussion of the issue, including a critique of the Riker and Ordeshook approach, the reader is encouraged to examine Brian Barry, \textit{Sociologists, Economists, and Democracy} (Chicago: University of Chicago Press, 1970).}

There is now a large literature on rational theories of voting.\footnote{The ambitious reader is directed to two companion volumes: James M. Eleanor and Melvin J. Hinich, \textit{The Spatial Theory of Voting: An Introduction} (New York: Cambridge University Press, 1984) and James M. Eleanor and Melvin J. Hinich, eds., \textit{Advances in the Spatial Theory of Voting} (New York: Cambridge University Press, 1990).} Since our primary interest in voting here is to display it as an instance of collective action, we will not pursue the subject in further detail... except to note one feature that the perceptive reader may have already discerned. In our treatment of collective action, we have mainly considered a single group in isolation faced with prospective dividends from cooperation. Indeed, we went further by focusing on a generic individual in isolation, seeking to determine the conditions under which that individual would choose to contribute to a group enterprise. The example of voting, however, suggests that many collective action situations \textit{pit groups against each other}. Ms. \( j \) may well be a Jackson supporter, and the question for her is whether to contribute, along with other Jackson supporters, to the Jackson cause. But somewhere out there is lurking a Mr. \( k \), a Kendall supporter, with a similar problem. Yet, their respective problems are \textit{interdependent} and should not be treated in isolation.

That is to say, many collective action problems are not only problems of individuals sharing a common objective and seeking to overcome incentives that discourage contribution. They also involve strategic interactions among competing groups. The fate of groups in securing their respective objectives often depend not only upon own-group success in encouraging participation but also upon other-group success in collective action as well. In short, life is complicated, and our analysis has only scratched the surface. In order to treat this more complicated manifestation of collective action, we would have to take up issues of strategy in considerable detail, entering the domain of game theory. Of course, we cannot do everything in a single textbook, but we encourage the student to pursue this matter independently.\footnote{An excellent starting point is a book to which we have drawn the reader's attention before: Avinash Dixit and Barry Nalebuff, \textit{Thinking Strategically} (New York: Norton, 1991). Two other fine treatments of game theory in the context of politics are Peter C. Ordeshook, \textit{Game Theory and Political Theory: An Introduction} (New York: Cambridge University Press, 1986) and Peter C. Ordeshook, \textit{A Political Theory Primer} (New York: Routledge, 1992).}
The social dilemmas that arise from properties of goods, and the manner in which they are produced or consumed, bear a close relationship to the establishment and maintenance of cooperation and collective action. This may sound like economics but, in fact, it's politics through and through. Markets are best thought of as human constructions, not as elements of some natural order. They require political understandings and institutions to come into being and to persist. Surely, politics can break markets, as economists are wont to remind us; but politics makes markets, too.

**Defining Terms**

Most goods exchanged in economic markets are called *private* because the "owner" has full control over their use. If you buy a tube of toothpaste it belongs to you in the sense that its use is entirely under your control.\(^1\) Specifically, you can exclude others from enjoying its use. This is an especially important form of control inasmuch as the toothpaste gets "used up"; if the purchaser could not exclude others, then it would hardly be worth it for her to make the purchase in the first place. Consequently, we say that private goods possess two properties: *excludability* (the owner may exclude others from enjoying the good) and *solitary supply* (use depletes the availability of the good).\(^2\)

Goods lacking in both of these properties are called *public goods*. They are *nonexcludable*—anyone can enjoy them whether they have paid for that privilege or not—and are *jointly supplied* (nonrivalrous)—one person's use does not diminish the supply available to others. Classic examples of public goods include national defense and lighthouse services.

Consider the former. If defense services are extended over a broad territory, then anyone living in that territory is a beneficiary. Suppose, for example, that a feudal lord's castle, cannon, and knights in fourteenth-century England effectively protect a territory extending, say, twenty miles in any direction from the castle. The significance of this is that bands of robbers are discouraged from practicing their trade within the lord's jurisdiction.\(^3\) Thus, anyone living within the boundary enjoys relative peace—and that enjoyment is not contingent on whether the person pays general feudal dues to the lord, specific user charges for protection, or is an ally of the lord. Just by being a resident of the castle's territory, one may "consume" the lord's protective services.

What, really, is this protective service? In effect, it is de-

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\(^1\) Of course, there are (politically imposed) limits to your discretion. In most societies there are laws against squeezing toothpaste into some else's floppy disk drive without their permission, for example.

\(^2\) Alternatively, these goods are sometimes called *rivalrous*.

\(^3\) This does not mean there is no robbing and thievery. Robber bands may hide out in, say, Sherwood Forest, and make raids on the lord's territory. The presence of the lord's defense forces, however, by raising the costs of thieving, discourages the frequency and intensity of the activity. Citizens, consequently, may not be spared entirely, but are spared more so than if the lord's defense forces did not exist at all.
terrence. The lord’s might discourages predators, and this discouragement cannot be parcelled out very effectively to some in the territory and denied to others. Thus, the entire territory enjoys it. In this instance, we say that defense is a public good because it is nonexcludable (it is available to everyone if it is provided to anyone) and jointly supplied (one person’s enjoyment of this deterrence does not diminish its availability for enjoyment by others in the territory).

In between the ideal types of private and public goods are mixtures of the two. Some goods are jointly supplied, but excludable. A Madonna concert comes to mind in which a high wall, a limited number of entry points, and turnstiles serve to exclude those without tickets, even though, within limits, Madonna’s music is jointly supplied. Other goods are nonexcludable, but not jointly supplied. What is ideal about a Cape Cod beach in August is enjoyment of the sun and surf without feeling like you are crowded together with others like sardines. The ideal beach, then, shares with private goods the attribute of solitary (or at least limited) supply—beyond some level of density its enjoyment by an additional family diminishes its pleasure for other families. (This density threshold is often surpassed on Cape Cod in August!) But it does not possess the other private-good attribute of excludability. To the contrary, nonexcludability, at least as regards public beaches, means that on the hottest days of summer you are cheek-by-jowl with loads of others. All these distinctions are illustrated in Display 10.1 We shall focus mostly on the extreme cases of an ideal-type public good and an ideal-type private good.

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4 The limits have to do with the degree to which jointness of supply is compromised by crowding. If greater crowding, beyond some limit, actually affects the quality of the good, then we cannot claim that the good is jointly supplied. We shall pursue this prospect in the next illustration.

