How Best To Impartially Define Electoral Districts

By Roy A. Minet -- (Rev. 10/02/20)

One of many techniques politicians use to keep themselves in power is the process known as "gerrymandering." That is, deliberately drawing the lines of electoral districts to favor themselves, or their political party. The practice has rightly been bemoaned for decades. It is way past time to fix it.

Many approaches have been proposed which are messy, not totally satisfying and fail to hit the nail squarely on the head. It turns out that a really good and clean solution does exist which should be implemented as soon as possible.

As usual, the first step toward determining the best solution is to correctly identify the requirements and write them down clearly and in order of importance:

1. **One Person, One Vote** – It is a hard requirement that each of multiple districts must contain, as nearly as is reasonably possible, the same number of eligible electors. This is an obvious good thing, and the SCOTUS has decreed it.
2. **Impartial** – The process by which districts are determined must not give any systematic advantage or disadvantage to any political party, group or faction.
3. **Understandable** – The process by which districts are drawn should be understandable by a reasonably bright high school student. (In fact, anything having to do with voting and elections should meet this requirement.)
4. **Verifiable** – It should be possible for reasonably equipped and motivated citizens or organizations to independently verify that districts have been correctly drawn. It is a bonus if a rough verification can be done quickly just by visually inspecting the map.
5. **Well-defined and Stable** – The process should be clearly and publicly spelled out. It should not be changeable on a whim or when different people are implementing it. Enshrining the process in the state or even the U.S. Constitution would be a good idea.
6. **Preserve Precinct Atomicity** – Precincts are very small areas of roughly 600 to 1,800 voters which are determined locally based upon available polling places and their proximity to voters. It is unnecessarily disruptive if redistricting requires redrawing precinct boundaries. Therefore, each precinct should be entirely contained within a single district. (If precincts straddling a district boundary should need to be merged, the merged precinct lands in the district from which most of its voters came until the next redistricting is done.)
7. **Contiguous** – It is required in many jurisdictions that voting districts be geographically contiguous, and that no district be completely contained within any other district. This requirement tends to support requirements 3 and 4.
8. **Compact** – Compactness can have several definitions. Fortunately, it is not critically important. Compactness does make it easier for candidates who must repeatedly traverse the district for campaign purposes and easier for elected representatives to commune with constituents. But primarily, compactness is believed to be desirable today mainly because it is felt to be an indication that the district has not been gerrymandered. However, this requirement does support requirements 3 and 4.

One thing NOT part of the requirements is "fairness." People sling the word "fair" around all the time, but the criteria by which they judge fairness can vary radically. Without a detailed understanding of the criteria, the word is meaningless and should not be used.

Popular proposed solutions seem to revolve around establishing an unbiased commission which figures out how to draw boundaries. No semi-intelligent individual is completely unbiased, so what that means is a commission on which it is lightheartedly hoped that opposing factions hold each other in check. How commission members are selected becomes very important and is quite problematic. A commission does not guarantee requirement 2 and definitely does not satisfy requirements 3, 4 and 5. It doesn't seem sensible to make a commission re-invent the redistricting wheel (with somewhat variable and unpredictable results) every time a redistricting is needed.

A much superior approach is to clearly define a *procedure* that satisfies all requirements. It doesn't matter who (or what) executes the procedure, the same impartial boundaries are the result.

A procedure which well satisfies all requirements (except 6) was proposed circa 2002 by Warren D. Smith. It is called "splitline." The splitline procedure very simply divides a state into two sections having the desired populations using the shortest possible line. If more than two districts are needed, the process is repeated (as many times as necessary) to subdivide one or both of the two sections until the desired number of equal population districts has been drawn.

There is a three-minute YouTube video which very clearly illustrates the procedure. Also, maps are viewable online which show the splitline Congressional districts for each state. (See https://www.youtube.com/watch?v=kUS9uvYyn3A and https://rangevoting.org/SplitLR.html)

The pure splitline algorithm is ruthless. Not only does it not give a rip about political boundaries, but it can even split residences. Special rules apply to determine which site of the line to put residences (so as to not split families into different electoral districts).

