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PROBLEMS OF MEASURING AND ACHIEVING
EQUALITY OF REPRESENTATION
IN STATE LEGISLATURES

Alan L. Clem*

I. INTRODUCTION

Americans live by a number of basic principles of government which are perceived to help guarantee the freedom of the individual within the context of the security of the community. Certain of these principles are commonly verbalized: "equality before the law"; the "first amendment freedoms" guaranteeing freedom of speech, press, worship, assembly, and petition; and "government of the people, by the people, and for the people" upholding the citizen's right and duty to take part in the government of his society.

This article is concerned with one of the most basic of these principles of democratic self-government, the principle that every man should have an equal voice in the basic group decision-making process underlying our government system — the process of choosing the officials who make and administer laws at the local, state, and national level. Specifically, this study discusses the problem of how each voter's equality of influence in electing members of state legislatures may be measured and achieved.

The article does not address itself to the problem of devising a method of arranging legislative districts, as this is the function of legislatures or of special commissions that have been established in a few states. There are fifty different systems of apportionment being used in the fifty states, thus making it impractical to suggest a mandatory plan for each. Any of the present apportionment methods would be allowable so long as it does not produce undue distortion of representation. This article's attention is accordingly directed toward devising a method of measuring the degree to which an apportionment fairly and equitably reflects population distribution.

II. IMPACT OF *BAKER v. CARR*

In the year that has passed since the United States Supreme Court's landmark decision in *Baker v. Carr*,¹ the problem of devis-

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¹ 369 U.S. 186 (1962).

ing a method of measuring apportionment has been considered only obliquely by a small percentage of the many writers who have discussed the implications of *Baker* in news and opinion magazines and in the scholarly journals in the field of law and political science.² Rather, major attention has been focused on broader implications, such as the decision's effect on our federal system or its indication of an increasingly activist role by the federal courts in relation to state government. Prior to *Baker*, a series of decisions typified by *Colegrove v. Green*³ had refused to recognize that apportionment systems, which deprived certain citizens of equality, were justiciable. *Baker v. Carr* for the first time stated that the apportionment of seats in state legislatures was a matter properly to be reviewed by the federal courts. Justice Brennan's majority opinion stated in clear terms that "the complaint's allegations of a denial of equal protection present a justiciable constitutional cause of action upon which appellants are entitled to a trial and a decision. The right asserted is within the reach of judicial protection under the Fourteenth Amendment."⁴

Though the decision created a storm of controversy, it is not yet apparent just how seriously it will affect state legislative apportionment systems. Mr. Justice Brennan could only state:⁵

Beyond noting that we have no cause at this stage to doubt the District Court will be able to fashion relief if violations of constitutional rights are found, it is improper now to consider what remedy would be most appropriate if appellants [those seeking reapportionment] prevail at the trial.

Perhaps the most serious handicap to the efforts of those advocating more equitable distribution of legislative power is that neither lawyers nor political scientists nor mathematicians⁶ have yet been

² Professor Israel discusses in considerable detail some of the leading mathematical problems encountered in the courts in past decisions dealing with congressional or legislative apportionment. Israel, *On Charting a Course through the Mathematical Quagmire: The Future of Baker v. Carr*, 61 MICH. L. REV. 107 (1962).

³ 328 U.S. 549 (1946).

⁴ 369 U.S. 186, 237 (1962).

⁵ 369 U.S. 186, 198 (1962). One writer concludes: "Yet, at this writing, the standards to be applied remain vague." Friedelbaum, *Baker v. Carr: The New Doctrine of Judicial Intervention and Its Implications for American Federalism*, 29 U. CHI. L. REV. 673, 703 (1962).

⁶ After a struggle that raged for years among mathematicians as well as among courts, congressmen, and political scientists, the mathematical aspects of apportionment in the U.S. House of Representatives were settled thirty years ago on what has so far been a permanent and reasonably amicable basis. The name of the formula employed is that

able to agree on a method to define a proper apportionment system. This handicap is confounded by the fact that the federal union is composed of fifty states, each of which has its own legislative system and its own system of apportioning the seats thereof among its citizens. Solutions then, to be coherent, must somehow take into account the serious problem of how to properly apportion legislative seats within each state, when each state is so diverse in such matters as population, geographical size, and the degree of concentration of the population in cities. "If the traditional diversities of American federalism are to be preserved, flexible standards, especially adapted to districting, need to be developed."⁷ The process of distributing legislative seats in a state with a population of fifteen million, of which seventy per cent is classified as urban, is different in many ways from the process of distributing legislative seats in a state with a population of 200,000, of which twenty-five per cent is urban. The problem is not simplified by the fact that the size of state legislative bodies also varies.⁸

of "equal proportions." This formula can be employed where all political units subordinate at one level (states in relation to the federal government or counties in relation to states) are guaranteed at least one seat in the legislative body. See the discussion in SCHMECKEBIER, CONGRESSIONAL APPORTIONMENT (1941); GALLOWAY, THE LEGISLATIVE PROCESS IN CONGRESS 264-270 (1953); and H.R. REP. NO. 2223, 86th Cong., 2d Sess. 1-7 (1960).

⁷ Friedelbaum, *supra* note 5, at 698.

