Voting, fairness, and political representation

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Introduction

We want our political system to represent the voters and treat them fairly. At the simplest, procedural level, this means giving a vote to all citizens and deciding elections based on majority or plurality rule. In practice, however, we are not all represented equally by the government, and as long as there is political disagreement there will be some dissatisfaction. It would be appealing to have a mathematical definition of the amount that citizens are "represented." Unfortunately, different measures of representation can clash with each other, as we discuss with examples from national elections in the United States.

What is the meaning of political representation?

The United States is a representative democracy: we vote for people who represent us: Congressmembers, the President, state legislatures and governors, and local officials. Indirectly, through our elected representatives, we vote for the Supreme Court and other appointed positions.

What does it mean for us to be "represented" in this political system? For one thing, everyone's vote counts equally, and, as a consequence of a Supreme Court ruling in the 1960s, most legislatures are set up so that the number of people living in each district is about the same. (Two important exceptions are the Electoral College and, especially, the U.S. Senate, both of which overrepresent small states.)

The right to vote could be thought of as a "procedural" aspect of democracy, but what about actual outcomes? Representation can be of individuals or of groups, and both these perspectives are relevant. For example, suppose you lived in a country where 90% of the voters got what they wanted, in the sense that their favored candidates for Congress won. So 90% of the people are happy on election night (at least for the Congressional elections).

That's real representation, right? Well, maybe not.

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In this scenario, you'll have very few, if any, close elections. for example, maybe the Democrats get 95% of the vote in one district, the Republicans get 88% in another, and so forth. If 90% of the voters get what they want, this can mathematically only happen if almost all the districts have landslide elections. Then, all the seats are "safe," and so the Congressmembers have no reason to fear the voters. If they fear us, they'll respect us, otherwise they can ignore us, and then we have no influence at all! (I don't mean to be cynical here—I assume that most politicians are trying to do what's best for the country, but if they think the election might be close, then they will probably worry a bit more about what we think is best for the country too.) Electorally, to get the benefit of two-party competition, you need competition in the individual districts, not just the country as a whole. Hence there is a whole theory of "pivotal votes" (see Shapley and Shubik, 1954, Banzhaf, 1965, Heard and Swartz, 1999, and Gelman and Katz, 2001).

Figure 1 goes here

How close are actual elections? Figure 1 shows histograms of the Democratic share of the two-party vote for elections to the U.S. House of Representatives in 1948 and 1988. Each histogram represents 435 districts and, as you can see, many are noncompetitive (that is, far from 0.5), especially in 1988. This has been studied in different ways (see, for example, Gelman and King, 1994), and there has been a trend in the United States in the past few decades for legislative elections to be less close; much but not all of this trend can be attributed to an increase in incumbency advantage—it's worth about 10% of the vote to be a sitting member of Congress (Gelman and King, 1990). Politicians are not stupid, and when they see elections that are less close, they don't have to worry so much about keeping the voters happy.

An exception was in 1994, when there was a big swing toward Newt Gingrich and the Republicans. But, even then, in most of the country the elections were not close. For example, I was living in Berkeley, California, at the time, and there was no way that a Republican would win there. Poll results sometimes find that most Americans like their Congressmember but are unsatisfied with Congress; this is sometimes taken as a paradox, but it makes sense, given that most Congressional elections are not close (see Figure 1).

So far, we've considered three senses of representation: having equal votes, being satisfied with electoral outcomes, and having your vote have the potential to influence these outcomes. Other measures are possible that are perhaps more important politically. For example, instead of asking if your vote is influential, we could ask if your money is influential. Given the effort that is put into campaign fundraising, it is reasonable to suppose that individuals and groups that give more money are better "represented" by politicians.

A completely different notion of representation is demographic: do your representatives look like you? Table 1 shows some data from the U.S. Congress: representation varies a lot by religious

and ethnic group. The most extreme case, nonrepresentation of the under-25's, is a consequence of the minimum age requirement in the Constitution.