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**Display 10.1**

<table>
<thead>
<tr>
<th>Jointness of Supply</th>
<th>Excludability</th>
<th>Public and Private Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Madonna concert</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Public goods: defense, lighthouse services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Crowded Cape Cod beach</td>
</tr>
</tbody>
</table>

**PUBLIC GOODS AND POLITICS**

Politics rears its ugly head because, like cooperation (which is often undersupplied) and collective action (which is often underachieved), the provision of public goods is subject to socially destructive incentives. Because a public good is nonexcludable, it may be enjoyed without paying a price for it. But a producer will be loathe to provide a good if he cannot elicit payment for it. And even if there were some imperfect method by which a potential producer could extract a return from providing a public good, the amount supplied would likely be very much less than it would be if payment could be extracted directly. As a result, everyone is worse off.

Peasant farmers in a feudal world may well be willing to pay something for the lord’s protection (certainly as much as they would have to pay, in terms of time, energy, and lost opportunities, to guard against predators themselves); but if the lord has no way of eliciting this payment from beneficiaries of his protection, then he will be less disposed to provide it, or very much of it at least, in the first instance. It was something like this that supported the enforcement of feudal arrangements in many parts of the world; accordingly, peasant families were coerced into contributing hours of labor in the lord’s
fields, a younger son to the lord's army, and a proportion of their crops to the lord's granary in exchange for the lord's safekeeping. Because protection is a public good, its supply by means of ordinary market exchange is problematic, necessitating the substitution of politics—the enforcement of coercive feudal institutions—for economic exchange. Political institutions, like feudalism, arise to fill the economic vacuum.

Sometimes the political arrangement is at one remove. The classic example of lighthouses illustrates this. The services of a lighthouse constitute a quintessential public good. If a lighthouse is erected on high ground near a shipping hazard, the warning it emits is available to every ship that passes (nonexcludability) and its use by one ship does not deny it to others (jointness of supply). No ship will willingly pay for lighthouse services, since nonpayment cannot lead to a refusal of service to nonpayers—if the service is provided at all. But if a private individual or firm cannot be compensated sufficiently to earn a normal return, it will not be inclined to invest in the provision of lighthouse services. For this reason, lighthouses turn up in introductory economics texts as the classic instance of a public goods problem—in which a public good is undersupplied owing to socially perverse incentives.

In a superb piece of economic detective work, the Nobel laureate Ronald Coase revealed that generations of undergraduates had been misled by the lighthouse example. In England, at least, lighthouses were quite commonly provided along its western coastline by private entrepreneurs. But how could such entrepreneurs obtain a return on their investment? The ingenious answer Coase provided is that lighthouses typically were positioned near harbors, allowing ships to enter without crashing onto dangerous shoals. The lighthouse was primarily needed by precisely those ships coming into port.

Ships not intending to put ashore would typically travel somewhat farther out to sea, thus not especially requiring the services of a lighthouse. Consequently, there was a way to discriminate between most users and nonusers. Was there a method for converting this capacity to discriminate into a capacity to extract payment? If a monopolist controlled the waterfront of the harbor, then he could jointly price lighthouse services together with docking privileges in a manner that captured a return for the former. Lighthouse services, then, were part of a tie-in-sale; if a shipowner wanted to use wharf and warehousing facilities of the port, he would be required to pay for the lighthouse services he consumed as well.

The monopoly position of the entrepreneur is crucial here. If the lighthouse provider was but one of many owners of wharfs and warehouses, he could not charge extra because of competition for customers. Other wharf and warehouse owners could charge a price for their services lower than the tie-in sale price. So, in order for a lighthouse to be provided, an entrepreneur must enjoy the political protection of his monopoly position.

Consider one last illustration, this one of more contemporary vintage. In the 1970s the entire industrialized world was held at ransom by a cartel known as OPEC—the Organization of Petroleum Exporting Countries. This organization, led by the oil ministers of the member states, conspired to jack up the price of petroleum by restricting the amount that would be available for export. The logic according to which they operated was quite straightforward and well known. From the simple law of supply and demand, for a given level of world

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demand for oil, if the supply were restricted, then its price would rise. Suppose the competitive price for and quantity of a barrel of oil—the ones that would emerge from competition among oil producers in the absence of a cartel—are \( P_c \) and \( Q_c \), respectively, with total revenue, \( R_c = P_c \times Q_c \). If the cartel could successfully restrict quantity to \( Q_{\text{spec}} \), an amount less than \( Q_c \), then the price would rise to \( P_{\text{spec}} \) an amount higher than \( P_c \). The new total revenue is \( R_{\text{spec}} = P_{\text{spec}} \times Q_{\text{spec}} \). Under conditions prevailing in the 1970s, it was possible to find a \( Q_{\text{spec}} \) and its associated \( P_{\text{spec}} \) that produced a larger total revenue, i.e., \( R_{\text{spec}} > R_c \). Thus, if the oil producers could agree on a system of quantity-restricting production quotas—one for each exporter—that added up to \( Q_{\text{spec}} \) and could hang together by honoring these quotas, they would thereby reduce the amount of oil available on the world market and have a bigger revenue pie to slice up among themselves.

The higher price that prevails because of this restriction on oil supply is a public good for OPEC (and a public bad for everyone else). Let's see how this works. We said that a public good is, first of all, nonexcludable, and this is certainly true of a prevailing price. Every oil exporter gets the prevailing price. Second, a public good is jointly supplied, and this, too, is true of the prevailing price. One supplier selling its product at that price does not deny that same price for some other supplier.

The joint actions that sustain this price require each supplier to stick to its production quota (so that the total amount of oil for sale adds up to the optimal \( Q_{\text{spec}} \), thus generating the optimal revenue, \( R_{\text{spec}} \)). But providing this particular public good, like the provision of public goods generally, is problematic. Each supplier will be tempted to cheat on the cartel by producing more than its quota. If the little bit extra is sufficiently small so as not to affect the prevailing price, then a cheater can sell more than its quota at the cartel-supported higher price than it would if it honored the quota. But if each member of OPEC cheats on the cartel, then there will be more oil on the market, the price will decline, revenues will drop, and each member will have incentives to begin a further round of cheating. In the end, like so many instances of collective action that we have already examined, everything unravels and the cartel fails.