⁸ SIZE OF STATE LEGISLATIVE BODIES

| UPPER HOUSES (including Nebraska) | | LOWER HOUSES (excluding Nebraska) | | BOTH HOUSES (including Nebraska) | |
|--------------------------------------|--------|--------------------------------------|--------|-------------------------------------|--------|
| Size | Number | Size | Number | Size | Number |
| Under 20 | 2 | Under 50 | 3 | Under 50 | 1 |
| 20-29 | 7 | 50-99 | 15 | 50-99 | 9 |
| 30-39 | 21 | 100-199 | 25 | 100-149 | 17 |
| 40-49 | 11 | 200-299 | 5 | 150-199 | 14 |
| 50-59 | 8 | Over 300 | 1 | 200-299 | 7 |
| Over 60 | 1 | | | Over 300 | 2 |
| TOTAL | 50 | TOTAL | 49 | TOTAL | 50 |

Delaware and Nevada share the honor of having the smallest upper chamber, with seventeen members each, while Minnesota has the largest, with sixty-seven. Delaware's lower house, with thirty-five, also has the fewest members and New Hampshire's, with four hundred, has the most members in the lower house. Nebraska's unique unicameral legislature, with forty-three members, has the fewest members and New Hampshire has the most, with 424 members in the total legislative body.

Data compiled by author from a table entitled "The Legislators: Num-

Before discussing the relationship between equal representation and equal protection, it is appropriate to consider briefly the question of whether or not even roughly equivalent voting power for each citizen is an essential in our system of government. In other words, is it necessary that "equal representation" be related to voting rights? This is a basic question, and not as easy to solve as it may appear. The American political tradition, while trending in the direction of securing the proposition of "equality before the law" in the matter of voting rights, has not always upheld it. The pre-*Baker* apportionment decisions themselves worked against the principle by leaving the matter to be solved by local legislatures. One writer concludes: "Our experience with legislative reapportionment by the legislatures themselves proves that it is a little like do-it-yourself surgery, a painful job that is apt to be done badly."⁹ Informal agreements within the various states as to the distribution of seats among certain cities or sections often have the same effect. Many of our election systems, both public and private, distribute power unequally among individuals.¹⁰

Equality of representation in a large community is almost necessarily a matter of relativity and can be measured by the relative importance of one citizen's vote compared with the votes of all others in electing members of the legislative body. In this country, and increasingly in the free world generally, many have agreed that as an ideal one man should have one vote.¹¹ Each

bers, Terms, and Party Affiliation as of November 1, 1961," in *THE COUNCIL OF STATE GOVERNMENTS, THE BOOK OF THE STATES, 1962-63*, 41 (1962).

⁹ Schattschneider, *Urbanization and Reapportionment*, 72 *YALE L.J.* 7, 12 (1962).

¹⁰ For example, the votes of corporation stockholders are generally weighted in proportion to the amount of stock owned. Since all fifty states each elect two United States senators, there is unequal representation of citizens in that body in proportion to the population spread among the states.

¹¹ Professor Baker has epitomized this ideal in the title of an article. Baker, *One Vote, One Value*, 47 *NAT'L MUNIC. REV.* 16, 20 (1958). The recent Supreme Court decision in *Gray v. Sanders* is much to the point. "The concept of 'we the people' under the Constitution visualizes no preferred class of voters but equality among those who meet the basic qualifications. . . . [O]nce the class of voters is chosen and their qualifications specified, we see no constitutional way by which equality of voting power may be evaded. . . . The conception of political equality from the Declaration of Independence, to Lincoln's Gettysburg Address, to the Fifteenth, Seventeenth, and Nineteenth Amendments can mean only one thing—one person, one vote." *Gray v. Sanders*, 83 *Sup. Ct.* 801, 808, 809 (1962). Another authority supports the same point of view. "Equal

responsible adult should have an equal voice in the choice of his representatives. *Stiglitz v. Schardien*, a 1931 state court decision, persuasively argues for equality of representation as follows:¹²

Equality of representation in the law-making, tax-levying bodies is a fundamental requisite of a free government, and no unbiased, fair, or just man has any right to claim a greater share of the voting power of the people than is granted to every other man similarly situated. It is vain for the people to hope for reforms of abuses or righteous results in legislation if the legislative bodies are not fairly representative of the spirit, purpose, and will of all the people, without discrimination.

Boiled down to its essentials, the problem of expanding voting equality is generally viewed as an attempt to increase the voting power of urban voters. *Baker v. Carr* has been viewed as "an episode in the urbanization of the American community."¹³ This opens an area which has received considerable attention. In discussing the subject a generation ago, one writer stated that "what is important is the underrepresentation of aggregates — of a group of correlated interests. The most significant general line of demarcation between interests in American state politics has been the cleavage between country and city."¹⁴ Much has been written on the merits of representing the people on the one hand, or political units on the other.

protection of the laws' would seem to presume, and considerations of political equity demand, that the apportionment of both houses in the State legislature, be based strictly on population." ADVISORY COMMISSION ON INTERGOVERNMENTAL RELATIONS, APPORTIONMENT OF STATE LEGISLATURES 67, 1962.

¹² 239 Ky. 799, 812, 40 S.W.2d 315, 321 (1931); accord, American Federation of Labor and Congress of Industrial Organizations, *Unequal Voting: A Challenge to Democracy*. LABOR'S ECON. REV. 80-100 (Dec. 1956). See also *Gray v. Sanders*, 383 U.S. 81 (1966).

¹³ Schattschneider, *supra* note 9, at 7. In this connection, Professor Shull's report on a questionnaire survey a decade ago indicated that informed observers believed that rivalries between rural and urban areas were caused by legislative apportionment systems to a far greater extent than rivalries between political parties, geographical regions, labor and business, or parts of metropolitan areas. Shull, *Political and Partisan Implications of State Legislative Apportionment*, 17 LAW & CONTEMP. PROB. 417, 431 (1952). But cf. Derge, *Metropolitan and Outstate Alignments in Illinois and Missouri Legislative Delegations*, 52 AM. POL. SCI. REV. 1051, 1065 (1958), which concludes that the real conflict is not between urban and rural legislators, but between opposing camps of legislators within the metropolitan area. Professor Derge says: "The city's bitterest opponents in the legislature are political enemies from within its own walls, and those camped in the adjoining suburban areas."

¹⁴ Walter, *Reapportionment and Urban Representation*, 195 ANNALS 11, 13 (1938). But see Derge, *supra* note 13.

