

Chapter 4

Is the redistricting problem math, systems, or people?

KEITH GÄDDIE

CHAPTER SUMMARY

Keith Gäddie will give us the political scientist's view of the redistricting landscape from 30,000 feet, helping us to taxonomize the problems and start to think about strategies for the way forward.

1 INTRODUCTION

“Tell Mike it was only business.” Salvatore Tessio, *The Godfather*

Gerrymandering is the act of drawing legislative district boundaries for political advantage. And, in American politics, gerrymandering is a profanity. There is no positive conversation where gerrymandering is deemed to be virtuous; it is only a problem, and, in American politics the source of all that ails democracy.

Concerns about gerrymandering revolve around the role of gerrymandering in distorting popular democracy. Free and democratic elections translate votes into government. Good democratic systems translate majorities of votes into majorities of delegates, thereby fulfilling one of the fundamental assumptions of democracy, that majorities should govern. In the representative assemblies of the Anglosphere¹ the desire to reflect majority will while still representing minority constituencies

¹The Anglosphere is a recent term, defined as countries of the world where the English language and cultural values derived from Great Britain predominate. To understand those linguistic traditions and cultural values in the American case, I recommend Fisher [17].

has led to the use of geographic constituencies—districts—to choose delegates to serve and make law.

When existing political subdivisions are used to allocate power, the strength of representation is dictated in part by where someone lives, which creates distortions in the translation of votes into government and deviations from overall proportionality. District systems are in part meant to alleviate these malapportionment problems, but they potentially introduce new distortions through the act of redistricting. These distortions can deny access by popular majorities to legislative majorities; or they can enhance or temper their size. In this chapter, I ask the reader to consider the extent to which redistricting is a **people problem**, a **systems problem**, or a **math problem**.

People. Are the problems we ascribe to gerrymandering really just artifacts of where people live or how we count them?

Systems. The single-member district system (SMD) is dominant in America—one bounded geographical area sends one representative to government. Are single-member districts fundamentally to blame for the paradoxes and distortions of gerrymandering? And are our correctives (like the Voting Rights Act) doomed to backfire?

Math. Is the shortcoming in our metrics of fairness? Have we all been distracted by meaningless quantification?

Systems again. How does technology compound the problems, and could it relieve them?

People again. All of these elements interlock, but can't be teased apart without contending with the most central of all. The incentives of the people who currently control the process of redistricting do not align with the aims of the fullest and most responsive representative democracy.

2 THE REDISTRICTING PROBLEM IS A PEOPLE PROBLEM, VERSION 1

How is redistricting a people problem? It has to do with where people live; how many people live there; how eligibility to participate is determined; and how geography is used to allocate representation and voting power. The earliest 'people problems' in Anglo America had two origins: first, the question of eligibility; and then the abuses of apportionment known as 'rotten boroughs.'

ELIGIBILITY AND APPORTIONMENT

An early example of the eligibility problem appears in an exchange between James Madison and Thomas Jefferson regarding voter eligibility for the Virginia general assembly, with Madison advancing a property basis for eligibility to vote (acreage or town lots), while Jefferson argued for a broader definition allowing any free man who had borne arms in the Revolution to be eligible to vote. The former plan gave

more political power to the counties of the Tidewater, dominated by planters and those with large slave populations. Jefferson's proposal gave more power to the frontiersmen who lived west of the Piedmont in the Blue Ridge, Appalachia, and in the Kentucky counties. This gives us our first glimpse of a recurring issue: the entanglement of principle with regional or political interests.

The rotten borough problem finds its origins in Great Britain, where a political subdivision called a *borough* was used as a vehicle to elect parliamentarians. Many boroughs were possessed of tiny populations, often in previously prosperous areas where population loss had ensued—for instance, Newtown, on the Isle of Wight, had fourteen residences and twenty-three voters in the 18th century [26, 31]. The tiny populations nonetheless commanded a significant share of political power, so they could be easily controlled by wealthy landowners who thereby magnified their voice in government. These came to be called “rotten boroughs.”

Taken together, restrictive participation standards and the use of fixed political subdivisions for apportionment (usually counties, parishes, or townships) could significantly distort political power.

