Chapter 3. **Traditional Districting Principles: Judicial Myths Vs. Reality**

3.1. Redistricting Principles In The Courts

One person, one vote. With this principle, the Court permanently changed representation in the United States. Equal population requirements changed the face of legislative redistricting in the 1960's when the Supreme Court applied it to congressional districts in *Wesberry* v. *Sanders* (1964) and to state legislatures in *Reynolds* v. *Sims* (1964). Equality in district population was valued not only as instrumental to other goals, but for itself, as Justice Black in *Wesberry* explained: "as nearly as practicable one man's vote in a congressional election is to be worth as much as another's... To say that a vote is worth more in one district than another would... run counter to our fundamental ideas of democratic government" (emphasis added).[74]

As Justice Brennan made clear, the court based its decision in large part on a particular understanding of the historical meaning of the 14th amendment and of article 1, ß2 of the constitution. And as widely accepted as this principle has come to be, it has been subject to severe historical criticism, criticism that has never been resolved. For example, Berger [# 1977] claims that malapportionment was historically present and accepted before and during the creation of the 14th amendment, and hence that the equal protection clause could not have implied the equal population principle (from Chapter 5): "Certainly there was no disclosure that such intrusion (on apportionment) was

---

[74] This is argued in detail in Lowenstein (1990).

contemplated; there is in fact striking evidence that malapportionment was an accepted practice."

This claim has never been thoroughly examined. Although previous authors have studied the history of apportionment between states (Balinski and Young 1982; McKay 1965; Schmeckebier 1941), studies of the history of apportionment *within* states is limited to isolated states and periods. (See Dixon 1968 for a survey.) And our knowledge of the apportionment of *congressional* districts has been particularly limited (Dixon 1968; Pildes and Niemi 1993; Schmeckebier 1941). In Section 3.4.2 I fill this longstanding gap in the literature, and I address Berger's claim.[75]

In the courts, many types of districts have been under attack, but congressional districts have undergone particularly close recent scrutiny by the Supreme Court. In particular, all of the cases in the last five years in which the Court has particularly empasized compactness and other "traditional" have been cases involving congressional districts. While this does not imply that the Court's statements about such principles

---

[75] Probably the most extensive empirical study of compactness in U.S. Congressional districts is, Pildes & Niemi (1993), should be noted for examining the compactness of districts in the 1980's and 1990's and for proposing a novel legal theory to explain the court's actions in *Shaw*. Neither this study, nor any other I am aware of, systematically studies the compactness of historical districts, the contiguity of districts, or the extent to which districts have followed "traditional boundaries."

exclude other kinds of districts, there are a number of reasons why the Court might treat Congressional districts differently than legislative districts: Legislative and congressional districts have somewhat different legal, historical, and even philosophical traditions. The laws that govern legislative districts have varied over place and time. Many states have required that legislative districts be contiguous, compact, or that they follow county boundaries and other states have required that each county have its own legislative districts. At the same time, Congressional districts have not, for the most part, been subject to such requirements — and even when these requirements were on the books, many questioned whether Congress had the property authority to make them and whether they were enforceable. (See Section 3.4.1.)

These myriad differences often stem from a more fundamental difference between congressional and (some) legislative districts: Congressional districts were written into the Constitution explicitly to provide representation on the basis of population. In contrast, many states' constitutions provided that legislative representation be based upon other non-population principles such as the representation of counties, cities, or other geographical and political units. I have followed the Court's path, and chosen in this chapter to discuss Congressional districts. As a practical matter, as well, records of congressional districts and representation are more complete and accessible than records of legislative districts.

As population equality changed the face of legislative redistricting in the sixties, a new set of principles has the potential to change redistricting in the 1990s. In *Shaw* v. *Reno* (1993) the Court labeled several principles "traditional" and "objective" factors,

and indicated that they could serve to defeat racial gerrymandering. These principles were reemphasized in *Miller* v. *Johnson* (1995), in which the Court listed many of these criteria[76]:

> The plaintiff's burden is to show, either through circumstantial evidence of a district's shape and demographics or more direct evidence going to legislative purpose, that race was the predominant factor motivating the legislature's decision to place a significant number of voters within or without a particular district.
>
> To make this showing, a plaintiff must prove that the legislature subordinated traditional race-neutral districting principles, including but not limited to *compactness, contiguity, respect for political subdivisions or communities defined by actual shared interests*, to racial considerations. Where these or other race-neutral considerations are the basis for redistricting legislation, and are not subordinated to race, a state can defeat a claim that a district has been gerrymandered on racial lines.

---

[76] In *Abrams* v. *Johnson* (1997), the court again stressed the importance of traditional districting principles in upholding the districts drawn to replace those invalidated by *Miller*.

More recently in *Bush* v. *Vera* (1996) the court extended and clarified the role of these criteria. Writing the plurality opinion for *Vera*, Justice O'Connor made compactness and regularity[77] particularly important criteria to follow for those who wish to pass strict scrutiny and to avoid plaintiffs' substitute redistricting plans: "A district that is reasonably *compact and regular*, taking into account traditional districting principles such as maintaining *communities of interest and traditional boundaries*, may pass strict scrutiny without having to defeat rival compact districts designed by plaintiffs' experts in endless beauty contests."

How, exactly, are we to evaluate districts by these principles? From which traditions did these principles spring? These opinions offer little guidance. The court neither supports its implicit claim that these particular principles deserve special status, nor provides us with a foundation for deciding in general what principles merit such an appellation.[78] I answer these questions by analyzing historical congressional districts. Before presenting this analysis, I briefly turn to data sources and measures.

---

[77] In this line of opinions, and especially in *Vera*, the court uses "noncompact" to refer to the overall shape of the district, and "regular" to refer to the meanderings of a district's boundary. This differs from the standard terminology in political science, where "compactness" has been used to refer to both properties.

[78] Nor is such a foundation to be discovered in *Gaffney* v. *Cummings* (1973) or *Karcher* v. *Daggett* (1983), the cases to which, on this issue, *Shaw* and *Miller* refer.

3.2. Data Sources

No single source contains geographical and population data for U.S. congressional districts over the entire period from 1789 through the present; for different periods I turned to several different data sources. Data on the geography of election districts is available from several overlapping data series: For election districts used between 1789 through 1912, I extracted geographical data from the *United States Congressional Districts and Data* series (Parsons, Beach and Hermann 1978; Parsons, Dubin and Parsons 1990; Parsons, Beach and Dubin 1986). This data source leaves out maps of some urban districts, so I extracted geographic data from *The Historical Atlas of United States Congressional Districts, 1789-1983* (Martis and Rowles 1982). This atlas contains district maps and lists the political units, typically the counties, cities, and wards, that the district comprises, but does not contain population data.[79]

Parsons' data series ends in 1912, and with it detailed data at the district level until the creation of congressional district data books with the census in 1960. For decadal district population data from 1913 through 1953, I used the figures in the *Congressional Directory* (Joint Committee On Printing 1913; Joint Committee On Printing 1923; U.S. Government Printing Office 1933; U.S. Government Printing Office 1943; U.S. Government Printing Office 1953). For the period 1963 through 1994, I extracted geographic and population data from the Congressional Quarterly's publications:

---

[79] The district maps are somewhat less detailed than the maps in Parsons, as well.

Congressional Districts of the United States (Congressional Quarterly 1964), *Congressional Districts in the 1970's* (Moxley, Walker and Healy 1974), *Congressional Districts in the 1980's* (Congressional Quarterly 1983), *Congressional Districts in the 1990's* (Congressional Quarterly 1993).[80]

I extracted the tabular data using an optical character recognition system, in addition to entering data manually.[81] Extracting compactness data from the district maps was more complicated: First, I digitized each district map using an optical scanner.[82] Second, I used image-processing software[83] to identify the boundaries of each district and to

---

[80] These books are based largely on data in the United States Census's *Congressional District Data Book* and *Congressional District Atlas* for the relevant period. This series leaves out maps for the 1963 districts, so I used the maps in (Martis and Rowles 1982).

[81] I used the commercial character recognition package Omnipage 3.0. All numerical data was independently double-checked to ensure correct entry.

[82] I used a HP-Scanjet III optical scanner operating at various resolutions ranging from 150–600 d.p.i. I used the higher level resolution when maps were particularly small and finely detailed.

[83] I used the software package NIH-Image (version 1.6), a program in the public domain developed by the National Institute of Health especially for mathematical analysis of two-dimensional digital images. This program has built-in routines that remove noise

estimate its geographical properties. Third, I used image analysis software to apply standard mathematical formulas (described in Section 3.1) that calculate compactness scores.

3.3. Evaluating Districts: Compactness And Population Measures Compared

3.3.1. Quantitative Measures of Malapportionment and Compactness

There are a number of different methods to measure malapportionment used in the scholarly literature and by the courts. The most popular early measures of population variation were the difference between the largest and smallest districts (divided by the mean), the population variance ratio, which is the ratio of the largest to the smallest district, the maximum (or average) percent deviation from the mean, and the electoral percentage, which is the minimum percentage of the population represented by a bare majority of seats.[84] Later court cases have tended to stress the difference between the

---

from images, that automatically identify the outlines of selected shapes (districts in this case), and that measure perimeter, area (etc.) of a selected shape. It was necessary, however, to guide the program in its selection of districts, and to correct defects in the district maps, such as boundary lines that were obscured by text markers or map symbols, boundary lines that overlapped solely because of line-weight, and the like.

[84] See Dixon (Dixon 1968) Chapter 17, Section 4 and Chapter 18, Section 2.

largest and smallest districts, and this measure was emphasized in *Karcher* v. *Daggett* (1983). These measures have a number of theoretical faults, and Foster (1985) argues cogently that such measures as the Gini index, Theil's measure of entropy, and the coefficient of variation have more desirable theoretical properties (Foster 1985).

For this data, all of these methods give very similar evaluations of districts. For the majority of this chapter, I use a common and easily understandable measure, the population coefficient of variation.[85]

Contiguity is the most often mentioned geographic principle. A simple idea in theory, it is less so in practice. In the context of redistricting, contiguity is meant to be a signal of the political manipulation of districts, not just a formal and accidental property of district shapes. If we are to use contiguity in this fashion, two hurdles[86] must be overcome. First, mathematical contiguity does not reflect a constraint on electoral manipulation, as any given noncontiguous district (or set of districts) can be made

---

[85] This is the standard deviation divided by the mean. Think of it as a measure of the average deviation.