In order to meet requirement 6, "the shortest possible line" of the splitline method is changed to "the shortest distance along precinct boundaries." Because of precinct granularity, this will introduce small errors in population (completely inconsequential for large districts, perhaps 1% for very small districts containing only 25 or 30 precincts). Some further small tweaks to the algorithm can further reduce population errors. Call this the Precinct-Preserving Splitline or PPS algorithm. Obviously, the annoyance of splitting residences, etc. is also eliminated.

PPS districts are always contiguous and geometrically compact. They are based *only* on the boundaries and populations of precincts; no voting history or registration data are ever used (nor should they be). The overall operation of PPS is easy to understand. If you're familiar with the state's population distribution, you can see that the lines have to be pretty much correct by just looking at them on a map. Lots of individuals and organizations are capable of independently verifying the boundaries. Also, it should be obvious that this one simple procedure can be used for any kind of district: Congressional, State Senator, State Representative, etc. Finally, it also should be obvious that PPS can be done in minutes by a computer at near-zero cost. What's not to like?

No matter how straightforward and impartial PPS may be, there still will be objections. The first probably will be that PPS is necessarily going to ignore geographic features and political boundaries (other than precincts). Chalk that up as part of being impartial. It definitely will divide cities and counties. But this is not an actual problem. It's more a vague "feel good" notion in people's heads. As proof, we've lived just fine for decades with many of the craziest such divisions which were introduced by gerrymandering. Quite a few splits of political entities will be inevitable just to achieve the one-person-one-vote requirement, no matter what method may be used. If it's OK some places, it won't hurt to do it other places as well. (One could even argue that it's "fairer" to do it everywhere.) Certainly, it is conceivable that geographic features (e.g., a river) could make traversing a district somewhat less convenient, but as a practical matter, this

cannot be a large problem, especially when precincts are preserved. Maintaining the integrity of precincts significantly alleviates this relatively minor complaint.

The second objection will be that some faction or another doesn't receive fair (!) representation. Well, what faction did you have in mind? There are so many. Factions might be defined by various political philosophies, religions, races, etc.; there are many factions of each type. And, of course, the smallest and most important faction is the individual. So, good luck! Whether a real or imagined issue, it is certainly not something that can be solved by playing around with district boundaries; wrong mechanism. Other remedies to consider which may partially address such concerns are multiple-representative districts, proportional representation and replacing plurality with a better voting method (BAWV or AADV, but <u>not</u> IRV). These definitely are good things to think about, but they don't have anything to do with impartially defining equal-population electoral districts.

Finally, the most often heard concern needs to be addressed head on: Many people say that boundaries should be drawn so as to not split up "communities of interest." This is a nebulous term without a clear and actionable definition, but it surely must be a feel-good concept that many people have firmly stuck in their heads. If they are asked, "So, you mean that a community of interest is a group or faction of people who share the same values and interests," most will answer, "Yes, yes, that's what we mean!" "And you want districts to consist predominantly of people who share a set of values and interests so they can elect representatives who truly represent them." "Yes, yes, exactly," they say. "So the faction that shares the set of values and interests will be able to consistently outvote the minority who may have other sets of values and interests." Now a few of the more astute may begin to see their folly: Drawing districts to preserve so-called "communities of interest" (however someone may succeed in defining them) is exactly the same as gerrymandering, just for factions which may or may not happen to align with political parties!

The Actual PPS Algorithm

In all cases where a political entity (e.g., a state) is entitled to elect multiple representatives, the (sometimes iterative) procedure defined here must be used to draw the electoral district boundaries for such representatives. If the population of the political entity is p and the number of districts to be drawn is n, follow these steps:

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 population of 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 political entities, it is possible that a line could exit and then re-enter the entity; the length of the line is defined to be the total distance between the two most distant points which lie on the boundary of the area being subdivided.
3. Make a list of just the voting precincts that the great circle line of step 2 traverses.
4. Any of the traversed precincts on the list which have 75% or more of their area on one side of the line are then assigned to the section on that same side of the line.

5. If any precincts remain on the list, assign the largest to the section which needs the most people to hit its population target. Repeat this step until all precincts have been assigned.
6. Then draw the final boundary accordingly.
7. For each of the 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.