Before 1962, the allocation of political power by county was common in the U.S., with every county in a state often guaranteed one representative in the state legislature, no matter how small the population. The example I am most familiar with is the state of Georgia, which was the primary defendant in two different one person, one-vote lawsuits, including one of the 1960s cases that coined the term.² In Georgia, all political power was deeply devolved down to the counties. Each of Georgia's 159 counties was guaranteed at least one state representative, and no county had more than three representatives. In state Democratic Party primaries, the legislative apportionment system was used to allocate votes in the primary. For each state representative a county had, it got two votes in congressional or statewide primaries. The consequence of this system was to make the value of a vote in Georgia's smallest counties, such as Echols or Taliaferro, worth several hundred times more than a vote in the major urban counties like Fulton or DeKalb (which both contained the city of Atlanta).³

The consequence was that half of all political power in Georgia was invested in counties containing less than a quarter of the state's population—and far less of the functionally eligible electorate, due to the broad-based disfranchisement of Black voters [9, 22]. And, given the predisposition of those who have political power to keep political power, it took decades of litigation culminating in the one-person, one-vote cases to disrupt the broad-based use of rotten boroughs, thereby establishing the standard that the value of one's vote should not depend on where you live—that rural votes (and especially rural White votes) should be neither practically nor morally superior to the votes of any other Americans.

²*Gray v. Sanders*, 372 U.S. 368 (1963); *Wesberry v. Sanders*, 366 U.S. 1 (1964).

³The political consequences of Georgia's reapportionment problem are described in Bullock et al., Bullock and Gaddie, Buchanan, Cornelius, and Saye [7, 8, 11, 15, 30].

WHERE THE PEOPLE ARE

Even with equal-sized districts, there is still a potentially distorting impact of where people live in modern redistricting. When we form modern legislative districts, residential patterns can interact with the line-drawing to dilute or enhance the political power of some types of voters over others.

Elections turn votes into government. And, in single-member districts (which are the most common representative district in the United States) this means that the candidate with the most votes wins the district, and the party that wins the majority of districts organizes the legislative chamber. Not all people in a district are voters. Minors do not vote. Unregistered adults do not vote. In many states, people with felony convictions do not vote. And, noncitizens do not vote. But minors, unregistered adults, and noncitizens are not equally distributed across all districts. Even when all districts in a state are apportioned to exactly equalize overall population, some districts in a state have far fewer people who are potentially eligible to vote than other districts, among other factors driving differential turnout. For example, in 2008, the 20th District of New York cast 325,706 votes for the two major presidential candidates while New York's 16th District cast just 167,108. Even more stark differences are observed in Florida and California and other states with geographically concentrated noncitizen populations. Political scientist Jim Campbell refers to this as the 'cheap seats' problem in American legislative elections—and the cheap seats problem actually creates a Democratic Party advantage in the elections he analyzed [12]. A multivariate analysis for voter participation rates in 21st century congressional districts indicates that larger non-White populations, large noncitizen populations, being more rural areas, and having fewer districts (smaller states) is associated with a greater variation in turnout from district to district within a state [19, 23, 29]. (This distortion problem is effectively eliminated in democracies that use proportional representation. See Sidebar 2.3 and also Amy [3].)

Then, there is a related issue: Is representation about voters, citizens, or people? A conservative argument advanced for the past decade has held that we should consider apportioning political power and crafting district populations based on citizenship data. This can be an intellectually seductive argument—elections are constrained to voters, who are in turn always supposed to be citizens. They have the sovereignty, which allows for the American government and the state governments. But voters are not the only citizens, let alone the only people, who are represented by elected officials. Representative needs extend to residents in general—as do representative responsibilities of the members of government.⁴ And there are data issues that can attach to trying to measure citizenship, as legal scholar Nathaniel Persily ably notes [29].

One of the questions of the modern redistricting conversation asks if gerrymandering drives political polarization. Polarization has grown in legislatures and among voters for three decades. The crafting of districts that cobble together people who vote of a like mind is often pointed to as a cause.

