

cational process. This trend of improved geographic education to rid the world of geographical ignorance has contributed positively to a third trend, that of greater public awareness of the importance of geography and its value, not only in better appreciating and understanding our local and global environments, but in contributing to the solution of significant global (e.g., global warming), national (e.g., poverty and inequality), and local (e.g., environmental health) problems.

Another trend that has contributed to our ability to recognize and solve geographic problems and to institutionalizing geography in the public and private sectors is the creation of geographic-based automated technology. Geography is now inseparably linked to information systems via GIS (geographic information systems). Many employers seek technical and analytical employees who can use this technology in problem solving. Among the other digital technologies often linked to GIS and, therefore, extended to applied geography, are remote sensing and global positioning systems (GPS). Both technologies frequently find their academic homes in geography departments and are requirements for undergraduate and graduate degrees. In short, technical skills are now often associated with applied geography and its practitioners because they acquire, portray, and analyze useful geographic knowledge for problem solving.

Finally, and perhaps most important, there is no shortage of pressing global, regional and local problems that require an applied geography approach. Many have been mentioned here. As long as there are geographers willing to contribute to the solution of problems that are inherently geographic or have geographic dimensions, there will be applied geography. Where geography is put into action, applied geography occurs.

See also: Cultural Geography; Environmental Policy; Geography; Human—Environment Relationships; Social Geography

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J. Frazier

#### Apportionment: Political

Most contemporary students of democratic theory take for granted that the basis of political representation will be geographic. There are two key components of any geographic system of representation: apportionment and districting. While the two terms are often used synonymously, formally, *apportionment* refers to the determination of the number of representatives to be allocated to pre-existing political or geographic units, while *districting* refers to how lines are drawn on a map within those units to demarcate the geographic boundaries of individual constituencies. *Malapportionment* refers to differences in the ratio of number of voters/electors to number of representatives across different constituencies. *Gerrymandering* refers to the drawing of districting lines for purposes of political (e.g., partisan or ideological or ethnic) advantage/disadvantage.

Use of geographical districting leaves open many key questions: How many and how large are the districts to be? Will seats be allocated to whole political units, such as provinces or towns, or will district lines be permitted to cut across existing political sub-unit boundaries? Will district lines be required to satisfy standards of compactness or contiguity? To what

extent will apportionment and districting lines be based (entirely or almost entirely) on total population? Or on population of (eligible) voters?

The USA has been a leader in defining standards of apportionment and districting to implement the principle of popular sovereignty. The US House of Representatives was intended by its founders to be the representative chamber of a bicameral legislature and its apportionment rules were set up to require a purely population-based allocation of House districts to the states, with changes in seat allocations made after each decennial census. Indeed, the various apportionment methods that have been used for the House over the past several centuries are mathematically identical to proportional representation methods such as N'Hondt and Ste. Laguë (Balinski and Young 1982; also see *Electoral Systems*). In *Baker vs. Carr*, 369 US 186 (1962), the US Supreme Court held that failure to redraw district lines when new census data was available was unconstitutional and that courts could fashion appropriate remedies. In subsequent landmark districting decisions, such as *Reynolds vs. Sims* 377 US 533 (1964), the US Supreme Court went much further, proclaiming 'one person, one vote' as the only appropriate standard for both districting and apportionment.

While one person, one vote notions of representation have had a profound influence throughout the world, by and large, the USA remains extreme among nations in its insistence on strict adherence to one person, one vote standards. For state legislative and local redistricting plans, where the one person, one vote standard is derived primarily from the equal protection clause of the Fourteenth Amendment, Supreme Court cases in the USA have established a 10 percent total deviation as prima facie evidence of constitutionality. (*Total deviation* is the sum of the absolute values of the differences between actual district size and ideal district size of the largest district and the smallest districts, normalized by dividing through by ideal district size.) For congressional districting, where standards are based directly on the supposed meaning of language in Article I of the Constitution, the Supreme Court has held that districts must be as close to zero deviation as is practicable. For example, in *Karcher vs. Daggett*, 462 US 725 (1983) a congressional plan with a total deviation of only 0.698 percent was invalidated. In reaction to this ruling, in some 1990s congressional plans, districts were drawn that were equal in population to within a handful of persons. In contrast, in other countries, especially those using plurality elections, no such strict population requirements exist. Many countries require (or even only just suggest) that differences should be no greater than plus or minus 25 percent or plus or minus 50 percent of ideal (Butler and Cain 1992).