Indeed, this is what ultimately happened to OPEC. But it took quite a while for the cartel to break apart and, in the meantime, OPEC did very well while the rest of the world suffered immense economic hardship. Why did the cartel last as long as it did? The answer, like our answers to the provision of defense and lighthouses, is that a political understanding sustained OPEC's operation. In this case one petroleum exporter, Saudi Arabia, was dramatically larger than any of the other members of OPEC. Saudi Arabia vigilantly enforced the cartel agreement by using various carrots and sticks to induce compliance by its smaller cartel partners to previously set production quotas. Saudi Arabia (which was intent upon being the dominant state in the Arab world and, not uncoincidentally, also had the most to gain from cartel pricing, given its oil resources) took on the burdens of political leadership to hold the cartel together.\(^7\)

We thus see that public goods will go underproduced, if produced at all, because individuals have private incentives at odds with those required to support their production. Individuals have private incentives to enjoy the benefits of defense and lighthouses without paying for them. Potential producers appreciate this prospect and, consequently, are discouraged from producing them unless they can find some means by which to elicit contributions. Potential cartel partners often forego cartel formation because they can anticipate that their various partners will cheat on the cartel, in effect seeking to

\(^7\) A sophisticated strategic analysis of OPEC, with Saudi Arabia conceived of as a dominant member seeking to preserve its reputation, is found in James E. Alt, Randall Calvert, and Brian Humes, "Reputation and Hegemonic Stability," American Political Science Review 82 (1988): 445–466.
enjoy cartel benefits without paying for them. Again, the public good—in this case a higher price for cartel products—will be produced only if members can assure one another that the behavior required to sustain the higher price will be forthcoming. In all these cases the solution, like the solution to the problems of cooperation and collective action reviewed in the two preceding chapters, is political. Perhaps the most common solution of all—the quintessential political solution—is the public supply of public goods. This solution requires a section all its own.

**PUBLIC SUPPLY**

We have argued that the provision of public goods is poorly handled by ordinary market means. They are undersupplied relative to the levels that the members of society would prefer. Absent some sort of political intervention, there is, as we have just seen, too little protection from predators and too few lighthouses. Politically enforced feudal arrangements and monopoly rights in ports, respectively, are solutions to these problems (though not perfect solutions). An alternative is to turn to the state for public goods provision. Let the government build lighthouses and raise armies.

In many parts of the world, lighthouses, the protective services of the police and army, judicial services, public utilities like water, sewage, and power, and provision for public health, roads, and other infrastructure are commonly provided by government. Telephone and television are also often provided publicly in many countries. The argument is that, because they are public goods (or at least “public-like”), private market actors will not provide them (at least not in sufficient quantities) because they cannot be assured of adequate compensation. The state, on the other hand, may use its authority to require payment, either out of general revenue raised by taxation or from user charges of various sorts.8

However, there is a paradox associated with the public provision of public goods. Public provision does not just happen. Political pressure must be mobilized to encourage the institutions of government to make this provision a matter of public policy. Bills must be passed, appropriations enacted, and government agencies created. In short, political actors must be persuaded to act. But, if the provision of a public good distributes some benefit widely, and if the enjoyment of that benefit is unrelated to whether a contribution has been made toward mobilizing politicians to act, then we may reasonably ask: Why would any individual or interest group lobby the government for public goods? Why wouldn’t they, instead, freeride on the efforts of others, thereby freeing up their own resources either to lobby for some other private benefits or to deploy in the private sector for private gain? That is, if many public services are like public goods, then their supply depends upon individuals and groups successfully engaging in collective action to get the government to provide them. Since magic wands are not available, the “public supply” solution to the provision of public goods becomes a problem in collective action.

The reader may wish, at this point, to return to Chapter 9 to review various conventional solutions. There is, however, a less conventional answer. First, we must distinguish between

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8 The reader should notice that public goods, as we have defined them, and publicly provided goods may not be the same. The latter may be public goods, like lighthouses and national defense; but the state provides lots of other goodies—like mail delivery, for example—that are sufficiently like other private goods that they undoubtedly could be provided reasonably well in the marketplace. (Indeed, courier services, overnight mail delivery, and package delivery are provided privately in direct competition with the U.S. Postal Service.) Publicly provided goods and services—the activities in which governments engage—reflect the political advantages possessed by interests in the political process that are sufficient to induce the public sector to do their bidding. Surely some of these things are public goods, but not all of them.
the consumption of a public good and its production. When designating a good as public or private, we are really talking about consumption properties—whether you can exclude others from consuming the good or not and whether consumption diminishes the availability of the good. We have not remarked at all about production. In fact, in nearly every instance public goods are produced with substantial private input.

When the U.S. Government began constructing a massive federal highway system in 1956, it was not intended for the government to get into the concrete business, the paint business, the sign- or guardrail-making business, or even the highway construction business. The government would use its taxing and borrowing powers to raise money, on the one hand, and its substantive political authority to make choices about highway routes and road attributes, on the other. But it would then request proposals for building highways from private contractors subject to these specifications. Successful contractors—actors from the market economy—would then make the concrete, pour it according to design, paint the yellow lines in the middle, assemble guardrails, signage, and overpasses, and so on.

The highway system, surely public in consumption, is in fact mostly private in production. Various aspects of the production process can be divvied up among contractors. The contract to provide concrete, for example, is excludable (the winning contractor gets the contract and can bar losing bidders from sharing in the associated profit) and is solitarily supplied (giving the contract to A eliminates its availability to B, C, D, . . . ). According to the criteria in Display 10.1, highway construction fits squarely in the private-good category.

So, who do you suppose lobbies for a highway system? On the consumption side, as we have seen, there are collective action problems. By conventional means they may be overcome to some extent. Thus, the American Automobile Association and the American Truckers Association, representing different segments of the consuming public, undoubtedly brought their political muscle to bear on legislators and executive branch officials in behalf of a highway program. Similarly, there are likely to have been political entrepreneurs taking up the cause—for example, legislators representing districts containing large transshipment centers (Chicago, Denver) and automobile and truck manufacturing facilities (Detroit, St. Louis, Akron, Toledo). But surely those most likely to gain directly and immediately (and less likely to have been as plagued by collective action problems as groups on the consumption side) are those that would actually produce the public good. Concrete producers, highway contractors, makers of heavy equipment, manufacturers of guardrails and steel supports for overpasses, owners of rights-of-way, and many others all stood to make enormous sums of money from this multibillion-dollar project. In short, the politics of public supply is as much about the production of public goods as it is about their consumption.

The lesson here is that the politics of public supply cannot be adequately understood as a collective action phenomenon among those wishing to consume public goods. Consumers of public goods like good highways, clean air, lighthouses, and security from national defense, certainly play a role in providing political pressure. They are, however, limited by the collective-action obstacles with which the reader is now familiar. In fact, their interests often never materialize into group action; they remain latent. On the other hand, for every reference to consumers of national defense, to take one of the most important public goods, there are thousands of references to the “military-industrial complex,” those who profit directly from the production of national defense. They are Olson's

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9 This distinction is made persuasively by Peter Aranson and Peter Ordeshook, “Public Interest, Private Interest, and the Democratic Polity,” in Roger Benjamin and Stephen Elkin, eds., The Democratic State (Lawrence, Kans.: University of Kansas Press, 1985).
“privileged groups” who have the ability to surmount their own collective action problems and the incentive to do so (profits). They are found in the committee rooms and hallways of the Capitol, testifying, lobbying, and spreading campaign dollars around to any legislator who will take up their cause. In trying to understand the public supply of public goods, then, the astute observer will look to the supply side as well as the demand side of the “market.”

