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Professor Bray

Game Theory and Democracy

5 October 2017

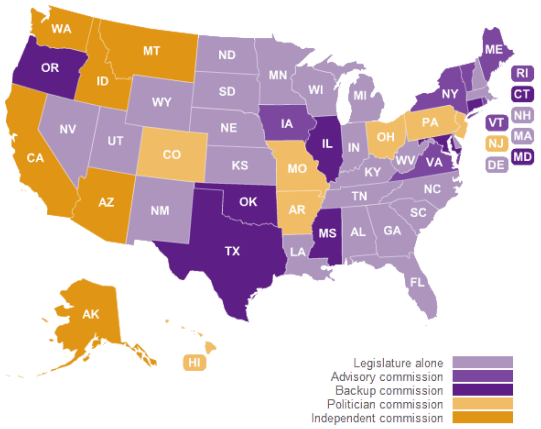
Gerrymandering

Government in the United States is ideally one that is representative of its citizens. However, circumstances in modern-day America spark a question of whether or not each citizen receives proper representation. This notion is fragile due to processes involving state legislative and congressional districts. In the redrawing procedure, citizen representation can be distorted by unusual district lines, creating a partisan advantage--a process called gerrymandering. Gerrymandering is a potentially consequential and widespread practice. But to what extent does it affect citizen representation and election outcomes in America?

Many legislators in the United States are elected from districts. As the population changes, these districts must be adjusted in a process called redistricting so that each district has an equal population. Redistricting occurs every ten years after the decennial US Census (Levitt). For example, the US House of Representatives is made up of 435 seats, which are allocated to individual states according to the state's population. It is then up to the state to determine how to divide the state into districts, each of which is to be represented by a member in the House of Representatives. *Gerrymandering* is using the redistricting process to gain a political advantage.

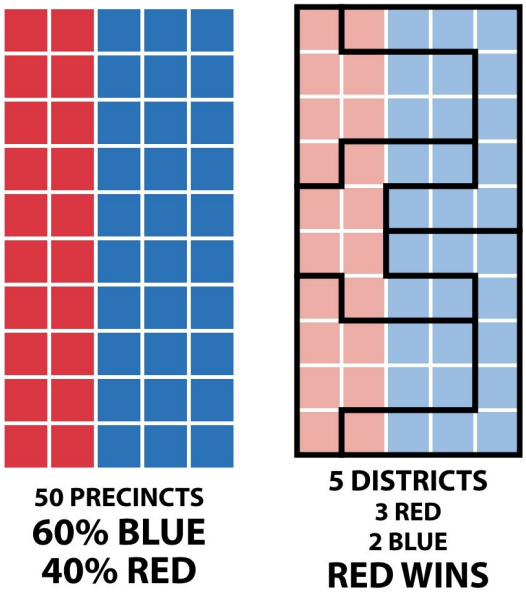
In the United States, districts are used to elect most federal legislators (the House of Representatives) as well as state legislators and many local legislators. The power to draw district lines falls into different hands in different states. In most states, the state legislature has the power

to draw district lines, for both their own state legislative districts, as well as for congressional districts. The district lines "pass just like regular legislation, with a majority vote," paving the way for partisan control over district lines (Levitt). Other states appoint advisory commissions who are involved with the drawing process. In these states, only five, non-legislators give input on where to draw district lines. Similarly, seven states use backup commissions to draw district lines if legislators' proposal is not passed. Politician commissions, meanwhile, are made up of elected officials, and are used in some form in seven states. Finally, independent commissions are championed by six states. Their district lines are drawn by independent individuals--legislators and elected officials have no say (Levitt).



Professor Justin Levitt

Gerrymandering involves manipulating district lines, and different manipulations can have different political effects. A simple example of gerrymandering is when a party redistricting a state can draw district lines in a way that increases the number of seats they're expected to win. This basic concept can be demonstrated with a simple graphic: (Figure adapted from Stephen Nass)



In this illustration of a state, there are five seats up for election. Cleverly drawn districts results in three victories for the red party and two for the blue. Despite 60% of the state voting blue, only 40% of the seats went to the blue party, while the red party gained a clear advantage and won the majority of the

seats with an overall minority vote. The party in charge of redistricting utilized a method of gerrymandering called *packing* (Crayton). They packed many blue voters into two districts, diluting their power in other districts. This method works well because in each district the margin by which a candidate wins is irrelevant. So despite a large majority of blue voters in a district, the district still only elects one blue candidate, just as it would have if the vote was 51-49 in favor of blue.