But, why is it so easy to form ideologically homogeneous districts? One theory is

⁴See Kozinski's partial concurrence and dissent in *Garza v. County of Los Angeles*, 918 F.2d 763 (1990).

that of journalist Bill Bishop, that people are making choices of where to live based on lifestyle and culture. And, lifestyle and culture ripple through politics. Termed *the Big Sort*, the half-century of American political separation into homogeneous communities based on race and ethnicity, the retreat of conservative Whites to their suburbs, and the gentrification wave of progressive Whites into heterogeneous communities like trendy urban centers and college towns have made it easy for mapmakers to lasso voters and create competitive or safe districts, whatever their goals [2, 5, 25]. Sophisticated community profiles by demographers, marketers, and social scientists tie political and other cultural and consumer data together to craft typologies of the communities in what Chinni and Gimpel term ‘the patchwork nation’ [14]. These granular data are available to mapmakers because of the detail of data developed by the Census, the American Community Survey, and also an expansive market research industry (which relies on Census Bureau products to support their work).

The ways that sorting amplifies the power to gerrymander are compounded by the political behavior and motivations of homogeneous groups. In part, this is just political partisanship. American politics has grown a more racially and ethnically diverse electorate, and non-White groups have trended heavily Democratic in their voting behavior. Meanwhile, White voters have trended more Republican. This means that tuning the racial balance of a district often gives a predictable party outcome. The divergence of White and non-White political preferences has a very specific definition under voting rights law: *racially polarized voting*. When blocs of Whites and blocs of minorities have consistently opposing preferences, and there is also evidence of racial appeals in campaigns (the famous ‘dog whistles’ of race, ethnicity, and immigration), then the foundation has been laid for potential legal challenge under the Voting Rights Act, which is the operational form of the 14th Amendment [10].

3 THE REDISTRICTING PROBLEM IS A SYSTEMS PROBLEM, VERSION 1

We have seen a variety of people problems that insinuate themselves into redistricting, including the forces that control clustering and segregation, the differing political preferences of homogeneous groups, and the larger political and legal context that maps group preferences onto party politics. But are our representative systems at the heart of the democratic problems we ascribe to redistricting and gerrymandering?

In order to explore this part of the puzzle, let’s recall the predominant forms of gerrymandering and what each seeks to accomplish: the population gerrymander, the geographic gerrymander, the partisan gerrymander, the bipartisan gerrymander (also called the incumbent gerrymander), and the racial gerrymander.

MANY WAYS TO GERRYMANDER

The population gerrymander, as we've seen, gives more or less power to different districts by malapportionment, or skewing the population from district to district. This practice is largely nullified by case law requiring that population across districts be "as equal as practicable," which has practically meant a population range of 10 points (effectively $\pm 5\%$) for state legislative districts and much tighter balance for Congressional districts.⁵ High population deviations have to serve some general state policy or goal, and cannot advantage one party or geographic region over others.⁶

Even in district schemes that balance population, it is possible to advantage geography or regions. Rural districts that are losing population often have their populations bolstered by extending "fingers" into suburban or even urban areas. Those precise extensions of the district allow the rural areas to dominate the overall vote in the district. Sometimes termed the "rural reach" or the "rural stretch," such practices have been found to be permissible so long as equal population and voting rights protections are not violated.⁷

Partisan gerrymanders are the best known form, where "packing" and "cracking" allow one party to amplify its representation [6, 35]. A related version of the partisan gerrymander is the bipartisan gerrymander, which seeks to protect as many incumbents as possible for reelection, regardless of party. This gerrymander most often occurs under circumstances of low political polarization, or when there is split control of the legislature and the executive in a state, thereby necessitating compromise.⁸ Bipartisan gerrymanders work by carefully constructing districts to put incumbents in front of familiar or friendly voters.

Then, there is the racial gerrymander. This is the ultimate legal, empirical, and rhetorical double-edged sword of the redistricting and apportionment process. Racial gerrymanders use race as a criterion when crafting districts, often by creating constituencies with majorities of homogeneous racial or ethnic minority groups. Race-conscious redistricting is 'good' when the practice creates a district that is a remedy to racially polarized voting that disadvantages the minority electorate. Race-conscious redistricting is 'bad' when it is designed to limit minority voter influence by cracking and packing. For example, if African American voters can readily control the outcome in a district that is 55% African American, increasing the African American vote share to 80% 'wastes' Black votes and limits broader African American representation. However, when minority voters are geographically concentrated and nearly homogeneous, a different problem occurs: it might

⁵ *Voinovich v. Quilter*, 507 U.S. 146 (1993); *Brown v. Thomson*, 462 U.S. 835 (1983).