Before concluding this discussion let us note several complaints lodged against public supply. The major concern with public supply as a solution to the problem of providing public goods is that public sector actors may not have “good” incentives. In this version of the “who will guard the guardians” problem, the question is not whether government is capable of supplying public goods, but rather is how well it does the job.

A classic instance of this involves the production of scientific knowledge. Many kinds of knowledge constitute public goods to the extent that they cannot be patented or copyrighted. Once it is known, for example, that $e = mc^2$, individuals cannot be excluded from this knowledge, on the one hand, and one person knowing it does not diminish its availability, on the other. Scientific knowledge belongs in the public goods cell of Display 10.1.

The production of scientific knowledge is undertaken very substantially by the private sector—in places like California’s Silicon Valley, Boston’s Route 128, and North Carolina’s Research Triangle. But this kind of research tends to be very applied, tied to specific product development, conducted secretly, and often patentable (thereby preventing those who do not “own” it from making use of it). Thus, applied scientific research, to the degree that property rights may be assigned to its products, is essentially a private good. However, basic or fundamental research—research that often does not have immediate application—is not patentable and thus cannot be owned; it therefore tends to be underproduced by the private sector for all the public-goods reasons mentioned earlier.

Consequently, the U.S. government, through various agencies like the National Science Foundation, the National Institutes of Health, the National Aeronautics and Space Administration, the Department of Energy, and the Department of Defense, sponsor basic scientific research—a clear instance of the public provision of a public good. Some of this research is actually done in government laboratories. But much is contracted out to university scientists. Consider now the incentives facing, first, the legislators who provide the financial resources for, and oversee the execution of, this public good and, second, the bureaucrats that actually administer the programs.

As it happens, the universities that are best positioned to compete for basic research grants are not randomly distributed throughout the territorial United States. While many locations have the capability, there are discernible concentrations of excellence: the Bay Area, Los Angeles, and Seattle on the west coast; Chicago and Minneapolis in mid-America; Chapel Hill–Durham–Raleigh, Miami, and Atlanta in the south; and Washington, New York, and Boston on the east coast—to name some of the most prominent. If the National Science Foundation (NSF), for example, were to support research proposals strictly on the basis of merit, a disproportionate amount of its budget would be spent in these pockets of excellence. Institutions in a great majority of the legislative districts of the nation would do rather poorly in the competition. And this, in turn, would not kindly dispose their representatives toward NSF. In short, while legislators may generally approve of producing public goods like scientific knowledge, they are much more focused on getting federal dollars for citizens and institutions in their districts. A government agency that flouted this concern of large numbers of

10 If instead we were discussing the production of art and culture as financed by grants from the National Endowment of the Arts, merit-based concentration would be even more extreme with New York and Los Angeles securing the lion’s share of support.
legislators would undoubtedly not fare well in the annual appropriations process.

The administrators at NSF are not stupid. They can forecast the profound budgetary problems their agency would encounter if it did not attend to the conditions of representative government. So, they arrange for alternatives to merit-based allocation mechanisms. Instead of earmarking their entire budget for basic research—which would end up being spent chiefly in a small number of pockets of research excellence—they invent new categories and new programs in which less well-endowed parts of the country are competitive. Research in science education (as opposed to pure science), for example, may be quite competently conducted in many places around the country, places that do not require advanced research laboratories and cutting-edge scientists.

Constituency-oriented legislators and survival-oriented bureaucrats and administrators, not philosopher kings, support, finance and administer public programs that produce public goods. Their incentives dispose them to move away from what would be optimal if only the most effective production of public goods were motivating them. Public provision, then, is watered down by these competing, indeed distracting, objectives. Thus, while public provision may seem the best way to go in correcting for the underproduction of public goods, it is not without its shortcomings.

A second incentive distortion associated with public provision involves time horizons. Many scientific projects are years in the making. The initial phases are often relatively inexpensive and invisible, as ideas are examined, developed, and tested in small ways. Only after these initial hurdles are cleared are greater sums spent on large-scale testing and development. It is the latter, however, that involve new laboratory facilities, expensive high-tech equipment, or advanced testing sites—the sorts of things to which the local legislator can point with pride (and snap the ribbon at the dedication ceremony heavily covered by the local media). The political pressures associated with public provision, as a result, involve truncating the longer incubation and percolation process ideally associated with scientific research into a much shorter time horizon.11

To sum up, the production of public goods is a problem for communities because of the very nature of these products. Private incentives are typically insufficient to encourage their production voluntarily. Some sort of political fix is required, examples of which include grants of monopoly privilege, waivers of antitrust laws, public subsidy of private production, and outright public provision. None of these is ideal because each entails the grant of extraordinary privilege or authority to some individual—the lord of the manor, the firm granted a monopoly, a public-sector bureaucrat—whose incentives may not be aligned properly to the social objectives being sought. The lord of the manor wants prestige and glory, not public defense; the firm wants profits, not a national highway system; the bureaucrat wants turf and budget authority, not scientific discoveries. The public good is the incidental by-product of, not the motivation for, their behavior.

It is, therefore, not surprising that different communities at different times experiment with alternative (imperfect) solutions. In the past few years, for example, we have witnessed a tidal wave of change in which public sectors that formerly provided public goods directly are abandoning these activities. Under the rubric of privatization, both developing political economies and already developed ones are selling off state-owned assets to the private sector, hoping that, imperfect as they may be, private-sector incentives will be better aligned to social objectives than under the former arrangement of direct public provision. This may also entail technological enhance-

ments that mitigate some of the "publicness" of the good. We also observe the related phenomenon of deregulation in which heavy-handed bureaucratic oversight, command, and control are being relaxed or relinquished altogether. The imperfection of any solution to the production of public goods stimulates this experimentation; but politico-economic change of this magnitude is, as we have emphasized, political through and through, with winners and losers determined at the end of the day in political arenas.

CASE 10.1
PUBLIC GOODS, PROPERTY RIGHTS AND
THE RADIO SPECTRUM

An interesting example of a public good is the radio spectrum. As a public good, the radio spectrum is nonexcludable and jointly supplied. In other words, anyone is physically able to broadcast on the radio spectrum, and my broadcast doesn’t prevent you from broadcasting. The problem is that my broadcast interferes with your broadcast if both are simultaneous and on the same (or a closely neighboring) frequency. To make radio transmission coherent, there must be some means to allocate the radio spectrum.

