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Representation and Redistricting Issues

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For Single-Member Districts Random Is Not Equal

Bernard Grofman

Senator Danforth: I don't know how many black members there are in the Congress. Maybe you do.

Mr. Wells: I don't know the actual figure, no.

Senator Danforth: But it is roughly fifteen, something like that, whereas it is about 10 or 11 percent of the population of this country is black. So, they are about one third of what their representation would be ($15/435 = 3.4$ percent).

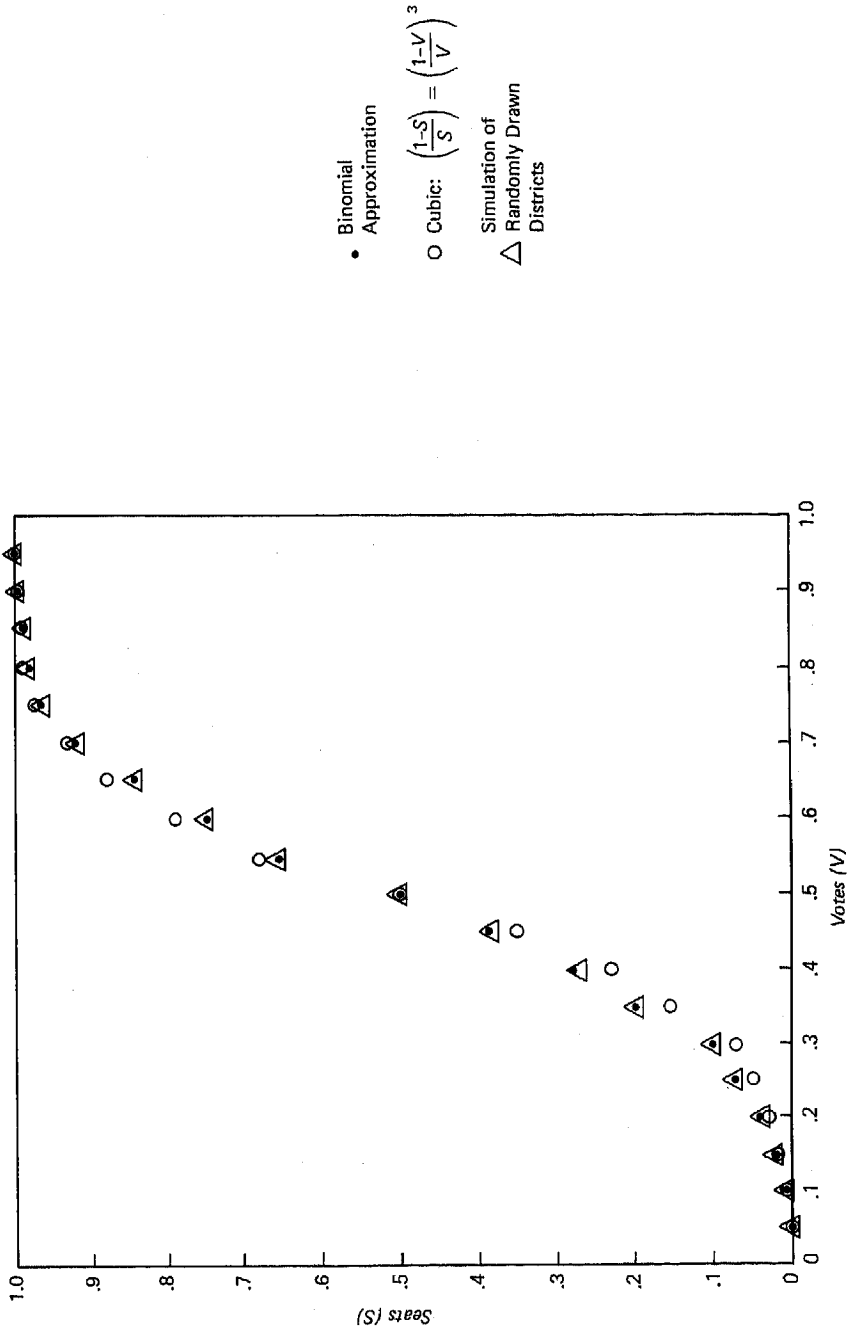
Senator Levin: Suppose it could be shown that to use what amounts to the chance method is going to result in even a lower black representation. I don't see how that is possible.

Mr. Wells: I agree with you, Senator. I don't see how it is possible. Even if it is possible in one particular district, it may not be in the next one. That is the beauty of operating on a chance pattern.

In the long run, if I understand mathematical logic, a chance pattern will, over the long haul, operate in such a way as to make the percentage of the population and the percentage of representation more or less equal. It may not do that in any given redistricting arrangement. But, in looking at it over a series of years, it should accomplish that (Wells 1979, p. 529).

Dave Wells's assertion that, for single-member districts, "a chance pattern will, over the long haul, operate in such a way as to make the percentage of the population and the percentage of representation more or less equal" is a view I suspect is widely held. For example, David Cohen of Common Cause in his testimony on S.596 also calls attention to the discrepancy between black and Hispanic population figures and the percentages of black/Hispanic congressional representatives as evidence of nonrandom (and discriminatory) districting. Unfortunately, except under very special circumstances, unlikely to be ever achieved in practice, random districting will not yield proportionality between a group's vote percentage and the percentage of seats it wins. We show in table 5-1 potential expected average long-

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Note: The author is indebted to Nick Novello for programming selection simulation reported here.
Figure 5-1. Relationship between Vote Percentage and Seat Percentage for a Single-Member District Legislature Whose Equipopulation Districts Have Been Randomly Drawn

In any actual election system, the value of k will depend upon the spatial distribution of partisan/group support across districts. Roughly speaking, the more the distribution of partisan/group strength is similar in all districts (that is, the lower the variance), the higher will be k . (See Johnston 1976; Niemi and Deegan 1978, for a discussion of related issues.) Wildgen and Engstrom (1980) note that, in general, minorities will do better if their strength is geographically concentrated; while majority seat share is maximized the more evenly distributed is its vote strength.

Backstrom, Robins, and Eller (1978) and Engstrom and Wildgen (1977) have proposed to measure fairness of apportionment (that is, proportionality between vote share and seat share), as relative to that which would be statistically expected under a random drawing of (equal population) district lines *given the actual pattern of minority concentration*. It is possible to establish confidence limits around predicted values at any desired level, for example, 95 percent. Observations that fall outside these limits can be assumed to be due to deliberate gerrymandering.

As we see from table 5-1, for any given level of minority voting strength, what would be a reasonable minority seat representation depends very much on k , which in turn depends upon the spatial distribution of minority strength. For example, under a random drawing of district boundaries, a minority with a 30 percent vote strength could expect on average 21.9 percent of the seats if $k = 1.5$ but only 7.3 percent of the seats if $k = 3$. In the U.S. Congress, were $k = 2$, then, an 11 percent black population minority could only *expect* to get 1.5 percent of the seats on average, while a 9 percent Hispanic minority could only *expect* to get .9 percent of the seats on average, even were districting completely unbiased. That blacks win more congressional seats than Hispanics (3.4 percent versus about 1 percent) relative to what might be expected is, in our view, at least in part due to the fact that blacks are somewhat more geographically concentrated than are Hispanics. Only where minority strength is at least 45 percent is seat share relatively insensitive to variation in k .

In sum, blind districting is extremely unlikely to give rise to proportional results, except when minority and majority are near equal in size.