Packing is a common form of gerrymandering, used to "skew statewide representation" (Levitt). It is used to elect a higher portion of representatives from a certain party than that party's portion of the voting population.

Cracking is a different form of gerrymandering with similar but more severe political effects. Cracking is the "[spread of] like-minded voters . . . across multiple districts to dilute their voting power in each" (Clayton). This also can increase the number of representatives elected for one party, leading to fewer, if any, seats for the victim party or parties.

Politicians can use gerrymandering to choose their own voters. They can design districts to pick a population of voters that they would be likely to win a majority in, as well as cut out a specific demographic that they might not do well in.

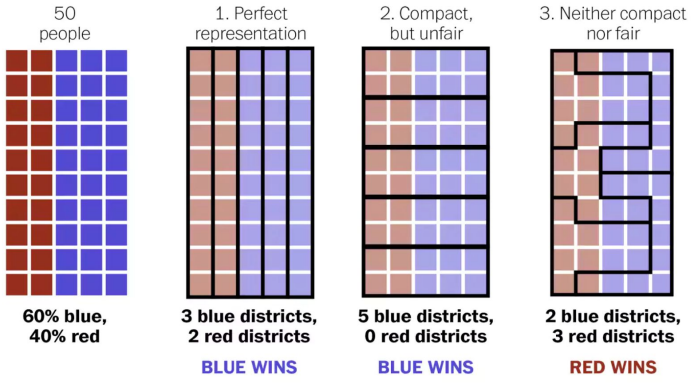
In addition to gerrymandering used for large-scale partisan advantages, politicians also gerrymander for their individual gain. A candidate can only run in a district in which they live. By drawing districts around incumbent or challengers residence, a politician can effectively eliminate a threat to their candidacy. And, by pushing an opposing candidate into another district, they can sometimes split the opposition party's votes in that district, or force one of the candidates to drop out of the race (Levitt).

To combat unfair redistricting, there are sets of rules that must be followed during the redistricting process. For example, the federal Voting Rights Act of 1965 blocks redistricting that affects minority voters' "equal opportunity to participate in the political process." (Levitt). There are three "Gingles" conditions, referencing the Supreme Court case Thornburg v. Gingles, dealing with the district lines. The first condition requires that a district, if possible, is drawn with most voters belonging to "a geographically 'compact' racial, ethnic, or language minority community." (Levitt). Although the use of the term "compact" is vague and undefined, this is the condition that may call into question districts with irregular shapes. The second condition asks if the minority population of voters usually vote in similar ways when given a variety of candidates from one party. The final condition asks if the remaining population in the area most often votes for different candidates than the minority community. Courts also look at the proportion of voters the minority population claims, and the proportion of representatives they have the power to elect. They are less likely to find a violation in the district lines if these two proportions are similar (Levitt).

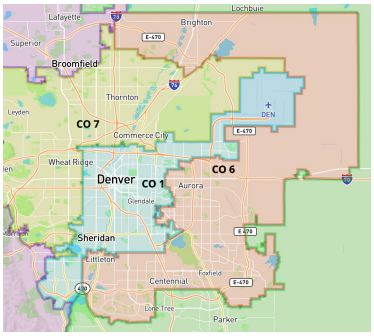
There are more extensive rules and regulations on redistricting at the state level. Most commonly, districts are required to be contiguous--a single district cannot be split into two or more separate areas. Many states also have rules surrounding political boundaries, such as city or county boundaries. Although most states require district lines to account for political boundaries, the rules are loose--"to the extent practicable"--and allow for divisive lines nonetheless (Levitt).

37 states mandate that districts are "compact." This requirement is an important factor when determining what and what is not gerrymandering, as many gerrymandered districts are long, jagged, or irregular. Unfortunately, "compact" is rarely defined in these state regulations, but

one method of measuring compactness is measuring "the ratio of the area of the district to the area of a circle with the same perimeter" (Ingraham). Another method is to minimize the average distance to the center of the district (Olson). Most scholars agree, however, that compact districts generally have three characteristics: smooth boundaries, low dispersion, and respect to housing patterns. Dispersion measures the "degree to which the district spreads from a central core," and a district without jagged edges and divisive lines in urban areas will generally be more "compact" (Levitt). Compactness, however, doesn't solve the entire issue. Just as jaggedness might not indicate gerrymandering, compactness does not always indicate fairness. Revisiting the mock state of 50 people, compact districts can still skew elections in unfair directions: (Figure by Christopher Ingraham, adapted from Stephen Nass)



Compactness also doesn't account for communities of interest. For example, one district might encapture a city in its entirety. Another district might encapture the surrounding suburbs -- communities of interest. This district might snake around the city, such as Colorado's 6th District,



but it represents a population of people with similar social or economic interests ("Colorado"). Thus, although they often represent attempts to clump or split groups of voters, nonsensical shapes of districts do not always indicate gerrymandering.

