Drawing Electoral Districts

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States entitled to more than one representative in the US House of Representatives must subdivide their areas in some manner to define the electoral districts for each representative. The same is true in most states for the districts of their state houses and senates. The manner in which such districts are to be drawn could and should be a reasonably straightforward and well-defined procedure. Unfortunately, it is far from that. Although specifications and limits governing how districts may be drawn have been somewhat tightened over the years by the Voting Rights Act, numerous court cases, and state requirements, enough flexibility remains to be problematic.

It is the legislators in each state who have the primary responsibility to define districts. They have roundly abused that power to draw districts in a way that favors their reelection or the election of another member of the same political party. This helps insulate politicians from their voters and prevents elections from functioning as intended.

Gerrymandering versus the rules. Gerrymandering is the corrupt practice and process of drawing the boundaries of electoral districts to intentionally cause the election of candidates from a favored faction to be easier and more likely. The "favored faction" normally is a political party. The practice is not unique to the United States and is centuries old. Its use and notoriety increased in 1812, when it received its name. Governor Elbridge Gerry of Massachusetts approved a redistricting map of oddly shaped districts. A media cartoonist thought one of them resembled a salamander and dubbed it a "Gerry-mander." From that came the process name, "gerrymandering," which stuck and quickly gained widespread acceptance and use.

"Packing" and "cracking" colloquially describe the process. First, draw as few districts as possible to contain the maximum possible number of opposition voters (packing). Second, distribute the remaining opposition voters to keep them in the minority in as many districts as possible (cracking).

The favored faction depends upon the party controlling the legislative body. Disputes are usually decided by state courts, which should be scrupulously neutral but frequently turn out not to be. Gerrymandering has been done to favor Democrats, to favor Republicans, and even occasionally to favor incumbents, with Democrats and Republicans actually cooperating to accomplish that.

Some restrictions on drawing districts. The oldest, most common, and most often obeyed restriction is that districts should be *contiguous* (connected). Surprising though it may be, municipalities and even voting precincts (the smallest jurisdictions) are not always contiguous themselves. This obviously can be at least a complication, if not an outright problem, when districts are drawn.

A more recent restriction is the *one-person-one-vote* opinion of the US Supreme Court (SCOTUS), which held that Congressional districts must have equal populations. The one-person-one-vote descriptor would lead one to think that this means an equal number of voters so that each vote

would carry substantially the same weight. Many still argue that position, but SCOTUS clarified in *Evenwel v. Abbott* (2016) that it is the populations that should be equal, not the voters. This is derived from interpreting the equal protection clause of the Fourteenth Amendment to mean equal representation in Congress. The practice has been to use the total population. However, it would seem that the "population" should include only US citizens. The difference may not have been large in the past, but with millions of illegal aliens flooding across the southern border, it may well become a highly contentious issue for the 2030 decennial redistricting!

Just how equal district populations have to be is another issue. Guidance from SCOTUS is that a 10% error would clearly flag a problem. One might take from that that 5% might be acceptable. Some have taken it to the ridiculous extreme of attempting plus or minus one person. That is totally absurd since considerable change and shifting of population is a certainty over the ten-year period between redistrictings. If plus or minus one person were to be achieved as of a given census, it would be wrong a day or two later. Targeting a plus or minus 1% or less population error for redistricting should be more than sufficiently accurate.

The population of the United States is about 331,449,281people (2020 census). Therefore, the target population for each of the 435 congressional districts should be 761,952. Consider that the state of Wyoming has one Congressional district for its entire population of 576,851. That is a 24% error below the target population. Wyoming residents are *very* overrepresented in Congress, and there is absolutely nothing to be done about it! Thus, it would seem silly to be upset about a 1% error.

State guidelines often state that district boundaries should be drawn to *minimize the division of political entities*, especially counties. However, satisfying the hard requirement for equal populations almost always necessitates the splitting of quite a few political entities. Apparently, it is acceptable to divide some political entities but not others.

Guidelines also usually state that districts should be *compact*. There are several ways to measure "compactness," but no standard has been adopted. True compactness can be hard to achieve along with all the other requirements. Since district boundaries must in some cases follow the boundaries of political entities, and those can be quite irregular, the application of a hard compactness measure tends to be problematic. Nevertheless, a lack of compactness is considered a strong indication that a district has been gerrymandered. The map below shows Pennsylvania Congressional District 7 as it was defined for the decade from 2011 through 2020.



This district is obviously quite the opposite of compact and clearly appears to be a gross gerrymander job. It was so ridiculous that it was described as "Goofy kicking Donald Duck." It may be an extreme example, but it actually has plenty of serious competition all around the United States. Clearly, the rules have not prevented gerrymandering.