Table 1 goes here

A related issue is representation by occupation: a lot of Congressmembers used to be lawyers and business people, some used to be teachers, but not many used to be janitors. My colleague from the Netherlands thought it surprising that in the United States, even the Democrats rarely nominate labor union officials for elective office. He said that in Europe, it is considered unseemly for left-wing parties to run white-collar candidates, and that such politicians are called "saloon socialists." I said, that's funny, "saloon" sounds pretty down-to-earth. He replied, oh, that's right, it's "salon" socialists.

Another thing to look at is the representation of your political views. Suppose you support abortion rights, the Star Wars weapons system, and a higher minimum wage. If all these policies are being implemented, maybe you should feel happy whether or not the candidates you vote for actually win. One could measure this sort of representation using opinion polls, and compare the average satisfaction levels of different groups in the population.

Fairness and representation

What about the representation of political parties? Most of Europe uses proportional representation: if a party gets, say, 20% of the vote, they are given 20% of the seats in the legislature. In some countries, a party that gets only 2% of the votes still receives 2% of the seats. Other countries have a threshold of 5% before a party gets representation—they don't want every group with 1 percent of the vote to have a representative in the legislature, screaming, putting chewing gum in the elevators, and generally causing problems.

The United States does not have proportional representation. There's a separate election in each Congressional district, and whoever wins that election goes to Congress. In theory, a party could get 49% of the vote and still get zero representation—if they got 49% in every district in the country. More realistically, a party could get 45% of the vote and only 40% of the seats, or 20% of the vote and no seats. Suppose some unfortunate third party gets 20% of the vote in every district. In one district, the Democrat might receive 42% and the Republican 38%. In another, the Democrat might win 60% while the Republican ties with the third party at 20%. Regardless, the third party loses out.

Some people, especially Europeans, consider the lack of proportionality to be a defect in our system, with the 20% of votes that went to that third party as wasted, since they do not lead to any representation. Of course, you could also consider the 38% for that Republican candidate as wasted, or that all votes for a losing candidate are wasted. For that matter, you can consider extra

votes for a winning candidate as wasted, too—did that guy really need 60% of the vote—but it seems particularly tough on that third party, since all their votes are wasted.

But ... proportional representation has a problem too: small changes in the vote give you only small changes in seats for the political parties. This is a problem because swings in votes between national elections are typically only about 5%. In the American (or British) system, a 5% swing in votes can easily produce a 10% swing in seats—enough to possibly change which party controls the legislature. Look at what happened with Newt Gingrich and the Republicans in 1994. You might not have been happy with that particular outcome, but it's reassuring that a change in votes has the power to change who ruled Congress. Under proportional representation, this can happen too, but in a more subtle, less voter-controlled way: perhaps some minor party increases its vote share from 10% to 15%, and then it can make a deal with another party, ultimately changing the government. The change in votes has an input, but not so directly—the proportional representation system with multiple parties is more like a pinball game where the voters shoot the ball, and then the parties keep it bouncing all by themselves.

Votes

Amid all this discussion of rules, we shouldn't forget who are the people being represented. A Congressional district in the United States has about 650,000 people (it varies slightly from state to state), of which maybe 400,000 are eligible voters (over 18, citizens, non-felons). So you can win your very own seat in Congress with 200,000 voters, or 100,000 voters if turnout is 50%. If the turnout is below 25% (as it is in some places), then if you can convince the right 50,000 people to vote for you, you then represent all 650,000 people in the district. According to the Constitution, the elected representative represents everyone who lives in the district, including those who could not vote, did not vote, or voted for the losing candidate. But obviously a politician will be less concerned with the people who did not vote for him or her, whatever the reason.

For that matter, my friends in other countries say they should get to vote for the President of the United States also, since he has such a large effect on their lives.

Inherent biases of the political system

As we have seen, even if our political system is working perfectly as designed, not all individuals and groups will be treated equally. Kids don't get to vote and can't hold political office, even though they are nominally represented in the government. Voters in small states are vastly overrepresented in the U.S. Senate. Votes for minor parties are generally wasted (at least in their direct effects), and, as we have seen, proportional representation creates other problems. And as long as campaigns need money, rich people and better-funded groups can expect disproportionate representation of their political views.

Looking at representation in terms of decisive votes creates other paradoxes. If you want politicians to fight for your vote, then elections have to be close (or at least potentially close), but when an important election actually is close (as in the 2000 Presidential election), half the people are going to feel unrepresented.