Frequencies on the radio spectrum in the United States are allocated by the Federal Communications Commission (FCC). Different frequency bands have different uses, including television, radio, cellular telephones, and radar. Individuals and organizations are given exclusive rights to particular frequencies. Broadcasting on a frequency for which you do not have rights is illegal. (The movie Pump Up the Volume depicts one such pirate station.) By allocating property rights to the radio spectrum, the public good is made excludable and the crowding that might otherwise result from joint supply is prevented.

The example of the radio spectrum demonstrates that there are numerous approaches to allocating property rights. Historically, the FCC has distributed licenses at no charge, either through application or lottery. The Clinton Administration, seeing an opportunity to bring some revenue into the federal coffers, has explored the possibility of auctioning radio licenses for new personal communications technologies.* At one point the administration predicted revenues of $4.4 billion over four years. The new plan is controversial and sometimes highly technical. But what is common to all of the arguments is their fundamental political nature. Who will benefit from the plan? Who will be hurt? Is the plan fair? What are the values that determine how we manage our public resources? Although discussions of topics like auctions, revenue sources, and externalities often appear purely economic and technical in their nature, it is important to remain conscious of the political issues that lie beneath the surface.


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12 For example, electronic lighthouses emit an electronic signal, rather than a light, which is received only by those ships that purchase the special signal detector. Cable television, likewise, requires a cable box and hookup that permits exclusion (thereby privatizing a public good). A public water supply may be metered at each household, thereby permitting user charges; so, too, may a firm’s effluent (via sewer or smokestack), thus allowing for the pricing of its use of the environment as a dumping site.
EXTERNALITIES

An externality is a special kind of public good. It is typically the unintended by-product of voluntary activity that is imposed on others. Thus, an externality is jointly supplied and, because it cannot be easily avoided, nonexcludable (although here we might more accurately say it is unavoidable). Some externalities are valued—the scent and appearance of the roses planted in a neighbor's garden; the freedom from infection others obtain when we inoculate our children against communicable diseases; the protection provided to both partners when one uses a condom in sex—so we call them positive externalities. In each case someone else benefits, perhaps un-intendedly, from an individual's action. Other externalities are loathed—the effects from the burning of high-sulphur coal in a manufacturer's boiler; litter in public parks; the loud music of boom boxes in Harvard Square—thus we call them negative externalities. Since externalities are special instances of public goods ("bads"), we may deduce that the positive ones are undersupplied, and the negative ones oversupplied, relative to what would be optimal for the community as a whole. Neither the neighbor planting her roses nor the factory burning coal takes our preferences into account. If, as we are often advised, we "stop to smell the roses," we discover that there are too few roses and too many other things to smell.

The phenomenon of externalities is nicely illustrated by an experiment the authors regularly run in an undergraduate class at Harvard University. An even number of students is selected, half of whom are designated as "buyers" and half as "sellers" in a make-believe market. Each buyer is given a schedule informing him how much the experimenter will pay him at the end of the session for each unit of the product purchased during the experiment. For example, the experimenter may pay 30 points for the first unit, 28 points for the second unit, 25 for the third, and so on. A buyer, then, makes a profit if his first purchase in the market is for less that 30 points, the second purchase is for less than 28 points, the third for less than 25, and so on. Each buyer wants to earn as many points (as much profit) as possible, since these points will be added to the score of his midterm examination. Similarly, each seller is given a schedule informing her of the cost of producing each unit. For example, the first unit may cost 12 points, the second 15 points, and so on. A seller makes a profit if she sells each unit for more than its cost (the first unit for more than 12 points, the second for more than 15, and so on). She, too, wants to earn as many points as possible—for the same reason.

The buyers and sellers sit across a table from one another. When the market opens, bargaining begins with buyers shouting out "bics" and sellers shouting out "asks" in what is known as a double oral auction. When a buyer and seller come to an agreement on a price $p$, the sale of a unit is registered. If the buyer with the schedule given in the preceding paragraph is buying his first unit, then his profit is $30 - p$; if the seller is selling her second unit (having already sold one earlier), then her profit is $p - 15$. (If $p$ lies between 15 and 30, then both make a profit.) The market remains open until no one can agree on a price for consuming any further sales. Since the experimenters have fixed the schedules so that the "ceiling" on acceptable prices for a buyer gets lower and lower with each purchase, and the "floor" on acceptable prices for a seller gets higher and higher with each sale, there will always come a time when it is no longer possible for a buyer and seller both to make a profit. The market closes at this point.


14 The seller's floor ultimately becomes higher than the buyer's ceiling.
As described, this experimental market is a model of the trucking, bargaining, and haggling that goes on in a bazaar or city market. It is well understood according to the law of supply and demand, and experimental results validate this law quite impressively. But we are not interested in that, since our experimental market setting has a twist. Every time a sale is consumated, everyone in the market, both the buyer and seller participating in the particular sale as well as all those buyers and sellers not participating, is charged 1 point each. In effect, the consummation of a sale generates a negative externality, harming participant and nonparticipant alike. The particular buyer and seller can take this “damage” on themselves into account. Factoring in the externality, the buyer in the previous paragraph will figure his profit at 30 \(- p - 1\) (so that \(p\) will have to be less than 29, or “no sale”), while the seller will figure her profit at \(p - 15 - 1\) (so that \(p\) will have to be greater than 16). The effect of the externality is to narrow the bargaining range for this buyer-seller pair. But neither buyer nor seller has an incentive to take into account the impact of the externality on others.

And they don’t. Even though the experimenters provide each participant with a table informing them of the impact on the entire market of each sale they consumate (1 point of “damage” on every buyer and seller per unit sold), our subjects never take this information on board. The only things they care about are their profit thresholds (ceiling and floor for buyer and seller, respectively), the negotiated price \(p\), and the impact of the externality on each of them. Each participant is intent on maxing out on points, thereby raising his or her midterm examination grade (and, presumably, increasing the chances of getting into law school). Nevertheless, on other occasions these very same students are heard denouncing pollutants of the atmosphere, destroyers of the ozone layer, litterbugs, and producers of second-hand smoke!

Public policy economists, at least since Adam Smith, have worried quite a lot about how externalities, both positive and negative, might be taken into account by those who produce them. We cannot review all these solutions here, but will mention a few in passing. Probably the most popular and widely used solutions are taxes and subsidies, the former to discourage negative externalities and the latter to encourage positive externalities. In the experiment above, suppose the experimenter informed the market participants that there would be a sales tax, \(t\), charged against the seller each time a sale was consummated. The seller two paragraphs back would now earn a profit of \(p - 15 - 1 - t\), effectively raising the minimum price she must now secure to show a positive profit.\(^\text{16}\) From Econ 101 it is well known that the effect of raising a price is that fewer sales will be consumated (at higher prices), and hence fewer externalities generated. We don’t want to eliminate sales altogether (unless the externality were so horrid as to overwhelm the benefits from having this market in the first place). But there is an “optimal” tax, one that internalizes the full effect of externalities. The tax, in this case, implicitly forces the buyers and sellers in a market to take account of the external consequences of their actions, something they were not willing to do unless coerced in this manner.