However, the notion that near perfect equality of political representation has been achieved in the USA is misleading. The grossly malapportioned US Senate

tends to be omitted from international comparisons despite the fact that it is a co-equal chamber. The US House requires that each state have at least one representative—a rule that usually gives representation to several small states who would not otherwise be entitled to seats. Also, since states are the units, 'rounding rules' create variation in average House district population across states. For example, based on 1990 census figures, the largest House district in the 1990s apportionment was 1.7 times the size of the smallest House district, and the House had a total deviation of 61 percent (based on absolute deviations from the ideal size of 572,465 of 231,289 (Montana, too many) plus 118,465 (Wyoming, too few)). The discrepancies have been even greater in earlier apportionments. Moreover, even districts that are equal in population need not be equal in terms of (eligible) voters. Perhaps most importantly, unless we somehow regard voters as completely interchangeable units, neither population nor voter equality across constituencies, however perfect, guarantees equality of effective representation of the disparate groups and interests within a society.

The degree and geographic locus of malapportionment and differential turnout across groups interact with how a group's voting strength is distributed across districts to affect the translation of a group's voting strength into actual electoral impact (Grofman *et al.* 1997). Indeed, malapportionment is sometimes referred to as a form of 'silent gerrymander,' since malapportionment can easily translate into the political disadvantage of groups whose influence has been diminished because their members are disproportionately concentrated in constituencies whose voters have been underrepresented relative to their numbers. Even without conscious gerrymandering, the way in which districting lines are drawn will necessarily have an impact on the representation of different parties or groups (Dixon 1968).

The term gerrymandering comes from word play on the last name of Elbridge Gerry, Governor of Massachusetts. In 1812, Gerry signed into law a districting plan for the Massachusetts Senate, allegedly designed to maximize the electoral successes of Republican-Democrat candidates and minimize the electoral successes of Federalist candidates, which included some rather strangely shaped districts. In a map in the *Boston Gazette* of March 26 1812, the strangest of these districts was shown as a salamander, given tongue and teeth (Fig. 1). Perhaps the most pernicious aspect of this figure is that it has led to a potentially misleading association of gerrymanders with oddly shaped districts. The defining aspect of a gerrymander is the political consequences it entails, not its shape. Political disadvantage can come about even when districts look like squares or hexagons (Grofman 1990). In fact, however, the 1812 Senate plan did achieve partisan advantage for the Republican-Democrats; in the next election they won

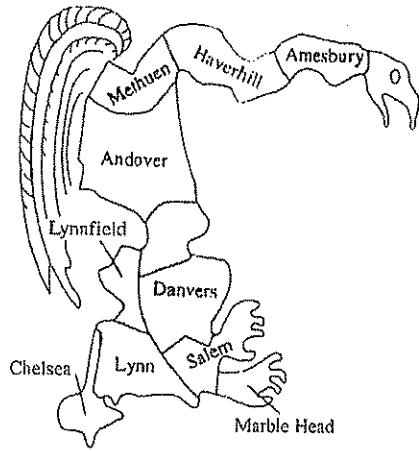


Figure 1

29 of 40 seats even though they received less than half of the votes (Hardy 1990).

Gerrymanders can be classified as partisan, bipartisan (often called 'incumbent gerrymanders'), racial, and personal, depending on who can be expected to be harmed or helped. In the USA, for example, the debate about gerrymandering has been fought largely over racial rather than partisan issues, e.g., over the extent to which plans should seek to place members of historically disadvantaged groups such as African-Americans into districts where they comprise the majority of the population even if doing so meant drawing districts that were irregular in appearance or cut across municipal and other political unit boundaries (Grofman 1998).

There are two basic techniques of gerrymandering: (a) 'packing' members of the group that is to be disfavored into districts that are won by very large majorities, thus 'wasting' many of that group's votes; and (b) 'cracking' the voting strength of members of the group by dispersing the group's population across a number of districts in such a fashion that the group's preferred candidates will command a majority of the votes in as few districts as possible. In addition, if elections are held under plurality, a group's voting strength may be submerged in multimember districts that use bloc voting--a technique sometimes called 'stacking.' The terms 'affirmative action gerrymander,' and 'benign gerrymander' have been used to denote districting done to advantage members of a historically disadvantaged group. However, it is important to distinguish between plans that are drawn with an aim to create a level playing field by avoiding unnecessary fragmenting of minority population concentrations, but that otherwise generally take into account the usual districting criteria such as respect for natural geographic boundaries and historical communities of

interest, and plans that seek to specially privilege particular groups by totally disregarding features other than race in drawing lines.