Two other systematic biases that have been studied by political scientists are the *tyranny of the majority* and the *median voter* rule. Majority rule has always been considered dangerous since, for example, 51% of the people could get together and vote to tax the other 49% out of existence (as conservatives were worried about during the New Deal in the 1930s). The founders of the U.S. Constitution created various checks and balances to slow this down, but it is still somewhat of a mystery why the majority in a democratic system is not more tyrannical. Perhaps one reason is that most people do not trust politicians enough to lend them this power.

The median voter rule was formulated by Harold Hotelling as an application of a theorem in economics (Hotelling, 1929) and was developed further in a book by Anthony Downs (1957). The basic idea is illustrated by Figure 2: the curve represents the distribution of voters in the electorate, ranging from far left to far right, and the usual positions of the Democratic and Republican candidates are indicated by D and R, respectively. Suppose that any voter will choose the candidate who is ideologically closest to him or her. Then all the voters to the left of the D position will go for the Democrat, all the voters to the right of R will side with the Republican, and the voters in the middle will go for whichever is closest.

Figure 2 goes here

In this scenario, the Democrat will gain votes by moving to the right—he or she will still get all the voters on the left and will also gain some votes in the center. Similarly, the Republican should move to the left. Ultimately, the only stable position for the candidates is for them both to be at the position of the median voter (labeled M in Figure 2). If either candidate deviates from this position, the other can move to the median and get more votes. This explains why, for example, in the most recent Presidential election, both candidates tried to sound moderate. It's not that there are no voters at the extreme, it's just that these extreme voters have nowhere else to go. (All the minor-party candidates together got less than 5% of the vote.)

Getting back to representation, this theory suggests that the median voter is strongly represented by the political system, whereas voters away from the center have no representation. This translates into less representation for groups such as African Americans and other ethnic minorities whose political views are far from the center.

In real life, however, Democrats and Republicans do not occupy the same point at the center of the political spectrum, and so the median voter rule does not tell the whole story, as in fact is indicated by the differing initial positions D and R in Figure 2. The differences between parties can

be studied in various ways; Figure 3 shows some data based on votes in the House of Representatives in 1992. The 435 Congressmembers were ranked from left-wing (negative scores) to right-wing (positive scores) based on their roll-call votes (Poole and Rosenthal, 1997), and this is plotted vs. the liberalness/conservativeness of their districts (as measured by an adjusted version of Bill Clinton's share of the Presidential vote in 1992).

Figure 3 goes here

Figure 3 shows that Democratic and Republican politicians differ a lot in their ideologies (as measured by their actions in Congress), even after controlling for the political slants of their districts. There are many reasons for this, including competition in primary elections, the need of politicians to secure funds and backing from interest groups closer to the political extremes, and party discipline within Congress. Our point here is that the median voter rule gives some insights into political representation, but it is not completely borne out by the data.

Conclusions

Definitions of representation can be categorized in several ways. First, there is the distinction between procedure and outcome. The laws may treat everyone equally, but differences in resources can translate into differences in political power. Second, one can distinguish between electoral outcomes and ultimate satisfaction with policy. Representation requires political participation at many steps in the political process (see Verba et al., 1995). And one can study many levels of government, including local, state, national, and international, as well as quasi-governmental organizations such as public corporations.

More fundamentally, representation can be defined in relative or absolute terms. Fairness requires that any person or group be represented just as much as any other, but on an absolute scale it is possible for all the citizens of a country to be more or less represented by its political system. (And, to return to our earlier concerns, it is possible that less political representation could make people happier and feel more represented in the space of outcomes.)

What's best for you individually might not be best for your group. For example, you might rather not pay taxes, but if nobody pays taxes, we're all in trouble. This is also true of representation—we'd all like to have more influence over government policy, but at some point it's mathematically impossible—there are 280 million of us, and we can't all get to be decisive. And, as we discussed in the context of proportional representation, a system that seems fair in one way can reduce representation in others. Political theorists have been struggling with these questions for millenia (see Beitz, 1989, for a recent review). As a statistician, it is interesting to see how empirical data can be used to get a better perspective on some issues of representation. Once we go beyond the search for a single numerical measure of fairness, we can study how our institutions represent

us, both individually and as groups. When crunching numbers, it's easy to get stuck worrying about relatively minor aspects of the political system such as gerrymandering and the allocation of Congressional seats and forget about more systematic ways in which people get more or less of a say in their collective institutions.