Arguments for the former tend to be advanced by urban interests whereas rural interests support the latter.¹⁵

In summary, while there are some dissenters, the articles and books dealing with apportionment are heavily weighted in favor of establishing apportionment systems giving each citizen a voting power as mathematically equitable as practicable. One recent article states that "it is their representative character which makes legislatures authoritative and legitimate. Through the process of representation, legislatures are presumably empowered to act for the whole body politic and are legitimized."¹⁶ A study in this area proceeded on the similar assumption "that a legislature which does not equably represent the people of the state contains an innate weakness which limits the effective functioning of that government on many types of problems."¹⁷ Mr. Justice Harlan counters these general statements favoring the establishment of equitable representation with a reasoned comment on the difficulties of applying mathematical measurements to legislative apportionment:¹⁸

The fault with a purely statistical approach . . . lies not with the particular mathematical formula used, but in the failure to take account of the fact that a multitude of legitimate legislative policies, along with circumstances of geography and demography, could account for the seeming electoral disparities among counties.

Certainly there are serious problems involved, but if there is such a thing as malapportionment, how can it be measured or expressed in other than mathematical terms? This article has as its goal the solution of the problem of establishing mathematical standards that do take into account the factors mentioned by Mr. Justice Harlan. Mathematics provides tools which must be used if malapportionment is to be located, and this task must be accomplished before citizens can begin, in Mr. Justice Frankfurter's words, to "sear the consciences" of their representatives.

¹⁵ For example, favoring the personal approach, see Baker, *supra* note 11; Aumann, *Rural Ohio Hangs On*, 46 NAT'L MUNIC. REV. 222 (1957); Snow, *Parliamentary Reapportionment Proposals in the Puritan Revolution*, 74 ENG. HIST. REV. 409 (1959); the decision in *Scholle v. Hare*, 369 U.S. 429 (1962); and THE TWENTIETH CENTURY FUND, *ONE MAN—ONE VOTE 8* (1962). For the opposing federal argument, see Justice Frankfurter's dissent in the Baker case and Perrin, *In Defense of Country Votes*, 52 YALE REV. 16 (1962).

¹⁶ Eulau, Wahlke, Buchanan, & Ferguson, *The Role of the Representative: Some Empirical Observations on the Theory of Edmund Burke*, 53 AM. POL. SCI. REV. 742 (1959).

¹⁷ Dauer & Kelsay, *Unrepresentative States*, 44 NAT'L MUNIC. REV. 571 (Dec., 1955).

¹⁸ 369 U.S. 186, 345 (1962).

III. HOW MALAPPORTIONMENT HAS BEEN MEASURED

Jurists and scholars have applied five major methods of measuring the extent to which state apportionment systems are inequitable. The problems involved in measuring and achieving equitable apportionment will be better understood after a quick review of these methods, noting their comparative advantages and limitations.

The *first method* to be considered is the most widely used method of measuring legislative malapportionment, and it involves finding deviations from the normal or average constituency.¹⁹ First, the average constituency of each seat in each chamber is found, and this average is compared with the actual population of each legislative district. The deviation between average and actual population shows the degree of over- or underrepresentation. For example, if the average lower chamber constituency is 20,000 and a given lower chamber district has a population of 25,000, the district is underrepresented by twenty-five per cent. Authorities have placed various limits—such as ten, twelve, fifteen, or twenty per cent—on the *allowable* deviation from the average. The advantage of the system of deviations is that it places a precise numerical value on each district's malapportionment. It relates malapportionment to the district itself and thus points out in general terms where adjustments are needed. Deviations are generally given for entire districts, however, and not for specific counties. To be most useful, the system of deviations needs to be related to counties or other specific permanent political units. More importantly, the system of deviations lacks a formula by which a specific political unit's total malapportionment in *both* chambers can be expressed. It is possible for a particular county to be overrepresented in one chamber and underrepresented in the other, or, more typically, the degree of malapportionment is much greater in one chamber than in the other.

The National Municipal League developed a *second method*, based on deviations from the normal constituency, but sufficiently

¹⁹ The following are examples of monographs using this method in discussing legislative apportionment in particular states: HOBBS, *LEGISLATIVE APPORTIONMENT IN MISSISSIPPI* (1956); WEAVER, *LEGISLATIVE REAPPORTIONMENT IN UTAH* (1950); HAVARD & BETH, *REPRESENTATIVE GOVERNMENT AND REAPPORTIONMENT* (1960); DRURY & TITUS, *LEGISLATIVE APPORTIONMENT IN KANSAS* (1960); and GARFINKEL & FEIN, *FAIR REPRESENTATION: A CITIZEN'S GUIDE TO LEGISLATIVE APPORTIONMENT IN MICHIGAN* (1960).

different to merit special mention.²⁰ The deviation from the standard population of each district in *both* chambers is computed; the deviations are added together (without regard to plus or minus signs), and a ratio is established which compares for each chamber average deviations per district with the standard or average constituency. If the average deviation per district is 10,000, and the standard or average constituency is 50,000, the ratio would be 0.20. The ratio is useful principally to compare one state's degree of malapportionment with that of other states; it is not helpful in locating the "problem" areas within each state.

The *third method* is also essentially a device to compare malapportionment among several states.²¹ In this method, the key finding is the percentage of the total state population that is necessary to elect a majority of a given state legislative chamber. The nearer to fifty per cent the necessary percentage, the more equitable is the state's apportionment.

The *fourth method* represents the most recent major statistical study of malapportionment and is the result of an extensive investigation.²² The central problem studied was that of the familiar rural-urban conflict. Included are tables for each state for the years 1910, 1930, 1950, and 1960, categorizing the counties of each state into four population groups and working out, first, the proportionate share of voting strength in both chambers and, second, the average values of the vote for representation as percentages of the state-wide average. Similar data is given for each county or other major political subdivision in the fifty states.