If one of your takeaways from this discussion is that the proper drawing of electoral districts is a slippery and messy problem, you would be correct. It gets worse.

The impact of digital computers. Copious data bearing upon the definition of electoral districts are now readily available in digital form. This includes, but is certainly not limited to, the geocoded boundaries of all political entities and their populations, voter registrations, and voting history. There is a remarkable level of additional detail. Modern digital computers can quickly manipulate, analyze, and present such data in limitless ways and have had a major impact upon all aspects of drawing electoral districts.

Those who wear the black hats and gerrymander have been able to utilize these tools to achieve a new level of sophistication in their "art." They are able to do their packing and cracking more quickly and accurately. Also, it is usually possible to achieve the desired result while avoiding such grossly obvious district configurations as "Goofy kicking Donald Duck."

However, the guys who (claim to) wear the white hats have been able to use the same tools to detect and measure gerrymandering. It is possible to easily compute various indices of "compactness." Several such indices are based upon the ratio of the district's area to the square of the length of its enclosing boundary. There are others. Of course, analyzing the composition of

each district in terms of voter registration, ethnicity, and many other parameters is also possible. Predicting and comparing how various districts would vote in future elections based upon voting history is another capability.

Some white hats advocate drawing districts so as to minimize the difference in "wasted votes" between factions. Wasted votes are defined as those over and above the votes that were required to elect a candidate plus those cast for losing candidates. This is a good and clever idea theoretically and in paper examples, but in practice, it would turn out to be based entirely upon Democrat and Republican registration and/or voting history. This completely disregards other parties and all those who have made it clear that they do not affiliate with either the Democrats or the Republicans. The non-Democrat/non-Republican "faction" is growing, is approaching a majority, and is much larger than either of the two old, declining parties.

The white hats have been proposing various ways to rein in the black hats by deploying the tools they have developed. No such "controls" have yet been adopted. As we will learn later, that is probably a very good thing.

Finally, it has occurred to some that computers might be programmed to draw electoral districts automatically. Stay tuned.

Why Gerrymandering Has Not Yet Been Banished

Polling data regularly shows that approximately 80% of citizens strongly want the practice of gerrymandering to be eliminated. That is just about as near to unanimity as polls ever get. Citizen organizations boasting 50,000 members have leaned hard on their legislators to fix the problem. How could gerrymandering still be alive and well across this country?

There are four main obstacles to banishing gerrymandering.

Those responsible for fixing gerrymandering do not want it to be fixed. The most obvious and difficult-to-surmount problem is the simple fact that the career politicians who populate the various state legislatures would need to take some action to abolish the practice. Despite what they may say, precious few of them are willing to give up the power to bias elections that drawing districts affords them.

Politicians are superbly skilled at making sure that things they don't wish to have happen never do. They are perfectly willing to help each other out with "cover" when needed. A representative under heavy pressure from constituents may even sponsor and introduce a bill to appease them, but the bill "so unfortunately" never makes it out of the committee to which it is referred—"in spite of the sponsor's strenuous efforts," of course. In extreme cases, such a bill may be discharged from committee, but "so sadly," the legislative session ends before it can be scheduled for a vote. Such bills have even been voted on and actually passed by one house of a bicameral legislature, only to meet a planned demise in the other chamber. This provides those who voted for the bill "hard" (but false) evidence to demonstrate their great and sincere intentions to their constituents. This is important information for anyone endeavoring to influence politicians; it can save many frustrating and fruitless years of work before a realization and understanding of how politicians operate is gained. There certainly may be some exceptions, but they are far too rare to have any beneficial effect. (Of course, *your* representative is one of the exceptions; just ask, and they will gladly explain why that is so.)

The remaining three reasons combine to preclude a truly on-target solution to gerrymandering from ever being proposed.

A persistent bad idea: Citizens' commissions. It is a perennial proposal that an "unbiased" citizens' commission be assigned the responsibility for defining electoral districts. No one with the intelligence to define electoral districts is going to be completely unbiased. So the selection of commission members is problematic. Shielding them from nefarious "influences" is difficult at best. Does it make sense to put together a new group of people every ten years and have them reinvent the redistricting wheel? There likely would be next to no transparency into how they went about doing their work. If their work is disputed, it ends up in the courts, with hard-to-predict and sometimes arbitrary results. Courts are not necessarily politically neutral. However, if we can't devise a better solution, such a commission would probably be some improvement over leaving the responsibility directly with the politicians.