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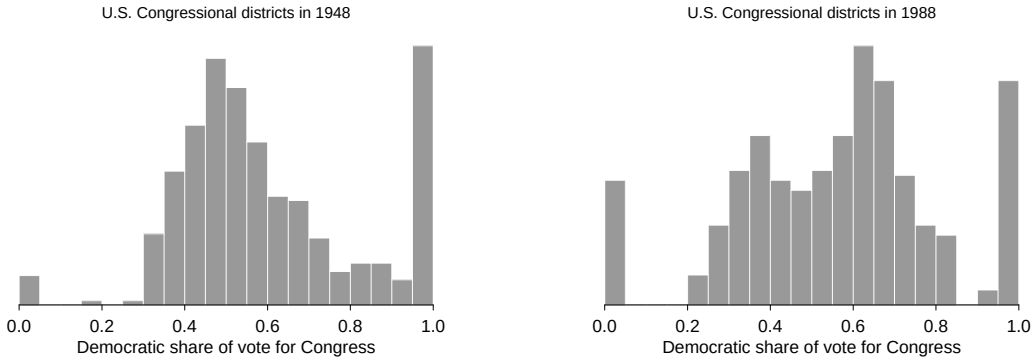

Figure 1: Democratic share of the two-party vote for elections to the U.S. House of Representatives in 1948 and 1988. (The spikes at the extremes of the histograms represent uncontested elections.) There were relatively few close elections (that is, with vote shares near 0.5), especially in 1988.

	Proportion of U.S. population	Proportion of seats in House of Representatives
Catholic	0.28	0.27
Methodist	0.04	0.14
Jewish	0.02	0.07
Black	0.12	0.09
Female	0.51	0.06
Under 25	0.37	0

Table 1: Some comparisons of the U.S. population to the U.S. House of Representatives in 1989. Adapted from King, Bruce, and Gelman, 1995.

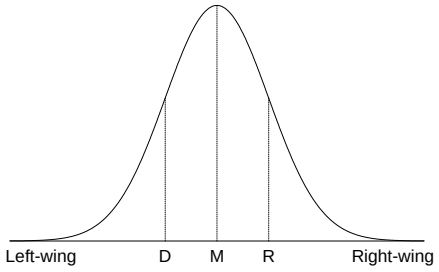

Figure 2: Sketch of the theory of voter competition leading to the rule of the median voter. The curve represents the political ideologies of the voters (it is drawn as a bell-shaped curve for convenience but in general can be any distribution). "D" and "R" indicate the initial positions of the Democratic and Republican candidates. If all voters turn out, and the two candidates have complete ideological flexibility, then they will both end up at the median voter's position, "M."

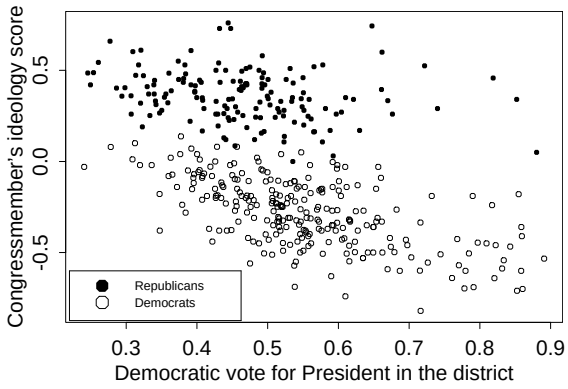

Figure 3: Ideology scores (high values are conservative, low values are liberal) for Congressmembers in 1992 plotted vs. Democratic proportion of the two-party Presidential vote in their districts. (The Presidential vote has been corrected for home-state advantage and other effects (see Gelman et al., 1995, Section 13.2) to yield an estimate of the party's political strength in the district.) Congressmembers in more Democratic-voting districts tend to be more liberal, but there is a dramatic difference between the ideologies of the Democrats. This ideological gap implies that the median voter (see Figure 2) is not completely dominant.