A *fifth method* of measurement, which most closely approximates the method to be suggested and developed in this paper, was used by Mr. Justice Clark in his concurring opinion in *Baker v. Carr*²³ and adapted by Mr. Justice Harlan in a dissenting opinion.²⁴

²⁰ NATIONAL MUNICIPAL LEAGUE, COMPENDIUM ON LEGISLATIVE APPORTIONMENT (1960).

²¹ Dauer & Kelsay, *supra* note 17.

²² DAVID & EISENBERG, DEVALUATION OF THE URBAN AND SUBURBAN VOTE: A STATISTICAL INVESTIGATION OF LONG-TERM TRENDS IN STATE LEGISLATIVE REPRESENTATION (1961).

²³ 369 U.S. 186, 254-64 (1962). The method employed by Justice Clark gives equal weight to each county in a joint representative district, irrespective of the county's proportion of the total district's population.

²⁴ 369 U.S. 186, 343 (1962). Justice Harlan's revision of Justice Clark's method, *supra* note 23, takes into account each county's proportion of the total district's population in assigning a legislative power index. Assuming a chamber of one hundred members and a legislative district

Mr. Justice Clark used a simple but imprecise calculation to express each county's representation in both chambers. Mr. Justice Harlan's dissent stated that Mr. Justice Clark's formula rests on faulty mathematical foundations. "The fractions used . . ." he said, "are computed by allotting to each county in a combined district an equal share of the House or Senate seat, *regardless* of the voting population of each of the counties that make up the election district."²⁵ The efforts of Justices Clark and Harlan approach the standards this paper seeks to establish—that of producing an index for each county (or other appropriate political unit), and expressing that county's malapportionment in a bicameral legislature in terms of units of underrepresented (or overrepresented) legislative seats. What remains is to convert this index into a percentage of total state legislative power and then to relate this percentage to the county's percentage of total state population.

IV. BASIC PRE-CONDITIONS OF EFFECTIVE REPRESENTATIVE GOVERNMENT

Before proceeding with the task of describing a measurement system, the values a system intends to analyze should be made clear. Briefly, the measurement is intended to evaluate the degree to which an apportionment system produces equitable representation in all counties of a given state. The system thus relates a county's population to its legislative representation; there is underrepresentation where a county's population ratio is higher than its representation ratio, and overrepresentation where a county's population ratio is lower than its representation ratio. This system of measurement thus proceeds from an unprovable assumption that true democracy, in the sense of substantial equitable voting power, is the best means by which the political community can determine its rulers. The study simply posits the idea of political equality in setting up the criteria for testing malapportionment.²⁶ To set up a secure governmental system, there should be added to the idea of

composed of counties with populations of thirty thousand, twenty thousand, and ten thousand, respectively, the first county would have 0.50 per cent of *that chamber's* legislative power, the second 0.33 per cent, and the third 0.17 per cent.

²⁵ 369 U.S. 186, 342 (1962).

²⁶ Professor Thorson has written: "What the democratic theorist must therefore do is to posit political equality, majority rule, and minority rights as simply given and make the business of democratic theory purely instrumental, that is, calculate the implications of the 'givens' and discover the most efficient ways of implementing them." THORSON, *THE LOGIC OF DEMOCRACY* 3 (1962).

political (voting) equality the idea of majority rule, and to protect the individual there should be added the idea of minority rights. With these conditions in mind, it is but a simple step to draw up a list of essential pre-conditions to the establishment of successful representative government. First of all, the citizen must be willing to accept and abide by the laws made by the legislative body of which his representative is a member (majority rule). Second, the citizen should have some recognized and effective means of expressing his approval or disapproval of the official actions of his representative, and in stating such approval or disapproval his vote should be equal to the vote of all others (political equality). Finally, there should be constitutional guarantees that the legislative body be restricted from passing laws discriminating unfairly against any individual or group (minority rights).

The pre-conditions just mentioned are useful in drawing up a priority list of criteria for the determination of malapportionment.

The measurement of malapportionment should first of all pinpoint areas where the people have too much or too little relative weight in choosing representatives. Considering that district boundaries are generally drawn along county boundaries and that census reports are available for counties and comparable political sub-units of the states, a minimally valid measure of conformity to democratic ideals should express malapportionment for each county, or for smaller units if reliable statistics are available.

The measurement should be simple to apply by a legislative, judicial, or other body charged with the task of alleviating malapportionment.

The measurement should produce a numerical index so that malapportionment can be compared from one state to the next. Four of the five major methods described above, including the new method, can also produce comparative state malapportionment indices.

The measurement should be understandable to the citizen with some knowledge of and interest in governmental problems. The traditional system of deviations is perhaps the most readily understood measure, but it has the disadvantage that indices thus derived relate to each of the two houses *separately rather than to both houses together*. It is in this regard that the Population-Representation Ratio (PRR) method presented here enjoys its most significant advantage over the other methods. The percentage differentials derived for each county can be converted into a ratio where perfect equality of representation is indicated by 1.00; overrepresentation by a number over 1.00; and underrepresentation by a number less

than 1.00. As will be noted, however, the percentage differential is much more helpful in showing precisely how many representative units should be added to or subtracted from a given county to produce equitable apportionment.

The measurement should be based on available, suitable and reliable data. All systems discussed above demand the same raw source data — population enumerations, legislative district boundaries, and the number of legislators representing each district.

Finally, the measurement should conform to historical political patterns, such as districts or, preferably, counties. Indices derived for each county or lesser unit are superior to indices derived for legislative districts, the boundaries of which are seldom identical for the two legislative chambers and which in any case are likely to change over the years and thus make historical comparisons difficult if not impossible.