[86] Another approach to making contiguity practical is to examine the costs of traveling and communicating in the district. Under this approach, for example, a district would be considered non-contiguous if it were divided by an impassible mountain. While this approach has merit, the historical data is not rich enough to consistently apply it.

contiguous by adding arbitrarily thin connecting lines, without materially changing the results of an election held in that district (Sherstyuk 1993). Second, breaches of contiguity may be difficult or impossible to avoid because of geographic obstacles, such as large bodies of water, and such non-contiguities occur in the absence of any political manipulation.

To overcome these hurdles, I divided districts into three categories in order of divergence from real-world contiguity: practically contiguous, questionably contiguous, and non-contiguous. All districts that are formally contiguous, or that only deviate from contiguity because of islands off the coast of the district, I put in the first category. Into the second category I put districts that were otherwise contiguous but that contained islands that were not directly off the coast of the district, districts that were non-contiguous but could be connected by straight bridges, and districts that were connected only by "points."[87] In the non-contiguous category, I put all other violations of formal contiguity (Figure 3-1).

---

[87] More formally, I classified a district as questionably contiguous when more than ten percent of the district's area was connected to the rest of the district by a passageway no longer than one percent of the district's length.

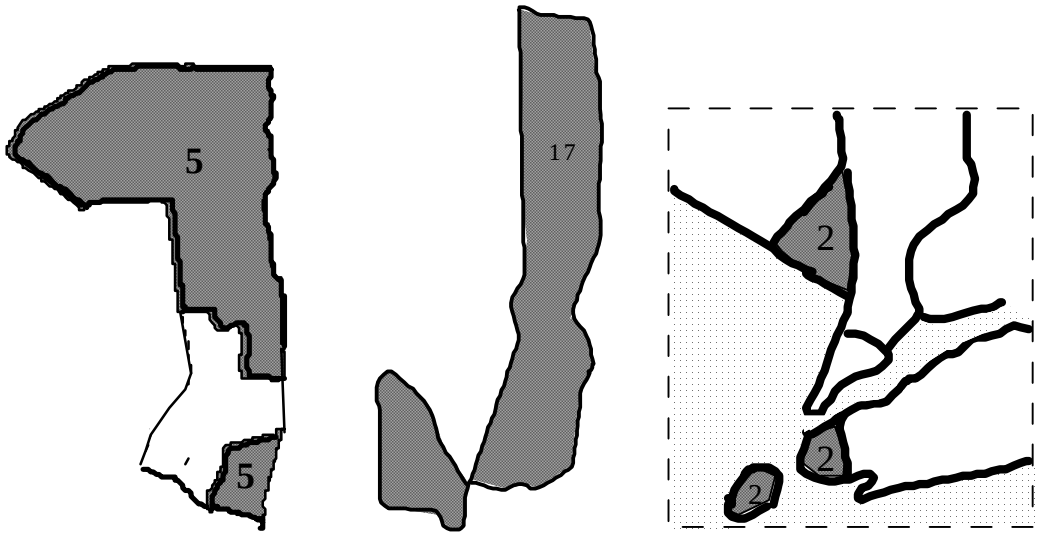

Figure 3-1. Three Odd District in Early New York Congressional Districting Plans. Part A shows the plainly non-contiguous fifth district in New York's first (1788) congressional districting plan. Part B shows the seventeenth district in the thirteenth (1812) Congressional district plan; this plan is of questionable contiguity because it is connected only at a single point. Part C shows district two in the twenty-third (1832) Congressional districting plan. The light shading shows areas covered with water. This district is of questionable contiguity because the island portions of the district are not joined to the nearest mainland district.

Breaches of "traditional boundaries" are even less often subjected to formal measurement. City and county boundaries, although often referred to by the courts as "traditional boundaries" are, at least at times, political boundaries, subject to change through the political process. Yet one suspects that there is some truth to the courts'

distinctions in this case, that city and county are less manipulable than districts, or that, at least, because of the extent to which these boundaries affect local government, these lines are manipulated for different purposes than are election districts. On this intuition, districts were placed in several categories. Districts "followed" traditional boundaries if they were composed of lasting independent political units: whole counties with the addition or subtraction of whole towns, cities, parishes, boroughs, or townships. Districts "split" traditional boundaries if they were defined explicitly in non-political terms, namely roads, streets, and (after the 92nd congress) census blocks and tracts. With a handful of exceptions, the remaining districts were classified as "questionable," with a subcategory for those districts splitting county and town boundaries only to follow assembly district lines.[88] This categorization is admittedly rough, but the overall patterns

---

[88] And, from the 93rd congress, "split" districts used census blocs and tracts. Also, in practice, districts that were "split" only along (explicitly defined) natural boundaries were quite rare: New York's fifth district in the first congress mentions the Hudson (but the county may not have been well defined), the third and fourth districts in Maryland were divided by the Monocacy River from the 3rd through 22nd congresses, and two districts around Pittsburgh, PA, were also split along several rivers during most of the Congresses from the 33rd through the 67th. These districts were put in the "followed traditional boundaries" category, while two districts in South Carolina's fifty-third congress that split one town along railroad tracks was put in the "questionable" category.

in the data are clear enough that changes in the categorization would not change any of the conclusions in this chapter.

The literature contains many more ways of measuring the compactness of a set of districts than it does for measuring the malapportionment in those district. As I showed in Chapter 2, geographically-based compactness measures fall into three rough categories: measures that compare the perimeter of a district to its area, measures that compare the length of a district to its width, and measures that compare the area of a district to the area of an idealized shape that encloses the district. I use three populaAs we measures that could be reasonably computed from the available historical data, selected from among these categories (Table 3-1).[89]

---

[89] Compactness measures can also be computed based upon population distribution instead of geographical distribution (See Chapter 2, and Niemi, et al. 1991 for a survey). State laws, constitutional provisions, and court cases, however, stress the geographical measures almost exclusively.

Name	Measurement
Normalized Area/Perimeter (Norm)	$A/(0.282P)^2$
Area of Circle (AC)	The ratio of the district area to area of minimum circumscribing circle (Normalized to the [0,1] interval.)
Length/Width (LW)	The length of the minor axes/major axes for the best fitting ellipse.[90]

Table 3-1. Selected compactness measures.

3.4. Historical Patterns

3.4.1. Congressional and State and Regulation of Congressional Districts

For many years, judges consistently refused to enforce state provisions designed to control redistricting. Although willing to hear an initial flurry of challenges in the 1890s, state courts universally failed to provide any positive remedy. Later attempts to enforce

---

[90] Measures that compare length and width are common (See Niemi, et al. 1990.) but these measures tend to be overly influenced by outlying points and are not necessarily orientation independent (Young 1988). By fitting an ellipse to the shape and measuring the axes of the ellipse both of these problems are reduced:

I calculate the best fitting ellipse by using the 'ellipse of concentration' (See Cramer (1946)) which equates the second order central moments of the ellipse to those of the distribution of points in the district, and then adjust the resulting ellipse slightly so that it has the same area as the district being measured.

redistricting rules in the courts also met with failure, culminating in *Colgrove* v. *Green*, in which the Supreme Court declared districting to be a non-justiciable "political question." (See Chapter 1 in Cortner 1970.) At the time these rules were created, usually in the 19th century, however, the courts' future direction had not been foreseen. And as we shall see in this section and in Section 3.4.3, some regulations on districts were effective, if only for a short time. If population equality, contiguity, or compactness are traditional districting principles, we should expect to see them in the laws and or congressional debates of the time.

Before 1842, there were no laws governing the construction of congressional districts.[91] In 1842, Congress passed the first such law, which required that all states use contiguous single-member districts (Table 3-2). State regulation of congressional districts followed soon after, but was limited to two states in this period (Table 3-3).

Starting Year	*Congressional District Requirements*
1842	Single Member Districts, Contiguity
1850	No provisions
1862	Repeated 1842 Provisions
1872	Added "practicable" Population Equality
1881	Repeated
1891	Repeated
1901	Added Compactness
1911	Repeated

Table 3-2. Congressional Redistricting Laws, 1789-1913.

Source: Schmeckbeier (1941), ch. 9.

---

[91] Between 1816 and 1826 there were a number of attempts to pass an amendment requiring congressional districts, see Schmeckbier 1941, pgs. 131-131.

Starting Year	State	Requirement
1849	California	Multi-County Districts Must Be Constructed of Contiguous Counties
1872	West Virginia	Contiguity and Compactness

Table 3-3. State Constitutional Governing Congressional Redistricting, 1789-1913. Based on data from: McKay (1965), State Summaries Appendix.

Although congressional districts were substantially unregulated, state *legislative* districts were often subject to a number of rules. As Table 3-4 shows, many states were apportioned on a county basis, or had provisions against splitting counties, and many others had contiguity requirements (Table 3-4). Perhaps these requirements for state legislative districts indirectly affected congressional districts, or perhaps they reflected the norms of the time, since despite the absence of official regulation, most congressional districts were contiguous (as we shall see in Section 3.4.3); and, with the exception of districts in large urban areas (See the appendix to this chapter.), most congressional districts during this period were composed of whole counties (Table 3-4).

Method of Apportionment of Legislative Districts	*States*[92] (Start of Provision)	*Restrictions for at least one house* (Date, if different from column 2)
Entire Legislature Apportioned by Counties	Delaware (1787), Georgia (1788), New Jersey (1787), North Carolina (1789), Wyoming (1890)	*Contiguity:* *Compactness:*
At Least One House of Legislature Apportioned Primarily by Counties	Maryland (1788), Montana (1889), New Jersey (1844), North Carolina (1835), South Carolina (1865), Virginia (1788)	*Contiguity:* North Carolina (1868) *Compactness:*
Apportionment Based Primarily on Cities or Other Geographical or Political Units	Connecticut (1788), Rhode Island (1790), South Carolina (1788), Virginia (1830), Vermont (1788),	*Contiguity:* Virginia (1902) *Compactness:* Rhode Island (1842)

[92] Connecticut apportioned its lower house by cities and town, but its upper house was elected at-large. Before 1840, Massachusetts apportioned its upper house on the basis of taxes. New Hampshire based its upper house on taxes and lower house on the number of "ratable polls." In 1788, New York added provisions to apportion by population and area in the upper house and to guaranty representation for some counties in the lower house. Prior to 1790, Pennsylvania elected a unicameral legislature on the basis of cities and counties. In 1874, it adopted compactness and contiguity for cities that were split into at least four districts.