⁶ This last point was reiterated by the courts in Georgia in *Cox v. Larios*, 542 U.S. 947 (2004). In that case, rural south Georgia and the urban core of Atlanta—predominantly Democratic areas—had been given an advantage in getting state legislative seats through the manipulation of district population deviations. Put simply, Democratic districts were typically underpopulated by 4-5%, Republican areas were similarly overpopulated. Regionally specific biases to advantage one region over others are not permissible [18].

⁷ Beyond "reaches" and "stretches," the various metaphors for strange shapes in redistricting are ably described in Owen and Grofman [28].

⁸ Some authors have argued that there is less partisan bias in district schemes when the process goes through commissions, courts, or split party control [1, 13].

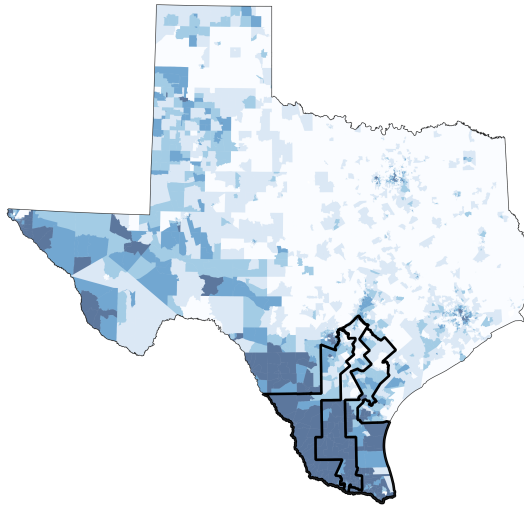


Figure 1: Districts in the Rio Grande Valley of Texas. The blue coloring indicates a higher concentration of Hispanic voters.

be necessary to break up clustered minority communities in order to avoid wasting votes and to secure greater impact for community preferences. This is highly visible in the Rio Grande Valley of Texas, which is approaching Hispanic homogeneity (see Figure 1). Drawing districts in the Valley can easily pack Hispanic voters in and similarly limit Hispanic impact in the overall Texas electoral map.⁹ A similar problem can occur in parts of the Mississippi, Alabama, and Georgia “Black Belts.”

IS THE SYSTEM TO BLAME?

We have all these challenges, and all of these opportunities for arbitrage, because we demand representativeness, responsiveness, diversity, and sometimes even proportionality from single-member districts (SMDs). And this system is ideally suited to allow for certain forms of community or geographic representation, but not to guarantee the balance of party or ethnicity in a representative system. Responsiveness is not built in. Yet we demand through legislation and litigation that these SMD systems do exactly these things.

There is a significant body of literature detailing the consequences of the SMD system itself. If a districting scheme combines a mixture of competitive and safe districts, the advantages to the favored party will be nonlinear. Therefore, the relationship between votes cast for a party and seats won will look curvilinear; many have described the votes to seats relationship with reference to a “seat bonus” or “winner’s bonus” for the majority party, so that winning 51% of the vote might result in, perhaps, 54% or 55% of the seats.¹⁰

⁹An excellent take on Texas redistricting, the issues of Hispanic representation, and redistricting in general is found in Bickerstaff [4].

¹⁰Ideas about seats–votes curves are found in classic political science literature like Taagepera and

Districts also lend themselves to incumbency advantage. By electing singular representatives and allowing them to stand for reelection with representative advantages of office, we enable incumbents to defy shifts in the popular vote [20]. And, because incumbents draw the districts, they take care of themselves and selected colleagues.

Historically, regulated single-member districts were thought to be a cure for racially exclusive voting practices. But racial fairness in representation is complicated, even with rules for monitoring district composition. Historical patterns of differential voter turnout and population dispersal can make it difficult to draw districts of sufficient number and composition to allow minorities to secure representation proportional to population.¹¹

Majoritarian values and racial fairness—two special cases of the goal of proportionality in representation—are implicit in the American ethos that has been refined through Constitutional amendments and case law over almost 250 years of U.S. history. The repeated use and interpretation of Article I and the 14th Amendment throughout the redistricting battles of the last half-century have been to protect equal access to the vote and minimize discriminatory distortions. Perhaps aggressive monitoring and regulation are necessary but not sufficient to cure the quirks, pathologies, and invitations to abuse in the system of single-member districts.

4 THE REDISTRICTING PROBLEM IS A MATH PROBLEM!

Political scientists and mathematicians enjoy redistricting for the same reason they enjoy baseball: it is a game filled with things that can be measured and correlated, and there are consequences to the play of the game.