V. THE POPULATION-REPRESENTATION RATIO METHOD

A. GENERALLY.

With these standards and problems in mind, the Population-Representation Ratio method has been derived. The PRR method compares each county's percentage of the state population with its percentage of the seats in both chambers of the legislature.²⁷ This produces an index showing the differential between the two percentages. From this index, it can be quickly determined how many representative units (*i.e.*, the equivalent of how many *lower chamber seats*) must be given to or taken away from a particular county to bring its population and representation ratios into substantial equilibrium. The smaller the differential between the two ratios, of course, the smaller the degree of malapportionment for that particular county.

An index combining a county's malapportionment in both legislative chambers is not accomplished without some risk. Mr. Justice Harlan's criticism of Mr. Justice Clark's methodology²⁸ should be sufficient warning in this regard. The PRR method may be objected

²⁷ The PRR method can be applied to larger or smaller political units if reliable population figures are available. In some cases, the use of such political subdivisions as townships, cities, wards, and precincts will be necessary to locate malapportionment within urban counties that have been divided into several legislative districts. It has been pointed out at a panel meeting discussing an earlier draft of this paper that there are often inequalities within one county that are as important as inequalities among several counties.

²⁸ 369 U.S. 186, *supra* note 25.

to on the grounds that two wrongs (for example, a county grossly overrepresented in one chamber and grossly underrepresented in the other) do not make a right. While about one-fourth of the counties in the states of Indiana, Kansas, Michigan, South Dakota, Tennessee, and Wisconsin²⁹ are slightly malapportioned in opposite directions from perfectly equitable apportionment, fewer than one in fifty are grossly malapportioned in opposite directions. The typical highly populated county is seriously underrepresented in one house, most often the upper chamber, and generally less seriously underrepresented in the other. In the case of Michigan, for example, Wayne county (Detroit) has 34.1 per cent of the state's population compared with 34.5 per cent of the lower house seats and only 20.6 per cent of the upper house seats.³⁰ Efforts directed toward curing malapportionment should begin with inspection of each county's malapportionment in each of the two chambers. Officials may also want to apply a maximum allowable deviation to malapportionment in each separate chamber *as well as* in both chambers combined.

The validity of this combination of representation ratios for two chambers rests on the assumption that the two chambers of American state legislatures, like the federal Congress, exercise roughly equal powers. This assumption is made in the calculations of Justices Clark and Harlan, and seems reasonable. Another assumption, not so obviously reasonable but necessary in the absence of a recognized standard for measuring relative effectiveness of individual legislators, is that each member of a legislative body exercises power equal to that of every other member. Irrespective of the relative influence of various legislators in the legislature, each member does have equal power in that his vote counts for as much as that of any other member of the same chamber. Although this assumption may be questioned, since it is obvious that a district which elects a presiding officer of one chamber is likely to get better treatment from the legislature than a district which elects an inexperienced freshman member of the minority party, each of the systems of measuring legislative malapportionment mentioned above proceeds on this assumption. Scholars and jurists

²⁹ Clem, *Measuring Legislative Malapportionment: In Search of a Better Yardstick*, 7 *MIDWEST J. OF POL. SCI.*—(May, 1963). See also Appendix C.

³⁰ Appendix A shows comparable figures for the largest cities in the three states studied here—Wichita, Kansas (Sedgwick county), Omaha, Nebraska (Douglas county), and Sioux Falls, South Dakota (Minnehaha county). Omaha, Wichita, and Sioux Falls are each most seriously malapportioned in the upper houses of their respective states.

have made these assumptions because relative values are confidently quantifiable only on these bases.

B. THE SPECIFICS OF COMPUTING LEGISLATIVE MALAPPORTIONMENT BY THE PRR METHOD.

The first step in applying the PRR method involves computing the percentage of the total state population living in each county. This percentage is entered in column one of the state table. (See Appendix A at the conclusion of this article). For ease of comprehension, the ten largest counties in each state are ranked in order of population.

The percentage of the total seats in the lower chamber elected by each county is entered in the second column. Where the county elects one representative, the percentage is merely the number of seats in the lower chamber divided into one (this produces the "representative factor" referred to in Appendix A as "percentage of power"). Where the county elects more than one representative, the representative factor is multiplied by the number of representatives. In cases where the county is joined with one or more other counties to form a district, the percentage of the total district population is first extracted and then multiplied by the representative factor or its appropriate multiple.

In the third column is entered the percentage of the total seats in the upper chamber elected by each county, computed in the same manner as described for the lower chamber in the preceding paragraph.

The fourth column is the average of the percentages in columns two and three, and represents the county's representation ratio in the entire legislature. The difference between column one (the population ratio) and column four (the representation ratio) is then found. If the number of column one is higher, a minus sign indicating underrepresentation is placed before the difference (column five); if the figure in column four is higher, a plus sign indicating overrepresentation is placed before the difference. Column five thus shows both the direction and degree of malapportionment for each county.

An *alternative* procedure would be to divide the county's population ratio (column one) into the county's representation ratio (column four), producing an index emphasizing the relationship between the ratios. Perfect representation would be indicated by 1.00; underrepresentation by a number less than 1.00; and overrepresentation by a number greater than 1.00. Since this study is concerned not only with measuring malapportionment but with indicating

precisely where and what kind of remedial measures should be taken; it is thought that the absolute differential (column five) is of greater practical use. Thus, to refer to the Kansas data,³¹ Sedgwick county's differential in population and representation ratios shows that the equivalent of 31.26 lower house seats (the differential of -12,505 divided by 0.400, the representative unit for Kansas) should be added to that county to produce equitable apportionment. The absolute differentials in column five of the tables below have the advantage that they show exactly how many lower house seats or their equivalent must be added (or subtracted) to equalize a given county's representation.