Population Exclusively	California (1850), Colorado (1876), Illinois (1818), Indiana (1816), Iowa (1846), Minnesota (1858), Nebraska (1867), Nevada (1864), Ohio (1803), Oregon (1859), South Dakota (1889), Texas (1845), Washington (1889), Wisconsin (1848)	*Protected County Lines:* California, Colorado, Indiana (1851), Minnesota, Texas (1876), Wisconsin *Contiguity:* Nebraska, Texas (1876), Washington, Wisconsin *Compactness:* Nebraska, Wisconsin
Primarily Population	Alabama (1891), Arkansas (1836), Florida (1845), Idaho (1890), Kansas (1861), Kentucky (1792), Louisiana (1812), Maine (1820), Massachusetts (1788), Michigan (1837), Mississippi (1817), Missouri (1821), New Hampshire (1788), New York (1788), North Dakota (1889), Pennsylvania (1790), Tennessee (1796), Utah (1896), West Virginia (1863)	*Protected County Lines:* Arkansas (1874), Idaho, Kentucky (1799), Mississippi (1831), New York (1894), North Dakota, Tennessee, Utah, West Virginia (1873) *Contiguity:* Arkansas (1868), Louisiana (1868), Massachusetts (1857), Mississippi (1831), Missouri, New York (1846), Utah, West Virginia (1873) *Compactness:* Arkansas (1868), Missouri, New York (1894), West Virginia (1873)

Table 3-4. Historical Provisions For State Legislative Districts. Start Source: (1965), State Summaries Appendix.

Congress first passed regulations governing congressional districts as part of the apportionment law of 1842. This law, in addition to assigning seats in congress to each state, specified that all members of congress were to be elected from single-member districts, in effect banning at-large elections.

Three topics occupied the bulk of the debate over this law on the floor as recorded in the *Congressional Globe* (Congressional Globe 1842, pgs. 435–7, 445–7, 452–4, 526–32, 583–5, 601). First, unsurprisingly, was the question of how many seats each state should receive.[93] Second was whether Congress had the authority to mandate single-member districts. Last followed a debate over whether at-large elections unfairly increased the influence of large states in congress by providing the majority parties in those states with a large electoral bonus. In the midst of these debates, the contiguity provision seems to have been generally accepted without mention, and there was little concern expressed over the subject of gerrymandering.[94]

The effect of the congressional mandate for contiguous single-member districts was swift. In the 23rd congress, prior to the districting legislation, 20 percent of representatives were not elected from single-member districts; whereas immediately after

---

[93] Debates over the size of the house, the method of fractions to be used to distribute seats, and the number of seats given to individual states recurred regularly in every apportionment debate that I examined, from 1842 to 1911. Balinski and Young (1982) cover the history and principles of apportionment between states quite thoroughly, and I shall not pursue it here.

[94] The one mention of a gerrymander in the records of the floor debates is a hypothetical and hyperbolic rhetorical question asking whether if congress could mandate single member districts, and why could it not then mandate particular gerrymanders.

the legislation, non-district representatives dropped to nine percent of the total, and dropped further to 1 percent by the 31st congress (Table 3-5). This legislation was not entirely effective, however. Despite requirements in later apportionment acts for single member districts through the 67th congress, at-large elections were used in some districts, though in reduced percentages (Table 3-5).

Congress	*States Deviating from Single Member Districts*	*Percentage of Representatives Not From Single Member Districts*
1	4 / 13 = 31%	20 / 65 = 31%
3	7 / 15 = 47%	46 / 105 = 44%
8	8 / 17 = 47%	40 / 142 = 28%
13	10 / 18 = 56%	63 / 182 = 35%
18	9 / 24 = 38%	55 / 213 = 26%
23	9 / 24 = 38%	49 / 240 = 20%
28	4 / 26 = 15%	21 / 231 = 9%
33	2 / 31 = 6%	3 / 234 = 1%
38	2 / 23 = 9%	4 / 184 = 2%
43	11 / 37 = 30%	19 / 292 = 7%
48	9 / 38 = 24%	16 / 325 = 5%
53	5 / 44 = 11%	9 / 356 = 3%
58	6 / 45 = 13%	10 / 386 = 3%
63	5 / 48 = 10%	8 / 435 = 2%
68	1 / 48 = 2%	2 / 435 = 0%
73	12 / 48 = 25%	54 / 435 = 12%
78	9 / 48 = 19%	13 / 435 = 3%
83	5 / 48 = 10%	7 / 435 = 2%
88	8 / 50 = 16%	17 / 435 = 4%

Table 3-5. Percentage of Districts and States Deviating From Single-Member Districting

Although the Court relied partially on the 14th amendment for authority to regulate malapportionment, there is little reference to malapportionment in the debates that

surrounded the amendment (Avins 1966).[95] Close analyses of these debates conclude that the 14th amendment was meant generally to be "open textured," and nothing in the record precludes its application to malapportionment, nor is there explicit evidence that it was meant to encompass malapportionment (Kelly 1965; Van Alstyne 1965).

When, in the apportionment following the passage of the 14th amendment, "practicable" population equality was added to the requirements for districts there was much debate over what this amendment required of apportionment. Although the record of floor debate touches neither on gerrymanders nor on the new population equality requirement for districts, it shows a vociferous argument over whether explicit provisions should be added to the apportionment law to enforce it by determining the number of qualified voters that were denied suffrage in each state and reducing suffrage accordingly.[96] (Congressional Globe 1871, pgs. 64–66, 78–84, 105–112, 608) Member

---

[95] The Court relied upon the 14th amendment to regulate state legislative districts, in *Reynold* and upon Article 1, ß 2 of the Constitution in deciding *Wesberry*, which prohibited malapportionment in congressional districts. The appellants in *Wesberry*, however, in their briefs before the court, argued much of their case on 14th amendment grounds — particularly on the grounds that widespread and extreme malapportionment violated the equal protection clause.

[96] Section ß2 of the 14th Amendment reads in part: "But when the right to vote at any election... is denied... or in any way abridged... the basis of representation therein shall be

of Congress Ullyses Mercur, a Pennsylvania Republican, expressed the sentiment of those in favor of such a provision in this statement: “This 14th amendment, like many other parts of the Constitution, does not enforce itself. It required legislation in order to give practical effect to its terms. Now, I take it upon myself to say that Congress has passed no law calculated to give effects to the terms and restrictions of this 14th amendment” (page 78).

In the apportionment legislation of 1901, congress added “compactness” to the list of requirements for districts, and compactness seems to have entered for the first time into the record of congressional floor debates.[97] Although mentioned in state constitutions as early as 1821, compactness was never formally defined, either in state constitutions or in the 1901 and succeeding apportionment bills. There was a short debate on the house floor over the compactness clause (Congressional Record 1901, pgs. 605–6, 647–9), which centered around whether it could be measured. An excerpt from this debate shows the purpose of the compactness clause and its limitations (pg. 605):

---

reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.”

[97] In the floor debates of 1882, Representative Beltzhoover complained of “dumbbell” shaped districts, and claims that contiguity and population equality are not sufficient to prevent this abuse. But he does not call for compactness by name (Congressional Record 1882, pg. 1603).

> Mr. Rixey (Maine): I want to ask a question in regard to the phraseology of the bill... The bill... provides that the district "shall be composed of contiguous and compact territory." The words "and compact" seem to be added in this apportionment bill for the first time in the history of apportionment... Now, what I want to know is, who is to be the judge as to when districts are sufficiently compact?
>
> Mr. Kluttz: (North Carolina) I admit the force of the gentleman's question, and that it has never been in an apportionment before, so far as I know.
>
> Mr. Rixey: But what I want to ask is, who is to be the judge as to when a district is sufficiently compact?
>
> Mr. Kluttz: The language has heretofore been "contiguous." When the committee discussed it, I will say that the word "compact" was added at the suggestion of one of the members, the object of it being to prevent shoe-string[98] districts;...

---

[98] "Shoe-string" districts probably referred to the anti-black Mississippi Congressional districts of 1883 and 1893. See Kousser (1992) .

Representative Claude Kitchin, North Carolina, Democrat, objected, "This committee amendment proposes to put in the words 'and compact,' which, I submit, is unwise as well as unauthorized by the Constitution, because 'compact' may be liable to various constructions and become the cause of great confusion hereafter. Disappointed and defeated candidates, ever ready to complain, may base contests upon the shape of their districts and give the House an opportunity to unseat the successful candidate, and opportunity is often deemed duty."[99]

Further debates of the time left the question of how to measure compactness unresolved. Despite this, the provision was adopted in the 1901 apportionment act. From 1901 to 1929, although congress passed one reapportionment law and held five hearings[100] on apportionment, neither compactness nor malapportionment received

---

[99] In fact, three recent supreme court redistricting cases, *Miller*, *Vera* and *United States* v. *Hays* (1995), included defeated candidates for congress among their plaintiffs.

[100] Many early committee hearings were not recorded and there is no official written record of congressional hearings on apportionment prior to 1915 (Congressional Information Service 1980).

significant attention.[101] When, after a decades delay, congress finally passed an apportionment act in 1929, district criteria were dropped without discussion.

In summary, legislative history of both the 14th amendment and of subsequent apportionment legislation is agnostic on the subject "traditional" districting criteria. The lack of debate can equally be interpreted as consensus or unconcern. It is possible that such criteria were commonly accepted as implicit in fair representation under the 14th amendment, and were included in the apportionment legislation because most recognized that this amendment was not self-executing. But it is also possible that such criteria were regarded as minor, unnecessary, expeditions into the control of districts. Was there a general principle of equal apportionment and compactness operating at this time? As the legislative record is not definitive, we must look for these principles by examining the districts of that time. In the next two sections we will examine historical patterns of malapportionment, contiguity and compactness.

3.4.2. Regional Patterns of Malapportionment

Figure 3-2 presents a graph of state congressional malapportionment, weighted by the number of congressional districts, for the period 1789-1963. To my knowledge, this is the first time that these figures have appeared in print. Malapportionment improves dramatically with the second apportionment (3rd congress), decreasing and converging

---

[101] Although in 1915 there was a hearing before the committee on elections, in the House, on a bill in favor of proportional representation.

around the time of the Civil War and reaching an overall low-point at the time of the 43rd congress, at the time of the first redistricting after the passage of the 14th amendment. After that war, regional malapportionment remained stable and then gradually got worse from after 1903 through 1943 (Figure 3-2).