Elections are iterative and dynamic. So is baseball. Nuanced changes in the playing field, playing conditions, and the composition of teams can alter the game. And, the home team has an advantage.

To think of redistricting as a math problem, one has to consider all the things that can be measured, and the uncertainty that attaches to those measures. We already know that there is a mathematical basis for the distortions from straight proportionality of votes-translated-to-seats in single-member district systems. And, there is an ongoing debate over how to measure bias and responsiveness of SMD systems based on changes in votes and the ‘wasting’ of votes. How does one disentangle the inherent advantages associated with SMDs, from the perception that those natural advantages are somehow reprehensible bias introduced by mapmakers? Some of the metrics and their logic were reviewed in Chapter 2. So we’ve seen that the

Tufte [32, 33]. See also Chapter 2.

¹¹The level of minority voter concentration within an SMD required to allow minority voters an equal opportunity to elect a representative of choice is variable within a state. So, for example, a lower proportion of Hispanic voters in a district is required to elect a representative in the South Valley of Texas than in the Big Bend country. The same might be said of Black Belt constituencies in Georgia or North Carolina when compared to Louisiana.

sheer volume of measures available to evaluate representative maps is impressive. There is not always a clear cardinal hierarchy to the rules of redistricting, or a clear measure of their importance and influence in the process. And there is not always a clear metric for each qualitative rule. But, even when the criteria come with metrics and a clear cardinal hierarchy, they are still stubbornly interactive and interdependent. And, nearly all of the measures we use suffer from internal and external problems of validity and consistency.

Let's briefly review a few of the rules and their measurements to see how much we can convince ourselves that gerrymandering can be cured with math.

Population equality is deemed to be a background assumption, one that must be achieved over and above all others. But even though the Census gives us the legal fiction of complete accuracy, it is just as shaky as most attempts at large-scale quantification. It is usually two years old by the time districts are drawn and used. It suffers from coverage problems and measurement errors that are sources of enduring controversy. These potential problems exist in the general enumeration; in the measurement of race; and in the identification of citizen populations.

The only other national imperative is the Voting Rights Act and its mandate for racial fairness, whose enforcement depends on the circumstances in individual states and the necessity to remedy historic discrimination. States must consider race just the right amount—not too much and not too little—in the process of drawing districts. The numbers used in VRA relate to two empirical questions: (1) is there racially polarized voting, and (2) is there vote dilution?

To answer these questions, one must measure minority voter participation rates. These are variable from state to state with regard to their precision, and must often be estimated, often from relatively imprecise data. The legal demands have led political scientists to develop a huge secondary literature of statistical techniques—homogeneous precinct analysis, ecological regression techniques, and ecological inference—each with their virtues and limitations [16, 21, 22, 24, 34].

Justice Sandra Day O'Connor observed in the landmark case *Shaw v. Reno*, which discarded a North Carolina congressional plan as a racial gerrymander, "We believe that reapportionment is one area in which appearances do matter." She was talking about shape and "compactness," the geometry of districts, which has also eluded clean measurement (see Chapter 1).

Political scientists have been players in the game of quantifying compactness. Niemi et al sorted compactness scores into what you might call "measures of circitude" and "measures of fillitude" [27]. Or, put another way, to what extent does a district look like a circle, or fill in the space within a circle? But there are other dimensions of the geometry to consider when talking about compactness. The shapes of districts are laid on top of complex, growing, and interacting communities. While it is possible to draw nice square districts in some parts of the country, the development of population corridors, the habits of movement and commuting, and even the concept of community might not fit in those squares. Appalachia and the coast of Florida form different challenges for making districts look like brownies in a pan. And even the outer outlines of a state like West Virginia or Texas will have a great impact on the numerical compactness of the districts within

the state, when compared to a state cut out by cleaner lines like New Mexico or Colorado. Shape requires context to fully understand its impact.

There are myriad other measures that might inform us about a mapmaker's impact on representation. Judges are tasked to craft maps to resolve litigation without putting a needless thumb on the political scale. To assess partisan impact requires still more metrics, which in turn require having data on election outcomes. To compare across all districts, some sort of counterfactual measurements will be needed for uncontested races, such as by crafting "reconstituted elections" or other imputation techniques (see Sidebar 2.2).