An even worse misconception: Communities of interest (Col). Many redistricting guidelines discourage having district boundaries divide political entities, such as counties. Not dividing political entities stems from a desire to not divide so-called "communities of interest," which are blithely presumed to coincide with political entities. There are two fundamental and *fatal* problems with the notion that communities of interest should be kept together: one is practical, and the other is principle based.

The fatal practical problem is that CoI is a very nebulous and hard-to-define concept. Different people will have radically different definitions. CoIs can be based on religious beliefs, political philosophies, single hot-button issues, and countless other criteria. CoIs as defined by different people can and will differ and overlap. Whose definition is to be adopted? CoIs can shift and change considerably from one election to the next, depending on the hottest issues of a particular election. Not dividing CoIs is a poorly defined and completely insoluble problem of impossible complexity. It's an exercise in futility that obviously cannot be solved by mere mortals, whether they are state legislators or citizens on a commission.

The fatal problem of principle is that the only possible valid reason anyone would want to keep a Col together in an electoral district is so that a representative who "truly represents their interests" can be reliably elected. The only way that can happen is if the members of that Col can outvote a smaller number of those in their district who do not share their same interests. That is the very definition of gerrymandering, which presumably we are trying to prevent! Oops.

We have lived for decades with districts that slice and dice counties in all manner of arcane ways. We have suffered *zero* harm caused by the division of political entities. However, we *have* suffered harm, *all* of which was caused by contriving districts to keep communities of interest together, where the communities of interest are those who share the philosophy of a specific political party!

In order to accurately achieve equal population districts, the splitting of many political entities is unavoidable. If splitting some is OK, it shouldn't be a problem to split others. One might validly argue that if some must be split, it would be fairer to split all.

An incorrectly stated objective: Electoral districts must be fairly drawn. The word "fair" should never be used in this context. It is highly subjective and means different things to different people. If the word is used, it is necessary to spell out in considerable detail the objective criteria to be used when judging fairness or unfairness. This is rarely done, so confusion reigns and progress becomes impossible without agreement.

The correct statement of the objective should be that *electoral districts must be impartially drawn*. "Impartially" has an objective definition. In this context, it means that districts must be drawn in such a way that *does not confer any systematic advantage or disadvantage to any particular faction* (or community of interest, if you prefer).

All the muddled thinking surrounding redistricting has made it even easier for politicians to stay in the driver's seat and keep right on gerrymandering.

The Precinct-Preserving Splitline Procedure

Suppose it were possible to write down a clear and concise procedure to define electoral districts that is guaranteed to be completely impartial. Such a procedure could be followed by anyone, or even a computer, and the identical impartially drawn districts would be the result. And suppose that the same straightforward procedure could be used to quickly and impartially draw equal-population districts very accurately for any number of districts and for any state. The procedure could be enshrined in the Constitution, and there would be no need to reinvent the redistricting wheel every ten years. Redistricting could be done quickly, at a very low cost, and without all the strife. The process would be completely transparent, and anyone could verify that districts have been correctly drawn.

The good news is that such a procedure has already been written down and is available for use at any time. It is called the *precinct-preserving splitline procedure* (PPS). It has just five steps. It will never divide voting precincts and always produce equal-population districts that are maximally compact. Here is the PPS procedure:

In all cases in which a political entity (e.g., a state) is entitled to elect multiple representatives, the procedure defined here must be used to determine the electoral districts for such representatives. Voting precincts will never be divided. The geographic boundaries of political entities (states, counties, municipalities, and precincts) and the total populations for each precinct are the only data to be utilized.

If the population of the political entity is *p*, and the number of districts to be drawn is *n*, the following (sometimes iterative) procedure is to be used.

- 1. If *n* is 1, no subdivision is necessary, and this is a final district. If n > 1, then define two new numbers, i = n/2 rounded up and j = n/2 rounded down. (Note that i + j always equals *n*, and if *n* is even, *i* obviously will equal *j*.)
- 2. Draw the shortest possible (great circle) line dividing the area into two sections so that one section has a population equal to p multiplied by i/n, while the other section has a population equal to p multiplied by j/n. If there is more than one equally short line, use the line closest to a north-south orientation, and if there is still a tie, use the westernmost line. For irregularly shaped entities, it is possible that a line could exit and then reenter the entity; the length of the line is defined as the total distance between the two most distant points of intersection that lie on the boundary of the area being subdivided.
- 3. Make a list of just the voting precincts that have parts of their area on both sides of the great circle line just drawn in step 2. If 80% or more of any split precinct's area lies on one side of the line, assign each such precinct entirely to that same side of the line and remove it from the list. Sort the remaining list in the order of the largest population precinct to the smallest population precinct.
- 4. If there are any precincts on the list, assign the first (largest) entirely to the side of the line that needs the most people to hit its population target. Repeat this step until all precincts have been assigned.
- 5. The division of the original large area into two sections has now been completely defined. For each of the resulting two sections separately, go back to step 1 using the section's population for *p* and either *i* or *j* (whichever was associated with the section) as *n*.