Nearly half of all states also have some form of redistricting criteria on "communities of interest" (Levitt). This term also lacks a universally accepted definition, but a "fairly typical definition" of a community of interest is one in which "[s]ocial, cultural, racial, ethnic, and economic interests common to the population of the area, which are probable subjects of legislation" (Levitt). However, this is often difficult to measure or gauge. And, as Professor Justin Levitt of Loyola Law School points out, geographic communities of interest may not coincide with political boundaries or compact geometric shapes.

Professor Levitt also discusses the clear lack of legal regulation on using the redistricting process for certain political outcomes. There are few limits on drawing lines to "favor or disfavor candidates of a certain party, or individual incumbents or challengers." Only eight states explicitly restrict such redistricting, and only five prohibit use of "partisan registration or voting history" (Levitt).

Despite legal restrictions on redistricting, gerrymandering still occurs in America. But how widespread is gerrymandering in America? It is simple to see there were many discrepancies between popular vote proportions and number of seats won in a number of states from the 2012 US House election. For example, Ohio Republicans won 12 of 16 seats (75%) despite only having 52% of the individual vote share. In the 2012 Pennsylvania House election, Democrats won 51% of votes, but only ended up with 5 of 18 seats (Prokop). Nationwide, some analysis claimed Democrats were under-represented by a net of 18 seats by comparing each party's share of the vote in each state to their share of seats won in that state (Ingraham). However, these differences are not necessarily indications of gerrymandering. Measuring gerrymandering and its effects is a difficult task and there are a number ways to do it.

Analysis by Jonathan Rodden, a professor of political science at Stanford University, and Jowei Chen, an associate professor in political science at the University of Michigan, explains how the effects of gerrymandering can be seen when no gerrymandering took place. This occurs due to "patterns of human geography" that result in skewed geographic distributions, putting one party at an inherent disadvantage (Rodden). For example, high densities of Democrat voters in urban areas simulate the "packing" effect of gerrymandering. Thus, vote proportions can differ widely from seat proportions--even without gerrymandering. This concept is called "unintentional gerrymandering" and is the result of "inefficiently concentrated" populations of Democrats in America.

Rodden and Chen use complex computer simulations in Florida to emphasize the effects of such a geographic makeup. They remark on the "striking" idea that "political geography can turn a party . . . with a persistent edge in statewide registration . . . into something approaching a permanent minority in legislative races" (Rodden). They also discuss the legal implications of such analysis: the prevalence of "egregious" effects of electoral bias with no gerrymandering makes it difficult to prove intentional gerrymandering in court.

Chen, along with David Cottrell, a lecturer with the Program in Quantitative Social Science at Dartmouth College, also conducted analysis on the impacts of gerrymandering on US Congressional elections. They attempted to isolate the impacts of gerrymandering by "analyz(ing) a counterfactual: How many legislative seats would each party control in the complete absence of any gerrymandering?" Chen and Cottrell discuss two common approaches the issue: estimating variation between election outcomes before and after redistricting, as well as analyzing the difference between vote-share and seat-share in a state (the vote-seat relationship). However, they

acknowledge the “potential confounding factors” of the methods, such as shifts in demographics, as well as how “partisan and racial distribution across geographic space” can favor opposing parties (Chen).

Their basis for a non-gerrymandered counterfactual is through the use of computer simulations. They utilize computers because they are “indifferent to partisan outcomes,” which allows for comparison between the simulations and the drawn districts, with any simulated bias a result of chance. They ran the simulations with the same redistricting criteria used by each state’s legislators in order to isolate major differences in the maps to partisan or racial bias--gerrymandering. Their simulations, which draw “compact, contiguous, and equally apportioned districts,” found mixed results. For example, simulations in Florida found that their majority Republican delegation is “one we should expect to observe even in absence of gerrymandering.” However, they also found differences between the actual and simulated districts that “indicate the districts were gerrymandered.” They reference the higher variance in partisanship in the drawn districts--“Democratic districts were more Democratic than their simulated counterparts,” an indication of packing. Although the analysis found the Republican majority was expected, they found evidence suggesting partisan redistricting increased the number of Republican delegates elected: “it is likely that the additional seats were produced through gerrymandering” (Chen 334).