We might have to consider the differential burden borne by the parties in the changes to a map. For example, Florida's redistricting criteria (which are part of the state constitution) hold that no plan or individual district be drawn with the intent to favor or disfavor a political party or incumbent.¹² To consider the impact on an incumbent or a party requires understanding not only of the partisan balance of districts, but also the extent to which incumbents confront new voters. This means measuring the retention of the "district core" from the old map to the new map. The more newer constituents an incumbent encounters, the presumptively tougher their reelection.

The measurement uncertainties can start to pile up, leading to a great deal of difficulty in identifying the best strategies. This may well lead us to doubt that fair redistricting can be achieved with math alone.

5 THE REDISTRICTING PROBLEM IS A SYSTEMS PROBLEM, V.2: TECHNOLOGY

The last problem for redistricting is one that is still being defined and written, that redistricting is a systems problem, and specifically a technology problem. In the last 35 years, we have gone from crayons to computers in the shaping of districts. And, now, with the incredible gains in computing speed, data storage, software, and online interfaces, most anyone can make districts.

As you'll read throughout this book, computers can now sample thousands or millions of alternative districting plans. This does allow for the crafting of a huge assortment of scenarios. But, this may be of limited use in a world where the maps are usually created and ultimately approved by legislatures, which only need one map that satisfies the rules and advances their goals. And, incumbents will create real constraints on the scope of potential maps that might be in play.

Where technology helps is in acting as a diagnostic and political forensic tool. The ability to run scenarios and view a range of possible plans allows one to also measure those scenarios in terms of every measure of maps available, including partisanship. If we can measure it, we can determine what map is an outlier or rare event, and what maps are typical of a process more guided by the rules and norms. This lets us ask questions of motive behind outlier maps, and just as importantly,

¹²Florida Constitution Article III, §20(a), 21(a).



the process of creation and assessment will hopefully give us insight that improves not just our *measures*, but our *systems* for deciding how maps will be crafted.

6 THE REDISTRICTING PROBLEM IS A PEOPLE PROBLEM, V. 2: POLITICS

In the end, the problems of redistricting are not created, nor can they be solved, by technology or by mathematics. Certainly the system of single-member districts and the landscape of human geography create challenges for fairness and opportunities for abuse. The main concern with single-member districts, however, is that the system encourages gerrymandering for political advantage because the process is infused with legislative politics. Those who benefit from the process also control the process in most every instance. Unified party majorities have little incentive or reprimand beyond conscience and a sense of fair play to not seek political advantage.

This makes redistricting problems, at heart, people problems after all. The reality of human existence and especially politics is that people want to win power, and this is especially the case for politicians. Political parties want to control government, and they want predictability. Status quo majorities that are afraid of the prospect for change, whether political or demographic. Democrats held on to political power in the Georgia legislature and the Texas congressional delegation long after demographics demanded partisan change¹³ simply by virtue of favorable legislative maps and strategically placed incumbents. And now Republicans in those same places will need aggressive gerrymandering to resist the demographic pull the other way, brought on by rising immigration and a growing urban vote. In the 21st century, efforts to craft maps to a party's advantage entails identifying and minimizing the impact of demographic trends that swing the pendulum away from the party in power. The use of primary political data and secondary demographic data can inform the evolution of politics in a state or community, and therefore

¹³The Democratic "Solid South" that had held up from the 1880s to the 1960s had rapidly transformed by the 1980s into the red states we know today. But Republicans did not take a majority in the Texas congressional delegation, or in the Georgia House of Representatives, until the election of 2004.

how to draw districts. And, the politicians in power have the computers, the data, and the legislative votes.

If the courts won't act, and legislatures are compromised by either cynicism or the effects of gerrymandering, only direct democracy through referenda or constitutional revision remain as the means to effect change. Such initiatives focus on either changing the standards for drawing maps; changing the rules by which maps are drawn; or changing the venue, by instituting commissions. The failure of other institutions to act in a manner consistent with substantive democratic theory requires new solutions to either instill those values, or to create new institutions.

ACKNOWLEDGMENTS

The genesis for this chapter comes from a public lecture to the Voting Rights Data Institute at Tufts University, on June 27, 2018 (<https://sites.tufts.edu/vrdi/>). My thanks to all of the Institute participants and convener Prof. Moon Duchin for their feedback and encouragement in developing this essay.

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