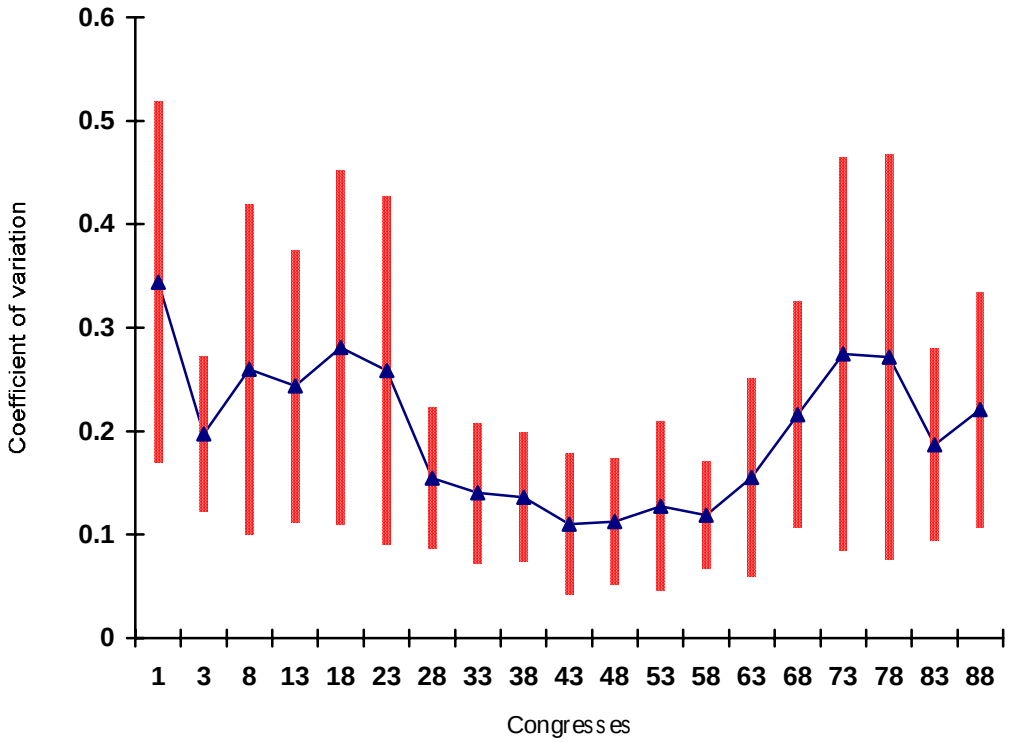

Figure 3-2. Malapportionment Across Time: The horizontal line shows average state malapportionment, weighted by the number of districts in the state. Vertical lines extend for one standard deviation from each of the sample averages.The coefficient of variation is used to measure malapportionment. Malapportionment of the white population is shown prior to the forty-third

congress (1873), and malapportionment of the total population is shown from that congress forward. These malapportionment measures are computed by state and averaged over ICPSR standard regions.

Figure 3-3 and Figure 3-4a–h show malapportionment by region[102] for this same period. Clearly, malapportionment varied significantly across regions and over time.

---

[102] I use the ICPSR standard region categories: The *New England* region comprises Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. *Middle Atlantic* comprises Delaware, New Jersey, New York, and Pennsylvania. *East North Central* comprises Illinois, Indiana, Michigan, Ohio, and Wisconsin. *West North Central* comprises Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota. *Solid South* comprise Alabama, Arkansa, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia. *Border States* comprises Kentucky, Maryland, Oklahoma, Tennessee, and West Virginia. *Mountain States* comprises Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming. *Pacific States* comprises California, Oregon and Washington. *External States* comprises Alaska and Hawaii.

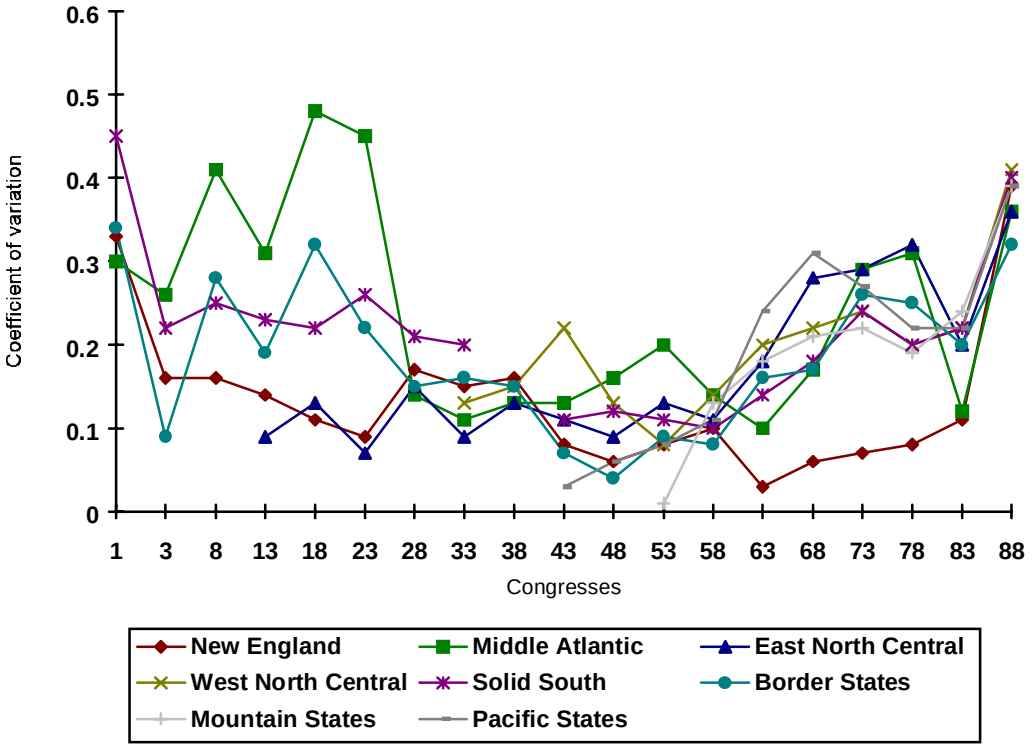

Figure 3-3. Malapportionment Across Time and Region: The coefficient of variation is used to measure malapportionment. Malapportionment of the white population is shown prior to the forty-third congress (1873), and malapportionment of the total population is shown from that congress forward. These malapportionment measures are unweighted averages over ICPSR standard regions.

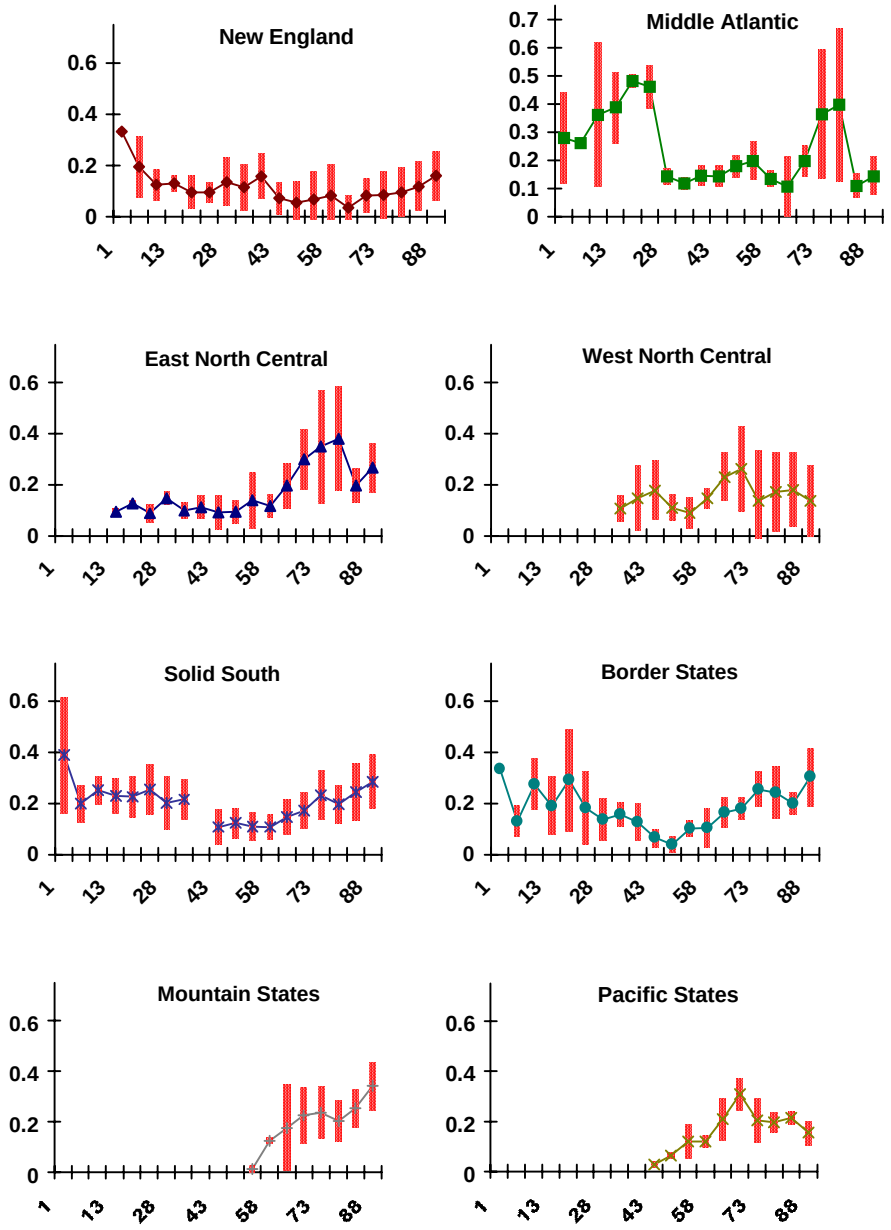

Figure 3-4. Regional Variation in Malapportionment: Malapportionment is shown as in Figure 3 except that regional lines are *weighted* averages over ICPSR standard regions. Vertical bars show plus/minus one standard deviation.

Regional malapportionment, with the brief exception of the West North Central region,[103] seems to follow the same trends in time as did the country as a whole, decreasing dramatically with the second apportionment (3rd congress), decreasing and converging around the time of the Civil War, and remaining relatively stable until after the 58th congress (1903). Note that the congressional requirement for population equality between congressional districts came after malapportionment had already dropped considerably. Malapportionment then became increasingly worse and increasingly divergent through the 78th congress (1943), but in most regions malapportionment improved greatly in 1953[104] and then worsened only somewhat afterwards.

---

[103] Malapportionment in the "West North Central" region does rises in this period. But this is due primarily to the introduction of Kansas into the Union only two years earlier. The regional mean, excluding Kansas, is approximately 0.14, bringing it down amongst the other regions.