The argument is exactly analogous when positive externalities are involved. In place of a tax, a subsidy is given to one or the other of the market participants in order to encourage more sales (and more externalities) than would otherwise transpire.

Experimentally, taxes and subsidies work as this theoret-

\(^\text{15}\) With no externality, the bargaining range for \(p\) is 15 to 30. With the externality, this range becomes 16 to 29.

\(^\text{16}\) The reader should not think that we are being unfair here in placing the tax only on the seller, since some of it will be passed on to the buyer in negotiating a final purchase price.
ternaly effects are known with quantitative precision, as in our experimental world. In the real world, however, matters are not so straightforward, since we rarely know everything we need to know (that is, the things provided by the experimental design). The consequence is that tax or subsidy rates are often little better than educated guesses. They may improve the situation, but they may also make matters worse.\footnote{Although we will not trouble the reader with details, in the running example from the experiment, a tax of 10 points per sale will still permit some sales to be consummated, though a smaller number than in the absence of the tax. If we had not been sure about the damage done by externalities, and (incorrectly) guessed that instead of 1 unit per person the damage was 2 units per person, the tax (now 20 units per sale) would have completely shut the market down. No sales would have occurred. Thus, mistaken guesses about the right tax or subsidy rate may make matters worse than no tax or subsidy at all.}

The second, more serious drawback to the tax-or-subsidy solution to externality problems involves the matter of exactly what activities should be taxed or subsidized. If one were to survey the activities that are taxed or subsidized in any place at almost any time, it would be impossible to claim that control of externalities had much bearing on these policies. Surely some goods are taxed or subsidized to deter negative or encourage positive externalities, and we have given examples of these in the preceding discussion. But so many goods are taxed or subsidized because political machinery for taxing and subsidizing exists in the first place, and comes under the influence of those who benefit from its policies, quite independent of any consideration of externalities. On the other side of the coin, so many other goods are not taxed or subsidized, even though a control-of-externalities case could be made, for much the same reason—political influence. “Optimal” taxes and other ideas from welfare economics theory, even if they might work in principle, get steamrolled in the rough and tumble of politics.

A classic instance is found in America’s experience with air pollution. In the 1970s much pollution was created by station-
ary sources, like power plants, burning high-sulphur coal. When coal with high sulphur content is burned, sulphur compounds spewing out of smokestacks combine with water in the atmosphere to produce “acid rain,” which damages crops, forests, wildlife habitats, and fresh water sources, not to mention human lungs. Much of this dirty coal was (and still is) mined in Pennsylvania, Kentucky, and West Virginia. A clean alternative exists in low-sulphur coal, mined in the western United States. This was a clear circumstance for the imposition of a tax. If coal were taxed in proportion to its sulphur content, then stationary source would find it in their interest to switch at last some of their energy demand from eastern to western coal: the higher the tax rate, the more the substitution of clean for dirty coal.

Enter politics. The West Virginia coal industry had during this period a very powerful protector—West Virginia senator and the majority leader of the U.S. Senate, Robert Byrd. The Senate is an institution in which well-positioned individuals (especially committee and subcommittee chairs and party leaders) can exercise significant veto power. It is relatively difficult to get a bill through the Senate, but it is considerably easier to prevent a bill from passing. And this Byrd did. Despite a powerful environmental lobby, and a Democratic administration sympathetic to its preferences, Byrd managed to thwart sulphur-content taxes by acceding to a much milder policy of requiring the installation of pollution scrubbers on smokestacks.\(^{19}\)

There are countless stories of this sort in which a powerful politician uses his or her position to block either the imposition of taxes on key supporters or the reduction of their subsidies. Only under the direst of fiscal circumstances (like the large federal deficits in the United States during the late 1980s),

when the insatiable revenue requirements of government cause it to raise taxes and scale back subsidies wherever it can, is this protection insufficient. Tax-or-subsidy solutions to externality problems are only occasionally effective, because politics constrains their proficiency when the shoe pinches the wrong toes.

Two other categories of solution to externality problems merit brief consideration. We have just seen that Senator Byrd was able to substitute what would have been an onerous tax on his dirty-coal constituency with a more tolerable regulatory regime. Regulation is a more hands-on approach to the control of externalities. It typically entails the creation of a governmental bureaucracy—an agency, bureau, or commission—charged with setting standards, prices, fees, or practices in consumption or production activities that generate externalities. Statutory authority usually spells out the purposes to which this bureaucratic control should be put and the discretion the bureaucratic entity has in pursuing those purposes. Through administrative procedures, or the civil and criminal court system, the agency has an ability to enforce its commands. Thus, an agency like the Environmental Protection Agency, with authority granted to it by a law like the Clean Air Act, can specify the kind of smokestack scrubber required of a stationary-source polluter.

Alternatively, externalities can be controlled by a respecification of property rights. Part of the quandary underlying externality problems is poorly specified rights of ownership and use. Since nobody “owns” the air, anyone can use it as a repository for dumping things (like sulphur-based particulates). To take an example a little closer to home, since no one owns or has responsibility for the common room in the dormitory, it is forever a mess. In some situations, however, it is conceivable that one could respecify property rights so that damage done by externalities can be held in check. We pursue this alternative in more detail in the next section, where we discuss

\(^{19}\) The entire story is told in Bruce Ackerman and William Hassler, Clean Air/Dirty Coal (New Haven, Conn.: Yale University Press, 1981).
“commons problems.” Here, however, we report on an interesting property-rights solution to air pollution.

Partially in reaction to the poor performance of other methods for controlling externalities, some economists have suggested that there may be a way to allow the atmosphere to be “owned.” By “owned” it is meant that someone has the right to use the atmosphere as he or she sees fit, on the one hand, and may sell or trade that right instead of using it if that is preferred. This is accomplished by distributing marketable pollution permits, each one entitling the holder to pollute the atmosphere in some standardized quantity. A factory in Los Angeles, for example, might hold a 10-dirt permit (“dirt” being a fictitious unit of pollution). If its production process generated only 5 dirts of pollution, then it could sell the remaining 5 dirts on its permit to some other user for cash, for the promise of an 8-dirt permit five years from now, or for something else of value. A government agency, like the Environmental Protection Agency, would set the overall quantity of permits available at any one time, after which a market in permits would arise.