The problem of effecting more equal representation is now merely a matter of deciding at what point deviation from the norm becomes excessive and demands remedy. One obvious possibility would be to allow, for each county, a deviation from the norm of no more than half the total legislative power represented by a seat in the most numerous chamber. On this basis, the maximum allowable deviation for counties in the states of Kansas, Nebraska, and South Dakota³² would be 0.200, 1.163, and 0.333 respectively.³³ It should be noted that there is a direct relationship between the number of seats in the most numerous house and the maximum allowable deviation; this means that the fewer members there are in a legislative chamber, the easier it can be to work out an equitable apportionment.

MALAPPORTIONMENT IN KANSAS, NEBRASKA AND SOUTH DAKOTA

The apportionment systems of three adjoining states, Kansas, Nebraska, and South Dakota, provide the basis for describing the mechanics of the PRR system. Among the three states there is some variety in population, degree of population concentration or urbanization, and legislative apportionment. South Dakota's 1960 population, of 680,514 compares with Nebraska's population of 1,411,330 and Kansas' population of 2,178,611. Sixteen per cent of South Dakota's population lives in cities with a population greater than

³¹ See Appendix A.

³² Malapportionment in these three states is the subject of the following section.

³³ These figures are derived by multiplying the number of seats in a bicameral legislature's most numerous house by two, dividing the result into one hundred, and halving the dividend. For a unicameral legislature, the number of seats is divided into one hundred and the dividend is halved.

25,000, compared with thirty-two per cent for Nebraska and twenty-nine per cent for Kansas. Appendix B lists these cities and their populations. As to apportionment, Nebraska's unicameral legislature is the most notable factor. The general pattern of urban underrepresentation will be noted below in all three states. This urban underrepresentation, it should be pointed out, appears to be more a product of population *growth* rather than population itself. In each state, certain counties have more than one representative; in Kansas and Nebraska, such counties are subdivided into smaller legislative districts, with boundaries of streets, rivers, and rural township lines, while in South Dakota all legislators from a multi-member county are elected at large by the voters of the entire county. For purposes of this analysis, these investigations will consider representation on the basis of the county alone; if reliable population figures are available for legislative districts smaller than a county, analysis could proceed on the basis of such sub-county units, as mentioned above.

Appendix A lists the ten largest counties in terms of population in each of the three states, showing population and representation ratios (columns one and four) and the difference between the two ratios (column five).³⁴

As Appendix C indicates, Kansas suffers, by far, the most serious case of malapportionment among the three states analyzed here.³⁵ Only fourteen per cent of the counties of Kansas are equitably apportioned, having differentials in population and representation ratios of less than the maximum allowable deviation. On the other hand, seventy-six per cent of South Dakota counties and ninety-eight per cent of Nebraska counties are *equitably* apportioned.³⁶ "Equitable apportionment" means that the county's malapportionment is within the allowable deviation.

³⁴ Columns 2 and 3 are eliminated for Nebraska because her legislature has but one chamber. Space considerations discourage listing the statistics for all the 265 counties in the three states.

³⁵ Another study by the present author shows that Kansas' apportionment is also considerably less equitable than apportionment in Indiana, Michigan, Tennessee, and Wisconsin; the PRR system of measuring equitability of apportionment has been applied only to the four states listed in the previous clause in addition to the three states being analyzed here. Clem, *supra* note 29.

³⁶ These particular percentage figures form a valid basis for comparing the equitability of legislative apportionment from one state to another, but they do not provide a valid index of equitable apportionment among counties within a given state. This is so because, to use one example, the two Nebraska counties that are substantially underrepresented claim as residents over thirty per cent of that state's citizens. Thus, while

Data presented in Appendix D indicates, as would be expected, that generally the largest counties are the ones suffering most from underrepresentation. All of Kansas' ten largest counties are underrepresented, eight in excess of the maximum allowable deviation, while seven of Nebraska's and six of South Dakota's ten largest counties are underrepresented (although some are within the maximum allowable deviation).

More detailed investigation of the situations in the three states will demonstrate what specific steps can be taken to cure malapportionment once it has been located.

A. KANSAS.

This state ranks first in degree of malapportionment. Its ten largest counties are all underrepresented. The really serious problems of underrepresentation exist in the four largest counties, Sedgwick, Wyandotte, Johnson, and Shawnee. Dividing the difference in Sedgwick county's population and representation ratios (12.505) by the value of each representative unit in Kansas (0.400) produces a dividend of 31.26. Therefore, to establish equitable apportionment for Sedgwick county, thirty-one lower chamber seats (or their equivalent in lower and upper chamber seats) must be added. By the same process it is established that a total of seventy-two representative units should be transferred to nine counties at the expense of counties that are presently overrepresented. The nine counties and the additional representative units to which they would be entitled, if equitable apportionment were in effect in Kansas, are as follows:

Sedgwick county (Wichita)—31 lower chamber seats

Wyandotte county (Kansas City)—14 lower chamber seats

Johnson county (suburban Kansas City)—10 lower chamber seats

Shawnee county (Topeka)—10 lower chamber seats

Reno county (Hutchinson)—2 lower chamber seats

Saline county (Salina)—1 lower chamber seat

Douglas county (Lawrence)—1 lower chamber seat

Riley county (Manhattan)—2 lower chamber seats

Geary county (Junction City)—1 lower chamber seat

Kansas' malapportionment is so severe that a complete re-writing of the apportionment system would appear to be necessary to

ninety-eight per cent of Nebraska's *counties* enjoy substantially equitable apportionment by these standards, only about seventy per cent of her people find themselves in such favorable circumstances.

establish anything approaching representative equality. To give Sedgwick county, for example, thirty-one representative units would involve so many small counties that almost all sections of the state would be involved. The most obvious first step to adjust legislative representation in Kansas to the spread of population would be to eliminate the requirement that each of its 105 counties must have at least one seat in the lower house. If this provision must stand, then substantial equality can be achieved only by such extreme measures as increasing the size of the lower chamber by several times or by limiting membership in the upper chamber to the larger counties. It might be suggested, though certainly not by this author, that this problem is not as severe as it seems, since the equitably apportioned upper chamber must agree to bills passed by the lower chamber before they are presented to the governor for his signature. Obviously, there is a danger that vetoes of this sort might lead to a complete suspension of the legislative function, which may indeed be precisely the goal to which some interests aspire.