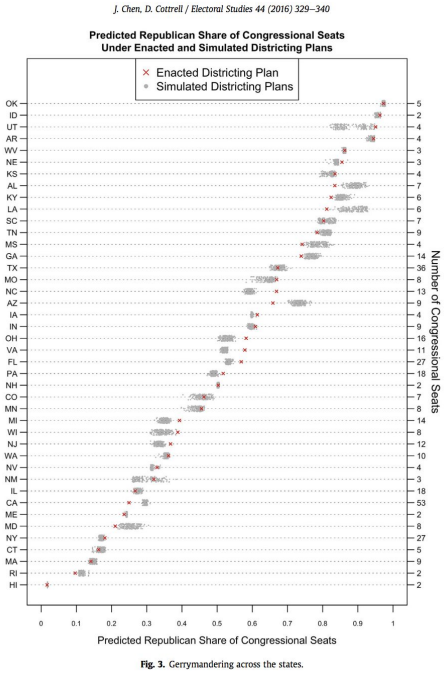


Fig. 3. Gerrymandering across the states.

Chen and Cottrell used simulations to analyze each state's expected and actual share of congressional seats. They conclude that "gerrymandering does play a role in altering electoral outcomes," though "in most states gerrymandering has little to no effect on the partisan outcome of congressional elections." They explain that most outcomes can be explained by unbiased redistricting, or "unintentional gerrymandering," and even in states where gerrymandering is present, "the effect is relatively small" (Chen 339).

Princeton University Faculty Associate and Professor Samuel S.-H. Wang published analysis in the Stanford Law Review on how to evaluate partisan gerrymandering. He discusses the measure of asymmetry: "for a given distribution of popular votes, if the parties switch places in popular vote, the numbers of seats will change in an unequal fashion." To measure such asymmetry, Wang analyzes the distortion in the vote-seat relationship expectations based on "nationwide district characteristics," discrepancies in vote margins between parties, and the "construction of reliable wins for the party in charge of redistricting." Wang uses both computer simulations and statistical analysis to evaluate the effects of gerrymandering. His tests are useful and effective as they can conform to state- and federal-mandated redistricting requirements, and they are "independent of evaluation of intent." He explains how gerrymandering can not only emulate, but "amplify the representational consequences of urbanization" (Wang 1303). Since voters often live in communities with "similar ethnic, religious, secular, and political affiliation," competitive districts are difficult to design. And it is due to wide winning-vote margins that vote-seat shares can become disproportionate.

Wang's statistical analyses led to different conclusions than those of Chen and Cottrell. He found that gerrymandering "distorts relationships between voting and representation that would

otherwise arise naturally." Unlike Chen and Cottrell, Wang found that the effects of gerrymandering in the US are significant: "the health of democratic process would be considerably improved by reducing the ability of legislative processes to impose partisan distortions of redistricting maps." He posits that his tests for asymmetry can be used as a standard for identify gerrymanders, "with the eventual goal of reducing or eliminating them" (Wang 1321).

The Duke University Data+ program used a different method to measure gerrymandering. Utilizing a "Markov Chain Monte Carlo method," students produced districts accounting for compactness, political boundaries, and minority voters (Bangia). The students compared outcomes from simulated sample districts with the actual district outcomes. Their simulated districts were designed to minimize divisions of communities of interest, maximize compactness, respect political boundaries, and protect minority votes. Through their analysis, they found gerrymandering played a role in multiple states, notably North Carolina and Maryland (Bangia). They also noted that states with independent commissions fared better in their tests of gerrymandering.

Gerrymandering is a complicated issue. Though there is not yet consensus in either the legal or scholarly communities over how to best measure gerrymandering and its effects, many analyses have found evidence of partisan bias playing a role in the redistricting process in the US. The degree of this role is still disputed, as well as its effects on American democracy. Through rigorous analysis, Professors Jowei Chen, Jonathan Rodden, and David Cottrell determined that, though gerrymandering exists in the US, its effects are small and can be due to a number of other underlying, though perhaps no less comforting, factors. Meanwhile, Professor Wang, using his own statistical measures of gerrymandering, found partisan bias in the redistricting process to be a

major issue, and threat to “the health” of American democratic processes. Continued analysis of American redistricting may provide a clearer picture of the effects of gerrymandering, and as well as a potential solution.

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