Pollution is costly to its producer, because he or she must now devote dirts to it that have alternative uses (like selling or trading them). The Los Angeles factory may now determine whether it is worth its while to retrofit its production process so that less pollution is generated; if the cost of retrofitting is more than covered by the sale of the pollution permits it currently owns or would otherwise have to purchase in the market, this move makes sense. The result, then, of this market for pollution permits is that polluters now have incentives to reduce their pollution and that pollution rights will flow to those that value them the most. These latter polluters are those for whom it is cheaper to buy pollution permits than it is to reduce their emissions.

The key, of course, and the place where politics is central, is the determination of the aggregate amount of pollution to be permitted, on the one hand, and the initial distribution of pollution permits, on the other. The first is a straightforward political judgment call of the sort that our political institutions are charged with making all the time. The second is political dynamite, since so much is at stake. But as long as the market works smoothly once an initial distribution is made, the permits ultimately will flow to their highest valued uses. Even the judgment call on the aggregate amount of pollution to permit in the first place has a certain self-correcting quality to it. If Friends of the Earth or the Audubon Society feel the political authorities have set the aggregate pollution level too high for, say, the Los Angeles metropolitan area, then these environmental groups can jump into the dirt market there and buy up pollution permits. These they can either permanently retire or resell in some other area of the country with an ambient air quality that can absorb additional emissions.

We sum up this section on externalities by noting that none of the solutions we have reviewed—taxes and subsidies, regulatory regimes, redefined property rights—are without problems. In each case there are practical or logistical complications that must be overcome. Even putting these difficulties to one side, however, there is always the problem of politics. Once the machinery to tax and subsidize, to regulate, or to redefine ownership is put in place, it may be used or abused. It is absolutely essential to be aware that the problem of externalities is transformed into a problem of providing appropriate incentives to those in charge of the externality-control apparatus. It is the same “who will guard the guardians” problem that we have encountered elsewhere in this volume, a problem we shall examine very closely in our treatment of institutions in Part IV.
Sitting just outside the office in which these words are being written is the Cambridge Common, a lovely urban public place most famous for the fact that it was there that General George Washington mustered the 1200 volunteers of what became the Continental Army in 1776. Publicly owned parks and land reserves are today the object of great passion by those who place significant value on "green space." In an earlier time in Europe (and still today in various parts of the world), commons were valued for more practical reasons—notably as places to graze cattle and to forage. Today, examples of commons include not only green space and sites for grazing and foraging, but also bodies of water utilized for commercial fishing, irrigation systems, urban water supplies, and, indeed, even the earth's atmosphere.

A commons is, by definition, owned by everyone (in common), and therefore is the responsibility of no one. Consider a field owned by a village and used by its residents' herds as a grazing commons. Each villager gets to graze his or her cattle "for free." If a villager is contemplating adding a head to his herd, he will take into account the costs of doing so, but this calculation will not include the cost of grazing. If the commons is large, and the village demands on it minimal, this will not pose serious problems. But even if demands on the commons grow, no villager has an incentive to restrict his use of this "free" resource, resulting in what Garrett Hardin called "the tragedy of the commons." The commons will be overgrazed and ultimately destroyed, inasmuch as its capacity to regenerate itself will have been disabled.

Overgrazing the commons is a metaphor for a host of problems, large and small, in which lack of restraint in using the commons leads to social catastrophe:

- The portion of the North Atlantic off the coast of New England is a common habitat for lobsters. Overgrazing in this instance takes the form of too many lobstermen harvesting too many lobsters (especially small lobsters that haven't reproduced).
- The acquifer under Cape Cod is a commons constituting the source of fresh water for that beautiful strip of land. Overgrazing this commons occurs because of residential and commercial development. With more people on the Cape, pollutants seep into the acquifer affecting its purity. Perhaps more profoundly, with more people drawing more fresh water from the acquifer, salt water penetration from Massachusetts Bay and the Atlantic Ocean intensifies. Ultimately, rain- and spring-fed renewal will be insufficient and the acquifer will be destroyed.
- The earth's atmosphere is a commons into which pollutants are dumped. It is replenished by oxygen created as a by-product of photosynthesis. The destruction of vast forests for development simultaneously increases the production of pollution and reduces the atmosphere's capacity to replenish itself.

The problem of the commons, like the problems associated with cooperation, the production of public goods, and the con-
control of externalities, is a problem of private and social incentives in conflict. A commons is a free lunch to its common owners. Indeed, each possessor of rights to the commons has a very strong incentive to use those rights. Let us return to the village with a common grazing field. A hundred villagers are each grazing two cows on the commons, a number which the commons can support and still regenerate itself. Each villager considers adding one cow to his herd, concluding that this would be profitable, especially in light of the free grazing privileges. If any one villager were to proceed, the commons would be damaged only marginally, indeed hardly at all since the herd size will only have increased from 200 to 201. But if all the villagers proceed, there will be a 50 percent increase in grazing, an amount exceeding the carrying capacity of the commons. So, if everyone proceeds each will be worse off since they will have destroyed their field. But if any one villager proceeds, he will be better off and all the others will hardly be affected at all. Thus individual incentives and social necessity clash. Indeed, overgrazing the commons is, in many respects, the large-number analog of the Prisoners’ Dilemma and Hume’s marsh-draining game that we discussed in Chapter 8.

As the reader is now undoubtedly aware, preservation of the commons is a public good. We will not rehearse again all of the standard methods for its provision, leaving this to the reader as the proverbial homework assignment. We will, however, comment briefly on two aspects of this knotty problem.

First, it is well known that commons problems arise because of imperfectly specified property rights. If a single individual rather than an entire community owned the commons, or if she and her fellow villagers each owned well-defined plots within the common, then she would have all the incentives associated with ownership of a private good to preserve the value of this asset. An individual would no sooner overgraze her commons, or overharvest her forest, or overfish her pond, as she would abuse any other physical asset she owned. The enclosure movement in England in an earlier era, and contemporary experiments with marketable permits in rights to pollute, are instances of redefining property rights, reallocating ownership from the community to specific individuals.

Second, as we have emphasized throughout this chapter, political arrangements affect both the solutions selected to deal with commons problems and the likelihood of success. In her pathbreaking study of common pool problems, Governing the Commons, Elinor Ostrom makes very clear that human-kind has been incredibly inventive over millennia in coping with—and, indeed, sometimes avoiding—the tragedy of the commons. These coping strategies are much like the constitutions (both written and informal) by which communities govern themselves. They involve mechanisms by which collective decisions about the use of the commons are made, monitored, enforced, and changed in an orderly manner. Ostrom provides instances of both successful and unsuccessful “commons constitutions,” emphasizing that the successful ones are those with design features possessing:

- clearly defined boundaries;
- congruence between rules for using the commons and local needs and conditions;
- individual rights to formulate and revise the rules for operating the commons;
- monitoring arrangements in which the monitors are ultimately responsible to the community;
- graduated punishments for violation of rules;
- low-cost arenas for resolving disputes; and
- relative freedom of users of the commons from external governmental authorities.