From where are the seventy-two representative units to come in order to establish equality for the nine counties listed above? As Appendix C indicates, there are eighty-one counties in Kansas overrepresented in excess of the maximum allowable deviation. Seventy-two of these representative units should be transferred to the nine large counties and the balance of nine units assigned to moderately underrepresented counties. It hardly needs mentioning that adjustments of district boundaries involving properly represented counties will almost inevitably have to be made to effect a proper apportionment; these adjustments should be made in such a way that no new malapportionment is produced.

Once the severely malapportioned counties are located, one needs merely to investigate the degree of misrepresentation for the county in each of the two legislative chambers. To take the example of Sedgwick county again, malapportionment in the upper chamber (column three, Appendix A) is somewhat more severe than in the lower chamber. Substantial adjustments in both chambers must be made. To equalize Sedgwick county's representation in the two legislative chambers, it should receive six senators instead of her present one senator, and twenty instead of her present five representatives. Each Kansas senator represents 2,500 representative units and each representative 0.800; the revised apportionment would give it 15,000 representative units in the upper house and 16,000 representative units in the lower house, an average of 15,500 for the total representation ratio. This would leave the representation ratio a little short of her population ratio of 15,755, so another

lower house seat could be added bringing her representation ratio up to 15.900. It may be noted that, considering the history of legislative apportionment in American states, it might be well to "over-represent" those countries, such as Sedgwick, which are growing at a comparatively rapid rate in comparison with population growth in their state as a whole; this will tend to limit the natural tendency of representation systems to become distorted with the population movements that normally occur with the passage of time.

Adjustments should then proceed for all counties in Kansas along similar lines.

B. NEBRASKA.

The establishment of equitable apportionment by the standards described herein is much simpler for Nebraska than for any other state. Because of its unicameral legislature, the investigator needs to contend with measuring malapportionment of counties in only one house. The excessively underrepresented counties are Douglas (Omaha), whose population-representation ratio differential of -8.059 divided by Nebraska's representative unit of 2.326 indicates that it should receive three additional seats, and Lancaster (Lincoln), which should receive two. If these seats were added, as is proposed in L.B. 629,³⁷ the deviation from the norm for the counties in the forty-nine seat Legislature contemplated by that bill, would be virtually within the allowable deviation found above.³⁸

C. SOUTH DAKOTA.

Malapportionment in South Dakota, on the basis of these investigations, is less serious than in Kansas and more serious than in Nebraska. Five counties, including the four most heavily populated, are underrepresented in excess of the maximum allowable deviation. These counties are listed below with the additional representative units needed to establish equality:

- Minnehaha (Sioux Falls)—6 lower chamber seats
- Pennington (Rapid City)—5 lower chamber seats
- Brown (Aberdeen)—2 lower chamber seats
- Beadle (Huron)—1 lower chamber seat
- Fall River (Hot Springs)—1 lower chamber seat

Minnehaha and Brown counties are most seriously underrepresented in the upper house and Pennington, Beadle, and Fall River counties in the lower house. Eleven counties (Turner, Tripp, Butte,

³⁷ L.B. 629, 78th Neb. Leg. Sess. (1963). (Ed's. Note: Passed Apr. 27, 1963).

³⁸ See text at note 33. *supra*. See also Appendix C, *infra*.

McCook, Corson, Miner, Douglas, Sanborn, Hanson, Faulk, and Campbell) are overrepresented in excess of the maximum allowable deviation and thus are likely victims if more equitable apportionment is to be established in South Dakota.

VII. CONCLUSION

This article has located those counties in Kansas, Nebraska, and South Dakota whose apportionment of state legislators is seriously out of proportion to their percentage of total state population. The statistics that have been developed constitute a useful first step toward bringing each county's population and representation ratios into closer balance; this end is achieved by awarding additional representation to seriously underrepresented counties at the expense of seriously overrepresented counties.

This objective may be accomplished by the respective state legislatures themselves, although for understandable reasons American state legislatures have not given the public much hope for remedial action. It might also be accomplished by special committees or boards set up by the legislatures. The committee's function would be to re-arrange districts every few years, or in the event that the legislature itself fails to act within a specified time limit. If the intent of the recent series of malapportionment decisions is to force more equitable apportionments, then in the absence of state legislative action it appears that increasingly forceful and specific federal judicial action will be forthcoming. This sort of court action would seem to demand some agreement on the proper mathematical tools that would be employed in locating malapportionment. It is hoped that this article may prove of use in establishing the efficacy of such tools.

Other reforms of state and local government, such as adoption of a unicameral legislative body following Nebraska's example, county consolidation,³⁹ or adjusting the size of the legislative

³⁹ Professor David has stated that "it may be appropriate to note that many of the overrepresented areas in question are long overdue for a substantial consolidation of counties into a much smaller number than presently exists. With enough county consolidation, a rule of at least one member for each county might conceivably be retained. It would seem, however, that the consolidation into a smaller number of legislative districts will have to come first if county consolidation for purposes of more effective local government is to come later or at all." David & Eisenberg, *State Legislative Redistricting: Some Practical Issues in the Wake of Judicial Decision 17* (mimeographed ms. read at the American Political Science Association convention, Washington, D.C., Sept. 5, 1962).

bodies to permit more equitable allocation of seats, have been suggested and would indirectly simplify the difficult task of achieving balanced apportionment. Various devices of this kind will recommend themselves in varying degree to the several states, depending on the local situation. It would seem to be in the interests of each state to examine its problems and seek solutions that would forestall direct action by the federal courts.