[104] Much of this improvement came from improvements in New York, Illinois, and Ohio — all large states that underwent a dramatic improvement in equality of apportionment between the 78th and 53rd congress. These states accounted for more than 20% of congressional districts, and congressional district lines in these states remained essentially unchanged for several decades prior to and including 1943, and were radically redrawn afterwards. In New York, Republicans won the Governor's seat, and took advantage of completing their control of the state government by passing a Republican

In both cases of major legal sanctions for equal population apportionment, the 14th amendment in 1868 and *Wesberry* v. *Sanders* in 1964, then, legalization followed and exacerbated changes already begun in practice. This strongly suggests that equal population requirements, whether effected by constitutional action, or judicial decision, was in accord with political changes in the society, which, no doubt, made the reception of these standards much easier. As we shall see, this was markedly not the case with the compactness language in *Shaw* v. *Reno* and its progeny, which may well portend difficulties in implementing these judicial mandates.

shows that malapportionment differed significantly by region, especially prior to the Civil War and following the 78th congress. The worst malapportionment occurred in the Middle Atlantic states[105], although the South takes this title for several decades centering around the time of the Civil War. The Northwest Territories ("East North Figure

---

gerrymander (Tyler and Wells 1962). Prolonged periods of divided government, exacerbated by urban-rural splits, may explain redistricting in Ohio and Illinois, as well (Jewell 1962).

[105] The figures in this region are driven by New York, to a large extent. New York had many districts, so it weighs heavily in the region, and had some of the worst extremes of malapportionment in the U.S. The worst of the worst malapportionment came from New York, including the plans of the 18th and 78th Congresses that are shown in Figure 3-6.

3-3Central" in Figure 3-2) showed the least malapportionment for the antebellum period, while New England showed low malapportionment overall. This figure also sheds light on the effect of the Northwest Ordinance (1787) on representation (See Section IV.2.a in Dixon, 1968). Article 1 of the ordinance stated that "The inhabitants of the said territory shall always be entitled to... proportionate representation of the people in the legislature." This article seems to have had an effect, as congressional representation in those states is generally divided more equally than anywhere else in the country.

Figure 4 shows average levels of malapportionment. What about the most extreme cases? Figure 5 shows the ratio of the largest to smallest districts (population variance ratio) from the most extremely malapportioned plans in each decadal reapportionment. In effect, it shows the worst of the worst (Figure 3-5).

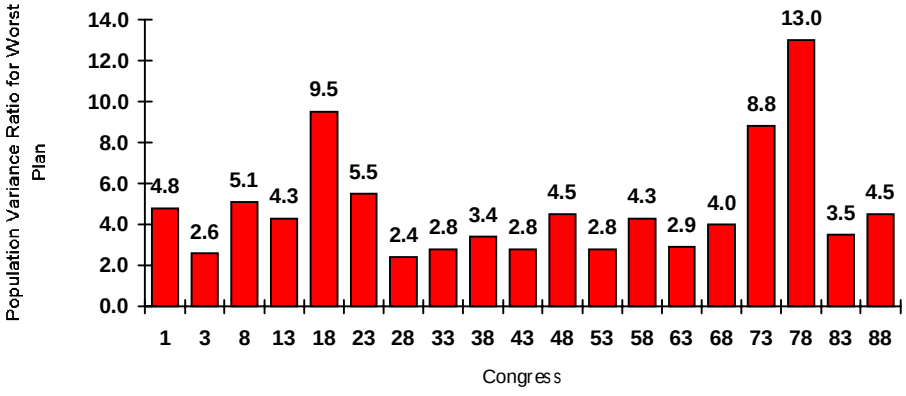

Figure 3-5. Worst plans, by the population variance ratio.

Figure 3-5 supports our conclusion that malapportionment generally decreased over time, and reached a low point around the time of the 43rd congress. In addition, we can see that even the extremes in congressional malapportionment were relatively mild when compared to malapportionment at the state level. For example, while the worst offender of population equality in the 43rd congress had a population variation ratio (p.v.r.) of 2.8, the Florida state senate for that time had a p.v.r. of 73.7[106] (Dixon 1968), which was more than seven times worse than any congressional plan, in any state, during the entire period of 1789-1963.

Critics of the decisions in *Wesberry* and *Reynolds* point to the fact that political districts were malapportioned both at the creation of the constitution, and at the time of the 14th amendment. This fact, while true, ignored the degree of malapportionment during these periods.

The weighted average of state malapportionment for the 88th congress was 0.22, exceeding that of the third congress (0.20), and exceeding by far the average malapportionment of 0.11 during the 43rd congress. At the level of individual states' plans, 24 out of the 31 states were worse in the 88th congress than during the 43rd, but only 3 out of 8 states were worse during the 3rd congress than in the 88th.

---

[106] Even Florida's malapportionment is dwarfed by California's population variance ratio of 422.5 in 1962, before *Reynolds* (Dixon 1968).

Table 3-6 compares malapportionment by region at the time of the 14th amendment to malapportionment just prior to *Wesberry* and *Reynolds.* By most measures, malapportionment in state congressional delegations was much greater at the time of the 88th congress than at the time of the 43rd congress. Comparing Table 3-6 ,Figure 3-4 and Figure 3-5 shows that malapportionment during the 88th congress was worse than that directly following the creation of the constitution. Also telling are the extremes of malapportionment. Columns 3 and 4 in Table 3-6 show the average ratio of largest to smallest districts. Figure 3-5 shows the extremes for each period. The extremes of congressional malapportionment were still considerably below the unprecedented levels of two decades earlier, but were greater than they had been at the time of the 14th amendment, and on the rise from the previous decade (Table 3-6).

Region	(max-min)/mean		P.V.R.		Gini		Coeff. of Variation	
	43rd	88th	43rd	88th	43rd	88th	43rd	88th
New England	0.19 (0.11)	0.40 (0.14)	1.22 (0.14)	1.59 (0.24)	0.03 (0.02)	0.05 (0.01)	0.07 (0.049)	0.12 (0.01)
Middle Atlantic	0.56 (0.13)	0.57 (0.13)	1.76 (0.19)	1.83 (0.23)	0.08 (0.03)	0.08 (0.03)	0.14 (0.027)	0.14 (0.06)
East North Central	0.30 (0.15)	0.88 (0.24)	1.39 (0.25)	2.47 (0.51)	0.05 (0.03)	0.12 (0.03)	0.09 (0.05)	0.23 (0.07)
West North Central	0.46 (0.18)	0.32 (0.17)	1.67 (0.42)	1.42 (0.36)	0.09 (0.04)	0.07 (0.044)	0.18 (0.10)	0.15 (0.14)
Solid South	0.28 (0.13)	0.96 (0.40)	1.34 (0.19)	2.73 (0.94)	0.05 (0.03)	0.15 (0.06)	0.11 (0.06)	0.29 (0.10)
Border States	0.19 (0.06)	0.81 (0.26)	1.22 (0.09)	2.34 (0.58)	0.04 (0.01)	0.15 (0.05)	0.07 (0.02)	0.30 (0.10)
Mountain States		0.63 (0.27)		2.12 (0.82)		0.14 (0.05)		0.34 (0.08)
Pacific States	0.05 (0.0)	0.68 (0.03)	1.05 (0.0)	1.95 (0.01)	0.01 (0.0)	0.08 (0.01)	0.03 (0.0)	0.16 (0.04)

Table 3-6. Malapportionment at Time of *Reynolds* compared to Malapportionment at time of 14th Amendment (weighted by number of districts)

3.4.3. Geographical Criteria

While it seems that population equality at the congressional districting level was "traditional" by the time of the 14th amendment, plans preceding and at the time of *Reynolds* were considerably less egalitarian. That is, the empirical evidence buttresses the notion that population equality had become a norm by the 1860s, not a notion far outside the experience of the 14th amendment's framers.

How about compactness and contiguity? Were they strongly grounded in the American experience of redistricting? In fact, the case for geographic norms is less clear than that for population equality, and as I showed in Section 3.3, different mathematical measurements of geographical criteria may lead us to different conclusions. So we shall examine each in turn, starting with contiguity (Figure 3-6).

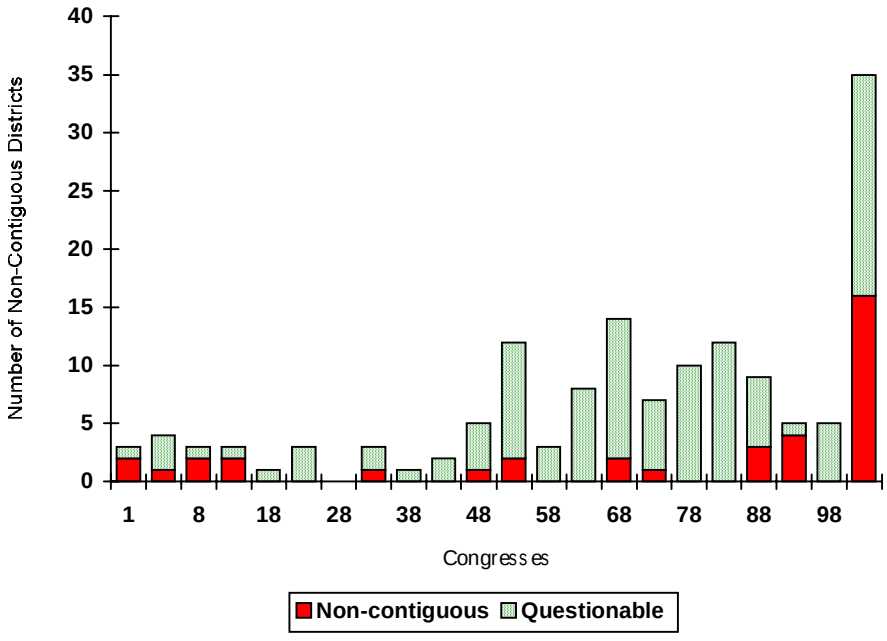

Figure 3-6. Total number of non-contiguous and questionably contiguous districts in each decadal redistricting. Questionable contiguity is evaluated as described in Section 3.1.

Was contiguity always followed in early congresses? The strict answer to this question is a clear negative; the first four decadal redistrictings all had at least one non-contiguous district, and with one exception every decadal redistricting between 1789 and 1913 contained at least one district of questionable contiguity. While congressional requirements for contiguity in the 28th and the 38th–58th congresses seem to have had an initial effect, there were still many non-contiguous districts or questionable districts in most of the decadal redistricting, despite these requirements.