Ostrom, Governing the commons, pp. 88-102.
In short, Ostrom has found that the management of a commons is a political problem. If rights over this commons cannot be parceled up into private bundles—the property-rights solution—then, in order to encourage the cooperation required to preserve the commons and to discourage the practice of overutilization, the group of users must enter into a political agreement—a form of self-enforcing self-restraint.

**CASE 10.2**

**FISHING AND THE TRAGEDY OF THE COMMONS**

Fishing provides an excellent subject for inquiring into the tragedy of the commons. As we have seen, the tragedy of the commons is a problem when individuals share a common, depletable resource. In their efforts to maximize their individual gains, users often overuse the resource to the detriment of all. Oceans, lakes, and rivers have largely been viewed as a commons by fishermen. The result is overuse: two-thirds of all assessed fish stocks are either overexploited or fully-to-heavily exploited, according to the United Nations Food and Agricultural Association.*

Governments have responded to the problem with a variety of approaches. Their responses provide evidence for Ostrom’s theory that a commons can be managed through the allocation of property rights or the evolution of self-enforcing restraints. Several nations, including Iceland and New Zealand, have addressed the problem of overfishing by allocating property rights. Their system of individual transferable quotas (ITQs) divides up the catch within national waters among commercial fishermen. Quota owners can either keep or sell their fishing rights. The government sets the total quota to maintain and conserve the resource over time.

There is considerable debate over the use of ITQs. Many organizations and governmental authorities are seeking alternative mechanisms. In New England, the government, the fishermen, and the fisheries have been working to address the sharp decline in fish catches between 1982 and 1989.† The importance of politics is apparent in the case of New England fishing. Government programs and interest group politics accelerated the overutilization of the commons. In 1977, the U.S. banned foreign trawlers from fishing within 200 miles of the U.S. coastline, partly to prevent overfishing of New England waters. But a federal loan program at the end of the 1970s and the beginning of the 1980s led to a boom in domestic boat construction. Fishermen organized to lobby against catch quotas and fishing limits. In 1982 the New England Fishery Management Council gave in to the pressure from fishermen and dropped the quotas and limits. The result was a rapid increase in overuse, and fish catches declined by over a third in four years. The decline led many fishermen to see the connection between their individual behavior and their collective fate. The vice president of the Atlantic Offshore Fish Association in Newport, Rhode Island, remarked, “I used to be strongly opposed to any kind of limited entry in fisheries. But I’ve come to feel we have to have some way of rationally allocating fishery resources just as we do other resources.”

What happens when fishery resources can’t be “rationally allocated”? In other words, what happens when the resource is not conducive to assignment of property rights? Ostrom predicts that users will enter into a political agreement involving self-enforcing self-restraint. We find support for this prediction in the case of “straddling stocks,” fish

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that migrate between national and international waters. Straddling stocks account for about one-fifth of the fish caught around the world each year. Their migration between national and international waters prevents countries from declaring ownership of the stocks and assigning property rights through fishing quotas. Countries have been forced to work cooperatively on the problem. The United Nations has been used as a forum for creating agreement and addressing issues of monitoring and enforcement, just as Ostrom’s theory would predict.

The importance of enforcement can be seen in a “natural experiment” created by the fall of the Soviet Union.** Ninety percent of the world’s sturgeon stocks are in the Caspian Sea, which is bordered by Iran and the former Soviet Union. For decades, the harvest of caviar from spawning sturgeon was tightly regulated by the Soviet Government. Quotas for the annual sturgeon catch were established by the Ministry of Fisheries in Moscow and enforced by armed inspectors who kept the lid on poachers and illegal dealers. In 1992, the birth of four new independent states and two new autonomous regions along the spawning grounds of the sturgeons, together with the breakdown of the chain of command out of the Kremlin, led to a marked decline in the enforcement of these quotas. The result was a rapid increase in sturgeon fishing. The director of the Fisheries Research Institute in Astrakhan, at the mouth of the Volga River, said, “Central authority has disappeared. People are living by the law today: Catch whatever you can and don’t care about tomorrow. If things are allowed to go on like this, within three to five years sturgeon stocks will be completely depleted.”

The importance of reaching an agreement on how to use the sturgeon resource was emphasized by Moscow’s chief fisheries inspector, “Either we agree on rules for catching sturgeon or we simply destroy the fish altogether. If we can


reach agreement with the United States on limiting production of nuclear missiles, surely we can reach an agreement with other [former Soviet] republics on catching sturgeon.” The reader may want to ruminate on this last remark. Knowing what you now know about cooperation, collective action, and problems of commons, is it really as easy to cut a deal on sturgeon among various new states and autonomous regions as it is for two superpowers to sign a bilateral agreement?

### CONCLUSION

The problems we have confronted in this chapter are, in many respects, those we met in the previous two chapters. Too little cooperation, too little collective action, too few public goods, too many negative and too few positive externalities, and too much use of common resources are all social dilemmas in which individual incentives are in conflict with socially desirable outcomes. These are summarized in Display 10.2

The problem of cooperation, as exemplified by the marsh-draining game of Chapter 8, is one that pits the joint benefits from cooperation against the individual motives to defect (since “do not cooperate” is the individually advantageous option whether the other guy cooperates or not). The problem of collective action is the problem of cooperation writ large, where defection takes the form of free-riding on the effort of others. This, in turn, is directly analogous to “not contributing” to the provision of a public good; to defect in this interpretation is to withhold payment for a public good since, if it is provided, noncontributors cannot be prevented from enjoying it. Likewise, paying no attention to the (positive or negative) external effects of your actions is a bit like not controlling your production of public “bads” or ignoring your production of public goods; each is a by-product of your actions for which you shun responsibility. Finally, overutilizing a common resource is
"antisocial" in the sense that this action fails to take account of the damage your actions wreak on others.

For each of these social dilemmas there are a variety of solutions advocated (a representative one of which is listed in the last column of Display 10.2), and a variety of human experience with all of them. Rarely are the solutions, even those that work tolerably well, ideal. (If any solution were, then we wouldn't be spending so much time writing about them.) One thing is clear, and bears repeating one last time. Solutions are political, both in their advocacy and in their implementation. To understand why they work or why they fail, the observer must come to terms with the political ambitions and motives of the actors involved, and with the institutional contexts in which these ambitions and motives get played out. We turn, in the concluding section of this text, to an analysis of political institutions.