Because the way in which lines are drawn can be expected to matter, an important issue has to do with who draws the lines. In most democracies, especially those electing under plurality, non-partisan boundary commissions are responsible for drawing district lines (Butler and Cain 1992). In the USA, the preponderant pattern is for a legislature to be responsible for its own redistricting, and for each state legislature to be responsible for the drawing of congressional district lines for its state. However, in most US legislatures, no plan can be passed without gubernatorial agreement. Because of divided party rule and other factors, states may be unable to reach agreement on plans, thus throwing decision-making into the courts. One way in which districting practices in the USA are distinct from those in other countries is the extent to which courts play a critical role as arbiter. In recent decades, all but a handful of states have had a legislative or congressional plan challenged in court, and many plans have been rejected--in the 1960s and 1970s mostly for reasons having to do with population inequalities across districts, in the 1980s and 1990s for reasons having to do with racial representation (Grofman 1998). Indeed, throughout these decades, courts themselves were responsible for drawing some of the legislative or congressional districting plans that were actually used. Another peculiarity of US districting practices is the role of the US Department of Justice under Section 2 and Section 5 of the Voting Rights Act of 1965 as amended in 1982 (Grofman 1998).

From a comparative perspective, we may say that, generally speaking, gerrymandering is more important in plurality elections than in elections under proportional or semi-proportional rules. In particular, when there are more than two candidates or political parties competing, districting can have a dramatic impact on outcomes in plurality elections Taylor et al. 1986). *Ceteris paribus*, for elections under proportional or semi-proportional methods, the larger the average *district magnitude* (the number of representatives to be elected from the constituency), the less the probable impact of districting choices on outcomes; in contrast, for elections under plurality voting, the greater the average *district magnitude* (the number of representatives to be elected from the constituency), the greater is the expected impact on outcomes, since *plurality bloc voting* (the extreme case of which is an *at-large election*) can result in the virtual submergence of the views of those in the minority. However, even under proportional representation, expected outcomes can still be manipulated by districting choices, especially choices as to district magnitude (Mair 1986).

See also: Electoral Geography; Electoral Systems; Latin American Studies: Politics; Political Geography;

Political Parties, History of; Political Representation; Proportional Representation

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**Apprenticeship and School Learning**

Apprenticeship models provide a view of school learning processes that is quite different from traditional models. In particular, apprenticeship learning is less prone to the inert knowledge phenomenon. In this article, the main characteristics of apprenticeship learning and its theoretical background are described, and pros and cons of apprenticeship learning vs. traditional school learning are discussed.

*1. Apprenticeship Models as Solutions for Problems with School Learning*

Qualification and integration-enculturation are amongst the most important functions of schools for society as well as for individuals. School learning therefore should teach students facts and skills that are

necessary for later life. However, evidence exists that school learning is often far removed from application situations out of school; critics have argued that it frequently leads to knowledge that is inert (Bransford et al. 1991) and thus cannot be used for solving real-world problems. A plausible reform idea is to make school learning resemble learning out of school. Resnick (1987) identified four principles in which learning in school and out differ:

(a) Individual cognition in school vs. shared cognition outside. Learning in school focuses on individual performance, students have to work in isolation; in contrast, learning out of school usually focuses on shared knowledge and cooperative problem solving.

(b) Pure mentation in school vs. tool manipulation outside. School learning focuses on abstract mental activities that have to be done without the use of any external support like one's own notes or Internet research systems; in contrast, learning out of school heavily relies on individuals' competence to use adequate tools in an adequate way.

(c) Symbol manipulation in school vs. contextualized reasoning outside school. With its focus on symbol-based reasoning, school learning often lacks close connections to events and objects in the daily world that are characteristic for learning out of school.

(d) Generalized learning in school vs. situation-specific competencies outside. School learning aims at the acquisition of general, widely usable principles, whereas learning out of school focuses on solving problems that actually arise at places and contexts the individual is situated in.

The analysis of discrepancies between learning in school and out includes criticisms of present school instruction concerning both the qualification function of school and its integration-enculturation function. Similar arguments were brought forward by the German *Reformpädagogik* (educational reform) at the beginning of the twentieth century. Alternative instructional models developed in these years are closely related to the proposals nowadays made by situated learning theorists. One common principle is that students participate in more advanced individuals' activities and thus increasingly become part of the community of practice. In such apprenticeship models of learning, besides knowledge students have to acquire the ways of thinking in communities of practice.

Since the early 1990s, a number of situated learning models have been developed in order to decrease the discrepancy between learning in and out of school and to avoid the acquisition of inert knowledge (Gruber et al. 2000). In each, students learn within complex contexts like apprentices by solving authentic problems in a community of practice. The approaches are based on the idea that knowledge is socially shared so that plain teaching of 'objective' knowledge does not suffice because each working situation includes de-

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