On the other hand, most of the non-contiguous districts were concentrated in a few states; of the 43 questionable or non-contiguous districts in the decadal redistrictings of this period, 16 belonged to New York, 7 to South Carolina, 6 to North Carolina, and 5 to Massachusetts. Furthermore, we can see that an exceptional number of districts in the 1990 redistricting violated contiguity, or were of questionable contiguity. So, at least in the aggregate, modern districts are more frequently discontiguous than was traditional. Are political and natural boundaries traditional borders for congressional districts? Yes. Very few districts divided town and county boundaries. Most were composed of whole counties and towns, or of whole counties subtracting only towns. Districts do begin to divide towns and counties following the third congress, but through the 38th congress the only deviations from this were for entire wards and other similarly sized units in urban areas. Between the 40th congress and the 62nd there were some splits even of these

subunits, but only in a handful major cities (New York, Boston, Philadelphia, St. Louis, Baltimore, New Orleans, Chicago).[107] After Reynolds and Wesberry the number of districts that split even political sub-units of counties and cities triples and such splitting becomes widespread outside of major urban areas (Figure 3-7).

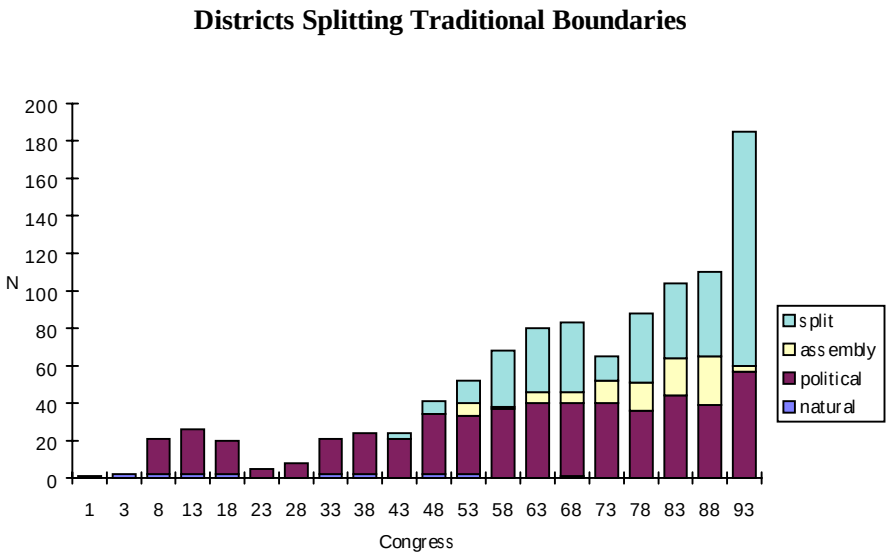

Figure 3-7. Violations of "traditional boundaries" in decadal redistrictings. Questionable districts violated county or town boundaries, but followed boundaries of political sub-units such as wards, election districts, election precincts, or assembly

---

[107] The choice of counties as a districting unit may well have resulted from the fact that the printed decennial census was aggregated to the county level for most of this period. I am indebted to Edward Still for making this point.

districts (the latter listed separately because it was legally required in some states). Split districts typically were split county boundaries in favor of streets or census tracts and blocks.

The extent to which historical political manipulation is responsible for the malapportionment, ill-compactness, and violation of traditional boundaries in this study is an interesting open question. Griffith's (1903) analysis of historical U.S. districts covers the period from colonial time up to 1842, and is the most comprehensive study of this type of which I am aware. In his study, Griffith identifies a number of congressional plans in the period under study as unequivocal attempts to gerrymander. Griffith relies (properly, in my opinion) more on political analysis rather formal indicia to identify gerrymanders. A reanalysis of these plans using my data suggest that formal measures are not consistent indicators of historical gerrymanders.[108] Hence, his conclusion that

---

[108] Some of these attempts were never passed, or were repealed before any elections were held, and hence are not included in my data sources. I analyze the remainder: New York's plan in 1789, Pennsylvania's and Massachusetts's plan in 1802, New York's in 1802-9, Massachusetts's in 1812-14, Virginia's in 1813, Massachusetts's plan in 1822 and in 1833, and Connecticut's in 1835 (Griffith, 1903, pgs. 42, 53, 55, 57-9, 72, 75, 77, 82, 89, 99, 105, 114). (Ohio's 1842 plan is also mentioned, but Griffith declares it out of the scope of his analysis, and does not give enough detail to positively identify gerrymandered districts.)

New York's 1789 plan was extremely malapportioned (in the worst 10% of plans) and violated contiguity, although it's compactness (by the most sensitive method, the minimum normalized perimeter score) was only somewhat lower than average and not in the bottom quartile. Pennsylvania's 1802 plan was even more malapportioned than New York's but was otherwise unexceptionable by formal measures. Massachusetts's 1802 plan was unexceptional by formal measures. New York's 1802-9 plans had "questionable" boundaries, following wards instead of counties (quite possibly, in part, to avoid malapportionment) and it had areas of questionable contiguity, but it was otherwise unexceptional. Massachusetts's 1812-1814 plan had areas of questionable contiguity and somewhat less than average compactness. Virginia's districts had somewhat worse than average malapportionment, and areas of questionable contiguity and extreme ill-compactness. Griffith, however, cautions against interpreting Virginia's odd district lines as indicative of a gerymander, noting that the worst looking district was not gerrymandered: "It (the district shape) indicates rather an indifference to the formation of districts in accordance with geographical considerations" (p. 83). Massachusetts's 1822 plan had a number of "questionable" splits of county and town boundaries, and although Griffith mentions a discontiguity in the plan, my data sources do not show it, perhaps because of the scale of the maps. It was otherwise unexceptional. Finally, Massachusetts's 1832 plan and Connecticut's 1835 plan were unexceptional.

regulating contiguity (etc.) is insufficient to prevent gerrymandering (pg. 118-119) seems well founded given the data and his identification of gerrymanders.

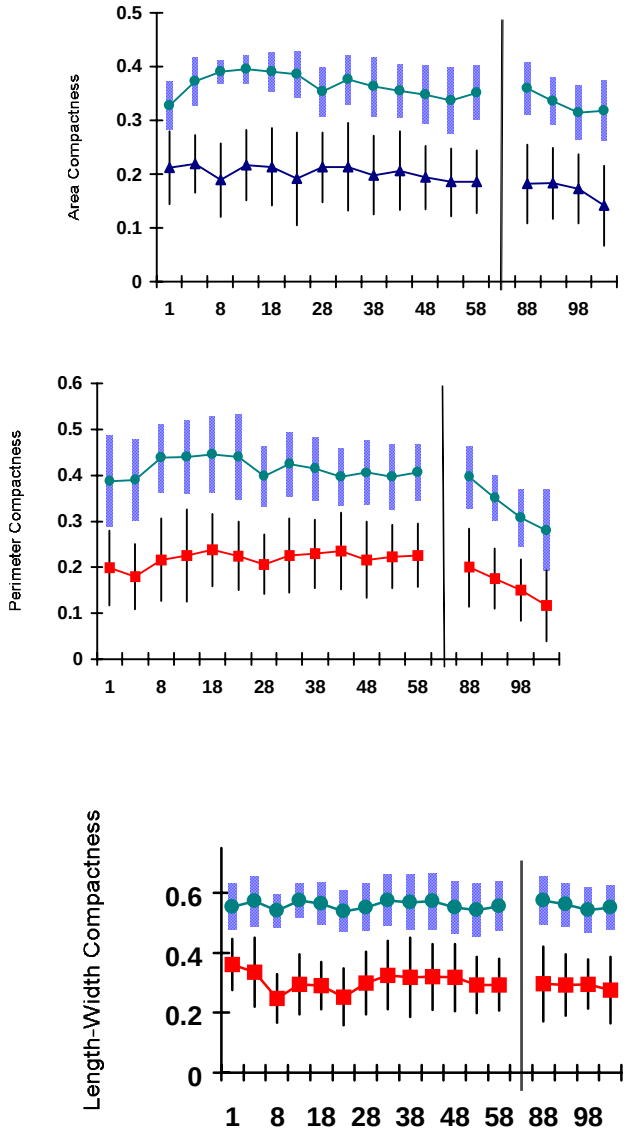

Figure 3-8a-c. Weighted average (by district) of compactness of state congressional districting plans with at least two districts for decadal redistrictings.

Area, normalized perimeter and length-width compactness are measured as described in Table 2. In each graph the top line shows plan compactness as equal to the mean of all districts, and the bottom line shows plan compactness as equal to the worst district. Vertical lines show plus/minus one standard deviation.

In modern times, compactness does seem to have fallen during the 1970's, 80's and 90's, especially when we look at perimeter-based compactness (Figure 3-8). Does this general stasis belie district trends? Figure 3-9a-c show regional variations in mean district compactness (Figure 3-9).