Those not mathematically inclined will prefer to have a visual illustration of how the procedure works. The state of Pennsylvania will be utilized as an example.

If Pennsylvania had just one representative, there would obviously be nothing to do, and the entire state would be the one required district.

The map below shows Pennsylvania with two districts. The procedure draws them simply by finding the shortest possible line that divides the state into two sections, each having half the population. Nothing could be simpler or more impartial. If that line splits any voting precincts, a simple rule determines on which side of the line each split precinct is to be placed so as to maintain its integrity. Those familiar with this state will quickly understand that the very heavy population density associated with Philadelphia in the southeastern corner of the state causes the splitline to occur (perhaps surprisingly far) toward the eastern end of Pennsylvania.



The next map (below) shows Pennsylvania with three districts. The procedure tells us to first draw the shortest possible line that divides the state into two sections, one having 1/3 of the population and the other having 2/3 of the population. Finally, the shortest possible line is drawn, which divides the larger section into two districts, each having 1/3 of the population. After each line is drawn, any voting precincts that would have been split are placed entirely on one side of the line or the other, as determined by the simple rule that is part of the PPS procedure.



The next map (below) shows Pennsylvania with four districts. First, draw the shortest possible line that splits the state into two sections, each having half the population (the same line as drawn for the two-district case). Next, draw the shortest possible lines that split each of those sections into two districts, each having one-fourth of the population.



For *any* number of districts, just follow the procedure, and the required number of equal-population districts will be impartially drawn. Now that the basic operation of PPS should be clear, we jump to the case of Pennsylvania with the seventeen districts that it actually has (map below).



Notice that for seventeen districts, the first splitline now divides the state into two sections, one having 8/17 of the population and the other with 9/17 of the population. This is the first step in defining eight districts to the west of that line and nine districts on its east side.

Finally, just for pretty, below is a clean map of the seventeen districts without all the notations.



Drawing straight (geodesic or "great circle") splitlines can achieve equal population districts extremely accurately. However, preserving the atomicity of voting precincts will inevitably introduce some errors in population equality. Is this a problem?

Voting precincts are the smallest political subdivisions. They are normally defined by county governments for the purpose of facilitating and managing voting in elections. Their configuration depends upon the availability, location, and size of a polling place that can conveniently service the number of voters in the precinct. This will nominally range from 500 to 2,500 voters. Populations will be somewhat larger since not everyone is a registered voter.

Setting up voting precincts and maintaining them as populations grow and shift over the years and the availability of desirable polling locations changes is a lot of work for counties. Chopping up a large number of them all at once in a redistricting would be highly disruptive, and that is why PPS is designed to avoid doing that.

The procedure PPS uses to preserve precinct atomicity is designed to be simple, understandable, and easy to follow. It also must not stumble when precincts are encountered that are not formed

as a single contiguous area, because those do exist. It does attempt to minimize population errors, but an optimal solution in that regard is not guaranteed. Population errors should be less than half the population of the smallest precinct that a splitline divides. Thus, the population error percentage will depend upon the number of precincts contained by the district.

A large district, such as a congressional district, will contain on the order of two hundred precincts. Population errors for districts this large are completely inconsequential. Looking for a worst case, the Pennsylvania House has 203 representatives, requiring very small districts containing nominally thirty precincts. Here, the population errors should be less than plus or minus one percent. As previously reasoned, even this worst case should still be quite acceptable.

To summarize the advantages of using PPS for redistricting:

- It draws maximally compact equal-population districts—any number for any state.
- It is guaranteed to be absolutely impartial (renders gerrymandering impossible).
- It completely eliminates the influence of politicians (indeed, all people) from the process.
- It can be done by people or computers.
- It is completely transparent—anyone anywhere can verify that districts are correctly drawn.
- Its procedure could easily be amended into the US or state constitutions.
- It provides a weak term-limiting effect as a byproduct.
- It turns decennial redistricting into a low-cost nonevent lasting about half an hour.

More information can be found in the book: <u>ElectionsAreBrokenByRoyMinet</u> © 2025

Also see the Elections and Voting page at: https://royminet.org/