APPENDIX A

COMPARISON OF POPULATION AND REPRESENTATION RATIOS
FOR TEN LARGEST COUNTIES IN KANSAS, NEBRASKA, AND
SOUTH DAKOTA, BASED ON 1960 FEDERAL CENSUS AND
APPORTIONMENTS AS OF DECEMBER, 1962

| County | Column One | Column Two | Column Three | Column Four | Column Five |
|---------------------|-----------------------------------|--|--|--|--|
| | Percent of State Population | Percent of Power in Lower House | Percent of Power in Upper House | Percent of Power in Both Houses | Differential Between Population and Representa- tion Ratios |
| KANSAS | | | | | |
| Sedgwick | 15.755 | 4.000 | 2.500 | 3.250 | -12.505 |
| Wyandotte | 8.514 | 3.200 | 2.500 | 2.850 | - 5.664 |
| Johnson | 6.600 | 2.400 | 2.500 | 2.450 | - 4.150 |
| Shawnee | 6.485 | 2.400 | 2.500 | 2.450 | - 4.035 |
| Reno | 2.711 | 1.600 | 2.500 | 2.050 | - .661 |
| Saline | 2.511 | 1.600 | 2.225 | 1.913 | - .598 |
| Leavenworth | 2.227 | 1.600 | 2.500 | 2.050 | - .177 |
| Montgomery | 2.066 | 1.600 | 2.500 | 2.050 | - .016 |
| Douglas | 2.007 | 1.600 | 1.988 | 1.794 | - .213 |
| Riley | 1.924 | .800 | 1.355 | 1.078 | - .846 |
| NEBRASKA | | | | | |
| Douglas | 24.338 | — | — | 16.279 | - 8.059 |
| Lancaster | 11.002 | — | — | 6.977 | - 4.025 |
| Hall | 2.534 | — | — | 1.884 | - .650 |
| Scotts Bluff | 2.396 | — | — | 2.326 | - .070 |
| Dodge | 2.301 | — | — | 1.693 | - .608 |
| Sarpy | 2.216 | — | — | 1.481 | - .735 |
| Adams | 2.051 | — | — | 1.895 | - .156 |
| Lincoln | 2.019 | — | — | 2.021 | .002 |
| Gage | 1.900 | — | — | 2.326 | .426 |
| Buffalo | 1.859 | — | — | 1.930 | .071 |
| SOUTH DAKOTA | | | | | |
| Minnehaha | 12.72 | 12.00 | 5.71 | 8.86 | - 3.86 |
| Pennington | 8.55 | 5.33 | 5.71 | 5.52 | - 3.03 |
| Brown | 5.01 | 4.00 | 2.86 | 3.43 | - 1.58 |
| Beadle | 3.19 | 2.67 | 2.86 | 2.76 | - .43 |
| Codington | 2.97 | 2.67 | 2.86 | 2.76 | - .21 |
| Brookings | 2.95 | 2.67 | 2.86 | 2.76 | - .18 |
| Yankton | 2.58 | 2.67 | 2.86 | 2.76 | - .19 |
| Lawrence | 2.51 | 2.67 | 2.86 | 2.76 | .25 |
| Davison | 2.45 | 2.67 | 2.86 | 2.76 | .31 |
| Roberts | 1.94 | 1.33 | 2.86 | 2.10 | .16 |

APPENDIX B

CITIES WITH A POPULATION GREATER THAN 25,000
IN KANSAS, NEBRASKA, AND SOUTH DAKOTA

| City | Population |
|--|------------|
| KANSAS | |
| Wichita | 254,698 |
| Kansas City | 121,901 |
| Topeka | 119,484 |
| Salina | 43,202 |
| Hutchinson | 37,574 |
| Lawrence | 32,858 |
| Prairie Village | 25,356 |
| NEBRASKA | |
| Omaha | 301,598 |
| Lincoln | 128,521 |
| Grand Island | 25,742 |
| SOUTH DAKOTA | |
| Sioux Falls | 65,466 |
| Rapid City | 42,399 |
| Source: U.S. Census Bureau, 1960 CENSUS OF POPULATION (1961). | |

APPENDIX C

MALAPPORTIONMENT IN THE COUNTIES OF
KANSAS, NEBRASKA, AND SOUTH DAKOTA

| State (with Number of Counties) | Counties Overrepresented | | | Counties Underrepresented | | | Counties Properly Appor- tioned |
|---------------------------------------|-----------------------------|---------------|-------|------------------------------|---------------|-------|--|
| | Exces- sive | Mod- erate | Total | Exces- sive | Mod- erate | Total | |
| Kansas (105) | 81 | 7 | 88 | 9 | 8 | 17 | 0 |
| Nebraska (93) | 0 | 79 | 79 | 2 | 11 | 13 | 1 |
| South Dakota (67) | 11 | 38 | 49 | 5 | 13 | 18 | 0 |
| TOTALS | 92 | 124 | 216 | 16 | 32 | 48 | 1 |

APPENDIX D

MALAPPORTIONMENT IN THE TEN LARGEST COUNTIES OF
KANSAS, NEBRASKA, AND SOUTH DAKOTA

| State | Overrepresented Counties | | Underrepresented Counties | | Total |
|--------------|-----------------------------|----------|------------------------------|----------|-------|
| | Excessive | Moderate | Excessive | Moderate | |
| Kansas | 0 | 0 | 8 | 2 | 10 |
| Nebraska | 0 | 3 | 2 | 5 | 10 |
| South Dakota | 0 | 4 | 4 | 2 | 10 |
| TOTALS | 0 | 7 | 14 | 9 | 30 |