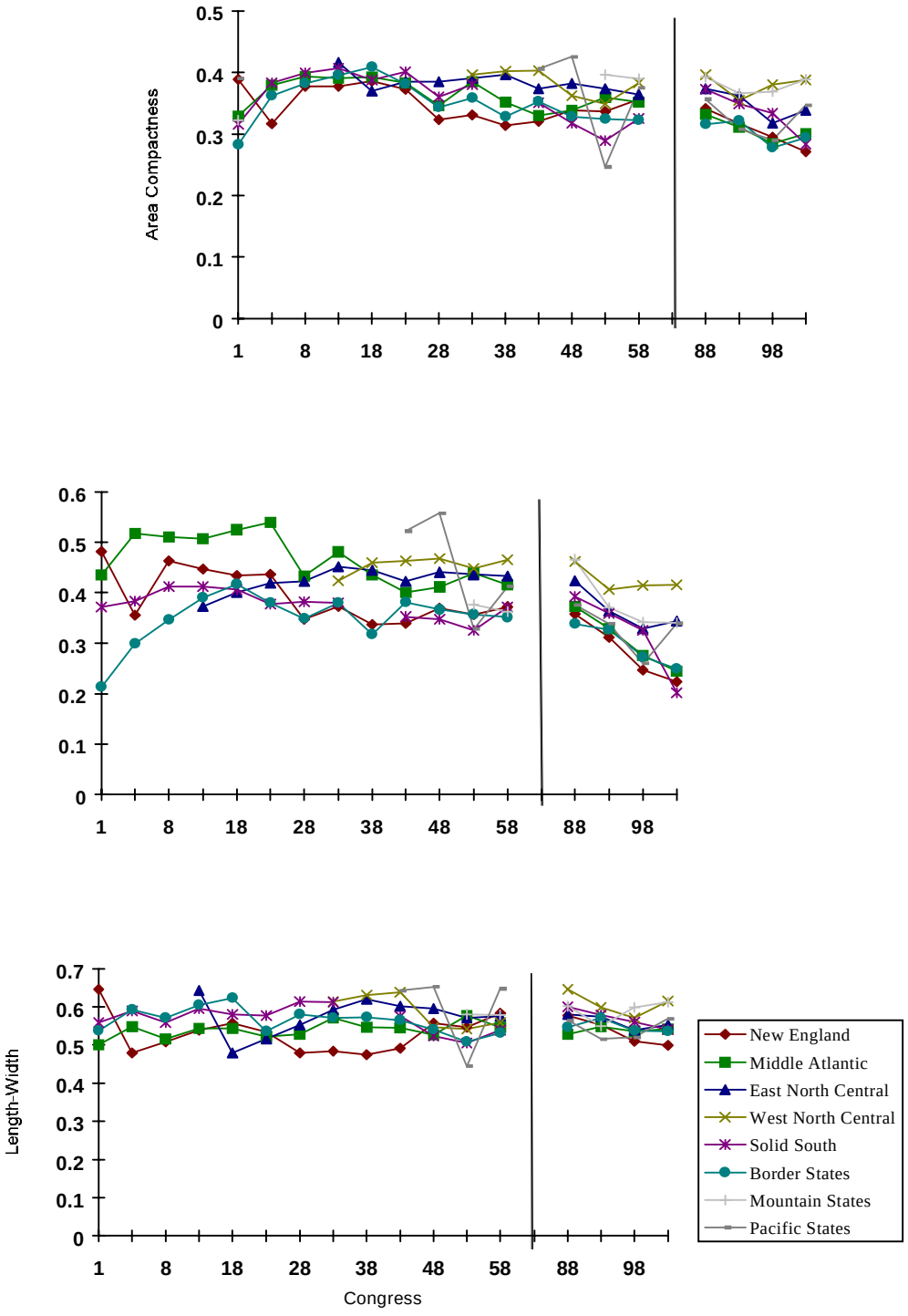

Figure 3-9. Weighted average (by district) of compactness of state districting plans with at least two districts for decadal redistrictings.

Again, besides a small general increase in compactness after the first congress, there seem to be no trends in regional compactness in the early period.[109] Compactness scores for different regions tend to be similar, depending on how compactness is measured, with area-compactness producing the most similar scores and perimeter compactness producing the most regional variance. As in Figure 3-7b, for most regions there is a decline in perimeter compactness over the last several decades. The redistricting plans challenged in *Miller*, *Shaw* and *Vera* were faulted by the Supreme court for failing to conform to traditional principles of compactness. Since *Shaw* in 1993, several other congressional plans have also been recently challenged (Congressional Quarterly Staff 1995; Idelson 1995), and all have been faulted, for, among other things, lack of compactness. Do the plans in the Supreme Court's line of compactness cases[110] violate traditional norms of compactness? Are they less compact than other modern plans? To answer this, we turn to Table 3-7.

---

[109] The pacific states do seem to diverge from the rest, but the data series is very short.

[110] As I previously noted, his line also includes *Hays*, but I exclude *Hays* from this part of the discussion because it was decided issues of standing, not compactness.

		Historical 1789-1913	1970's–90's	1990's Only
Shaw	AC	>1%	1.8%	2.6%
	NORM	0%	>1%	2.1%
	LW	19%	20%	18%
	Min AC	0%	>1%	>1%
	Min NORM	0%	>1%	1.3%
	Min LW	3.6%	3.7%	3.4%
Miller	AC	8.1%	15%	19%
	NORM	>1%	4.8%	11%
	LW	31%	33%	33%
	Min AC	1.8%	3.8%	5.9%
	Min NORM	>1%	4%	9.6%
	Min LW	26%	28%	25%
Vera	AC	48%	61%	64%
	NORM	0%	1%	1%
	LW	78%	78%	80%
	Min AC	8.8%	16%	20%
	Min NORM	0%	>1%	>1%
	Min LW	44%	46%	46%

Table 3-7: Perc**entile Ranking of Challenged Plans. Here I show what percentage of modern and historical districts were of equal or lesser compactness to those districts faulted for compactness by the Supreme Court.**

The districts in *Shaw*, *Miller* and *Vera* span the spectrum of compactness. Compared to historical districts, the districts rejected by the Supreme Court in *Shaw* were ill-compact by almost all measures. On the other end of the spectrum, the districts rejected by the courts as "bizarre" and "irregular" in *Vera* were not, on average, horribly ill-compact by two of the three compactness criteria. For example, by the length-width measure of compactness, the districts rejected by the court in *Vera* scored as well or better than 78% of historical districts. Even the worst of the Texas districts was as compact as 44% of historical districts, by the length-width measure.

It is the perimeter measurement that clearly distinguishes all of the rejected districts from earlier historical districts. The districts rejected by the Supreme Court in this series of cases were less compact, by this measurement, than almost any other district in the period 1789-1913. It is probably this type of ill-compactness that prompted Justice O'Connor to refer to the "(ir)regular(ity)" of districts fourteen times in the plurality opinion for *Vera.*

It is not necessarily fair, however, to compare the compactness of modern plans to historical plans because historical plans did not have to meet the approximate population equality standards imposed by *Wesberry* nor the absolute population equality historically imposed by *Karcher*. In fact, most of the rejected districts rank better relative to modern districts than to historical districts. This is especially true for rankings based on the perimeter measure, almost certainly because the court's decision in *Karcher* has forced states into making myriad minute adjustments to the boundaries of districts in order to exactly balance population. In Texas and North Carolina, for instance, no district varied more than 1 *person* from the average of more than 570,000 people. By contrast, in 1880, the largest and smallest districts in the two states varied by more than 36 and 89 *thousand* people out of an average of approximately 144,000 and 164,000, respectively.

The initial decline in compactness after the 60's, is probably in large part, of increasing court requirement for population equality. The decrease in compactness is not in isolation -- three changes occur immediately following the Supreme Court's decisions in *Reynolds* and *Wesberry*: traditional boundaries are violated in favor of census blocks, tracts and streets, malapportionment decreases and compactness decreases. Given the

general stability before the Court's malapportionment decisions, the most straightforward inference from this pattern is that changes in compactness were a result of the splitting of local boundaries by redistricters to meet the Court's new requirements.

The Court continued to tighten its population equality requirements throughout the time period, culminating in *Karcher* v. *Daggett* (1983), which demanded, in essence, absolute equality.[111] Thus, some of the decrease in compactness over this period is almost certainly a result of the necessity to meet these requirements. (Which is not to say that some gerrymanderers did not make a virtue of necessity.)

3.5. Discussion

State and Congressional requirements for population equality, contiguity, and compactness never specified how these properties were to be measured. This failure does not raise problems in a historical analysis of malapportionment, since different measures still lead to the same conclusions. Contrary to what some scholars have argued, gross

---

[111] The Court seems to recognize the connection between maintaining traditional boundaries, increasing compactness and allowing population variance. The opinion in *Karcher* allowed for deviations of population in principle for such reasons as following traditional boundaries, although the Court did not allow such deviations in practice until very recently. In *Abrams* v. *Miller* (1997), the Court seems to have withdrawn, at least for the instant, from their zero-tolerance of population deviations in Congressional districts, in order to support Georgia's "traditional boundaries."

malapportionment was not a traditional feature of congressional districts. Malapportionment decreased and converged after the 28th congress, and reached its low point around the time of the 14th amendment. Although it was generally worst in the South, and best in the Northwest Ordinance states, in almost every region and by any measure, malapportionment at the time of *Wesberry* and *Reynolds* was worse than it had been historically, and far worse that it was when the 14th amendment was drafted and approved.

In his dissent from the *Wesberry,* Justice John Marshal Harlan claimed that the history of congressional regulation of congressional districts contradicts the court's finding that population equality is constitutionally mandated: "This history reveals that the Court is not simply undertaking to exercise a power which the constitution reserved to the Congress; it is also overruling congressional judgment" (page 548). For two reasons, I disagree.

First, the empirical analyses in this chapter show that the congressional regulations of 1842—1911 had at most a small and fleeting effect on congressional districts. Congressional districts were already, for the most part, increasingly well-apportioned and contiguous. This finding is consistent with the hypothesis that Congress was not mandating new and special requirements for districts, but stating commonly held norms that population variations should not be excessive. Second, the floor debates over these apportionment measures also bears out this interpretation. As I showed in Section 3.4.1, despite the long and spirited debate over each of these apportionment measures, the provisions for both equal population and contiguity were readily accepted. The fact that

congress chose to regulate district criteria does not imply that such criteria did not also have a constitutional basis, as Pennsylvania Representative Mercur argued (quoted above).

Malapportionment was untraditionally high immediately prior to *Wesberry* and *Reynolds* exceeded that at the time of the 14th amendement, and in decades prior had far exceeded traditional levels. However, the Court's insistence on absolute population equality, especially with the *Karcher* decision, has resulted in a level of malapportionment that is untraditionally low.

In some ways, it is more difficult to measure violations of contiguity than to measure malapportionment. Still, while some marginal cases are difficult to classify in the absence of a precise definition, we can easily discern overall patterns of non-contiguity. Contiguity is not, strictly speaking, a traditional districting criterion. In practically every decadal apportionment from the first through fifty-eighth congress, some districts violated practical criteria of contiguity. Violations of contiguity, however, were few, and concentrated in a small number of states (New York, Massachusetts, and the Carolinas). The violations of contiguity in the latest round of redistricting far exceeded traditional baselines.

Modern districting plans exceed their predecessors to an even greater extent in the frequency with which their districts violate town, counties and other sub-unit boundaries. Except in dense urban areas, early districts followed county and town boundaries exclusively. Districts split larger boundaries with increasing frequency after the 43rd

congress, but the frequency of violations of "traditional boundaries" skyrockets following the population requirements imposed by the Court in *Reynolds* and *Wesberry.*

Of the formal criteria examined in this chapter, compactness has been the most controversial. How to define compactness and whether it can be usefully defined are questions that have been debated since the first compactness requirement passed by Congress. (See Section 3.4.1.) Unlike evaluating population equality and contiguity, our conclusions about district compactness depend on which definition of "compactness" that we use. Whether or not there were traditional norms of compactness, and whether the current round of "ugly" districts violate these norms, depends crucially on the precise method that we choose to measure this property.[112]

---

[112] Reviewers of this chapter make the point that the common pre-Reynolds practice of states using county and town lines as units of representation for the state legislatures lead to these districts being historically more malapportioned and more compact than congressional districts.

While my studies confirm that Congressional districts were more equally apportioned than legislative districts (See Section 4.3.), I am unaware of any empirical study demonstrating the second point conclusively. Although Congressional districts were never required to be composed of whole counties, the vast majority of these districts did not, in fact, split such boundaries, so there is little reason to conclude *a priori* that one type of district would naturally be more compact than the other simply because legislative districts

Under the average area and the length-width measures, there seems to be little change in compactness over time, even in the last several decades (although by the "minimum" area measure, plan compactness has dropped slightly). The normalized perimeter-area measure tends to be the most sensitive to differences in plans and over

---

were composed of counties. Furthermore, while it is true that some legislative districts were based upon single counties or cities, counties (and cities) are not themselves necessarily compact, especially in older states and in earlier periods (See, for example, Maryland's, New Hampshire's and Tennessee's counties around the time of the first through fourth congresses), so legislative districts based upon single counties would not necessarily have been compact. Congressional districts containing several counties, could, in some circumstances be more compact than the individual counties comprising the district. (See, for example, Maryland's fourth district in the first congress, and Kentucky's second district in the third congress.) The compactness of legislative districts, and the related question of how county boundaries were created are interesting empirical issues worthy of future study.

More generally, I hesitate to draw conclusions about traditional districting principles for *congressional* districts from observations of *legislative* districts since state and congressional representation have had different historical and legal bases. Congressional districts are constitutionally based upon the representation of population, but legislative districts were sometimes based on different principles (as I show in Table 5).

time. Furthermore, this measures and seems to capture most consistently what the Supreme Court finds as "bizarre" in irregular districts.[113]

A number of districting plans in the 1990's have been challenged, and some have been overturned, partially on the basis of ill-compactness. By many measures, these do not exceed traditional levels of "ugliness." By the normalized-perimeter measure, however, these plans are unusually ill-compact, especially when we look at the worst districts in each plan. Under this measure, all plans have become less compact since the Court's requirements of equal population in districts. These challenged plans are ill-compact even in comparison to other modern plans.

Districts have become uglier in modern times, but this fact has been slow to capture the attention of the Court, perhaps because this change has been, in part, a result of the

---

[113] Here, I am in general agreement with Pildes and Niemi (1993) key observations about changes in compactness from 1980-1990: Plans in the 1990's were by some significant measures of compactness, worse than those in the 1980's, this decline is worst when measured by extreme districts, and this decline is most significant when measured with perimeter-area standards. It is important, however, to place the change in compactness in a larger historical compactness. This chapter shows that decreases in compactness neither started, nor were largest, in the 90's, but instead followed the Court's equal population decisions in the 1960's.

Court's own actions. By completely eliminating malapportionment, rather than returning it to more traditional levels, it eliminated the traditional geographic districting as well.

3.6. Appendix: Corrections to and Omissions from the Data

No source of data is perfect, and this data is limited in four ways. First, population estimates for each district are based on decadal census data, and this data inevitably represents the population at the beginning of the decade more accurately than the population at the end of the decade.

Second, some districts contained political units for which no precise census data exists, either because the political unit was created after the census for that decade, or because the political unit subdivides one or more census aggregation units. In these cases, I adopted the district estimates found in the data source, or, if this were unavailable, I estimated the demographic data myself using census data aggregated at the county level.

This limitation particularly affects districts in major urban areas (primarily Baltimore, Philadelphia, New York City, Boston, St. Louis and Chicago) after 1860, because it was at about this time that many of these ceased to be created entirely from whole counties. For most of these districts it is possible to determine total population accurately by using census information aggregated at the ward level, but other demographic variables have to be estimated (Parsons, et al. 1986).

Third, partially because of this estimation problem, the available demographic data series extends only through the districts of the 62nd congress, and does not resume until the U.S. Census created the Congressional District Data Book (and Atlas) series for the 87th and later congresses. Of course it would be possible to reconstruct reasonably

accurate apportionment data for most districts during this gap,[114] using the statutory descriptions of districts found in Martis and Rowles (1987) and ward-level data from the 13th–16th Censuses of the United States; unfortunately, this is a project well beyond the scope of this chapter.

Fourth, the level of detail in district maps varied across time and across sources. I attempted to use the most detailed maps available, but in a few cases lack of detail in the available district maps,[115] or differences in detail in different data sources has affected the accuracy of my measurements.[116]

---

[114] Estimates of more detailed demographic data for urban districts would necessarily be questionable at best, and perhaps useless.

[115] In all of the cases where the primary data source contained several maps of the same district, I used the map which captured the most detail, as long as the complete boundaries for that district could be reconstructed from it.

[116] In general, sources were in agreement on the overall shapes and areas of each district, but the perimeter of convoluted districts could vary significantly with the level of detail contained in each map. This problem is a result of the differences in information that are contained in different maps, and is not an artifact of the methods used to extract the data and is in large part unavoidable because perimeter measurements are, in general,

In this chapter I relied heavily on the *United States Congressional Districts and Data* series (Parsons, et al. 1978; Parsons, et al. 1990; Parsons, et al. 1986) for districts in the period of 1789–1913. In using this data, however, I discovered a number of omissions and errors, most of which I was able to correct using other sources.

This data series omits a number of district maps; the vast majority of these are of urban areas. For many of these maps used the district maps in Martis & Rowles (1982) for the following districts (Table 3-8):

---

sensitive to the accuracy of the measuring device; furthermore, in the case of natural, fractal, boundaries, the "real" length of a shape may be indeterminate.

For example, suppose you were trying to measure the length of a section of the California shoreline, perhaps the section between San Francisco and Los Angeles. If you used a coarse approximation, perhaps by measuring the length of Route 1, which runs along the shore nearby, you would guess that the shoreline is several hundred miles long. If you tried to make more precise measurements by walking along the beach, your path might expand to several thousands of miles. Finer measurements will reveal the shore to be of ever-increasing length. This problem is of most concern when comparing perimeter-based compactness measurements across districts that were measured at widely different scales.

Congress	State and Districts
3rd	PA-1
18th	IN-1–13
23th	PA-1 –PA-3
28th	NY-2–6, PA-1–4
30th	IA-1–2
33rd	MD-4, NY-3–8, PA-1–3
38th	MD-3, PA-14
43rd	MA-3–4, NY-11–14, PA-1–4
44th	PA-1–5
50th	IN-1–15,OH–50-51
58th	NY-18

Table 3-8. Redistricting plans that were reconstructed from other sources.

This data series also omits maps and population data for a number of minor redistrictings. I was able to reconstruct most of these redistrictings using county-level data for the following state plans: New Jersey's redistricting for the 29th congress, Ohio's redistricting for the 29th congress, Georgia's redistricting for the 31st congress, Indiana's redistricting for the 50th congress, and Kansas's redistricting for the 53rd congress. There were a number of omitted minor redistricting plans that I was unable to reconstruct, since they involved extensive changes at the ward level; population variables for the following districts was marked as missing in the data-set[117] (Table 3-9):

---

[117] In addition, there were several changes to New Hampshire's redistricting plan for the 32nd congress, in which a few towns were shifted among districts. I was unable to reconstruct these districts, but since these changes were very minor I chose to ignore them.

Congress	State and Districts
52th	MD-2–5
55th	MD-1
56th	MA-9–11,MD-3–5

Table 3-9, Redistricting plans that were partially reconstructed from other sources.

I corrected a number of obvious typos and inconsistencies in the population data and maps. Two notable errors were that the population of Tennessee's 5th district in its plan for the 53rd congress, and New York's 6th district in its plan for the 28th congress, were listed as ten times their actual size. Also, a typo shows Howard county in Indiana's 50th congressional map as belonging to two different districts. I corrected these errors.

For the purpose of determining whether a district followed traditional boundaries, Parsons's descriptions make clear whether a district is composed of whole towns and counties but do not always describe a split. Consequently, for all split districts, Martis's descriptions were checked. In a few districts in California's district descriptions for the 92nd—97th congress and New Jersey's district descriptions for the 93rd congress are so lengthy and intertwined that it is difficult to determine, even from Martis's detailed descriptions, whether a district split traditional boundaries. These indeterminate districts were conservatively classified as not splitting "traditional" boundaries. In addition, there are a few small inconsistencies between the two sources that could not be attributed to lack of detail in one of the accounts: Splits around the time of the 40th Congress in Louisiana and in the 43rd Pennsylvania are described somewhat differently by both sources. Martis gives more detail in this case, so his description was used.

Finally, the base maps for Maine and Rhode Island changed across time; maps of these states in the data series show them to have much longer coastlines before 1842 than afterwards, which causes identical districts to appear to have different perimeters and thus different degrees of compactness. To fix this inconsistency, I reconstructed all of the earlier districts for these two states upon a base map created from the post-1842 maps.

For population data after 1912 and before 1963, I relied on the *Congressional Directory*, using the directory first session after each decadal redistricting. There were occasional omissions or obvious typographical errors in these directories, but I was able to correct all of these by examining the directory for later sessions of Congress. In addition, I checked the total of the population in all districts against the recorded total for the state, and found minimal differences for most states and years. Only in five states in these five redistrictings were the differences bigger than 0.1% of the states population, and only in one case did the difference exceed 1%: California 63rd Congress (0.3%), Colorado 63rd Congress (1.1%), Pennsylvania 68th Congress (0.16%), Utah 83rd Congress (0.25%).

For districting plans in the period 1963–1993, I relied primarily on the district data books published by Congressional Quarterly (as described in Section 3.2). For the most part, these books provide complete and concise summaries of U.S. Census data and district maps. In a small number of cases, however, district maps in this data series were incomplete. I corrected most of these omissions by constructing maps of the district from maps contained in Martis & Rowles the U.S. Census Congressional District Atlas data

series. Unfortunately, some of the maps in this series were fragmentary, and I was forced to omit a small number of districts from the analysis (Table 3-10).

Reconstructed Districts	
Congress	**State and Districts**
93rd	CA-23,25,32,34, IL-12, NY-6
98th	IL-1,2,4,7,9,10,12, NY-14,19
Omitted Districts	
Congress	**State and Districts**
93rd	MI-14,15,17, OH-22, PA-13
98th	CA–5,6,21,33
103rd	NY-13

Table 3-10, Redistricting plans that were reconstructed from other sources or omitted.