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Sheila Ards
University of Minnesota - Twin Cities

Marjorie Lewis
University of Colorado at Denver

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Vote Dilution Research: Methods of Analysis

by

Sheila Ards and Marjorie Lewis

Why have issues which disproportionately affect African Americans not been brought to the policy forefront and given attention properly so that effective solutions can be found? Because of their roles as controllers of the government's budget, politicians and other policy makers decide which problems will be addressed. It is important, therefore, that African Americans elect political candidates of their choice. In the past, African Americans largely were outside the arena of public-policy setting. Thus, solutions to problems which disproportionately affected African Americans were not pursued.

Since African Americans represent only 12 percent of the U.S. population, rational behavior by the 88 percent majority population might assure that the political voice of the 12 percent minority never be adequately heard. Through such racial gerrymandering techniques such as *cracking* (dispersing large concentrations of minorities among several districts), *stacking* (combining several concentrations of minority population along with a greater white population to assure a white majority), and *packing* (combining minority voters into one or more districts to minimize the number of districts controlled by blacks),[1] minority voices have been diluted in elections for state and local offices. African Americans have not been successful in electing the candidates who will address issues of importance to the African-American community.

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Patterns of Voting

After years of pushing for residential integration, the majority of Americans are still living in racially segregated neighborhoods. For whatever the reasons, African Americans primarily live in areas where other African Americans live. Because the African-American population is a small percentage of the general population, one usually finds African Americans living in residential clusters.

Through the process of gerrymandering over the years, African-American populations have been either stacked, packed, or cracked, as described above. Thus, candidates running for elected office court the votes of non-African-American voters. The votes of African Americans in many instances are not needed to win the election. Therefore, the major issues confronting African Americans, in particular, largely go unresearched and unsolved. In order for an African American to elect his or her candidate of choice, that candidate would have to be the candidate of choice of the majority population as well.

Table 1 visually presents the following discussion. In Table 1, voters are classified as African American and non-African American. The candidate of choice is classified as being the choice of African Americans or the choice of non-African Americans. The candidate of choice of either group reflects that over 50 percent of the groups's population voted for the candidate. Here, we do not assume that the candidate of choice for African Americans is also African American, although much of the discussion in this area has presumed this to be the case.

Table 1

	% Voters		Candidate of Choice	
Voters	Voting Pop	% Voted	African-American (AA)	Non-AA
AA	1000	90	80	20
Non-AA	9000	90	10	90

If the candidate of choice of the majority of African Americans is the same as the candidate of choice of the majority of non-African Americans, then there is no problem. The problem arises when the candidate of choice of African Americans is different from the candidate of choice of non-African Americans.

In Table 1, African Americans make up 10 percent of the voting age population. Ninety percent of both groups voted in the election. Eighty percent of the African-American voters voted for Candidate A. Only 10 percent of the non-African-American voters voted for Candidate A. Because African Americans constituted a small proportion of the total population, Candidate A could only win by obtaining votes from non-African Americans. When, however, non-African-American voters intentionally and deliberately vote for only non-African-American candidates of choice, the process is called *bloc voting*.

Although the candidate of choice of African Americans does not have to be African-American, we now will assume for this discussion that to be the case. In addition, we will assume that the candidate of choice of non-African Americans is white. Over the past several decades, a number of African-American candidates have

won state and local elections in majority non-African-American areas. These elections experienced a large concentration of white-voter *crossing over,* voting for the African American candidate. Attention is not being focused on these elections or how they differ from past elections because they have been the exception, not the rule. Much of the research to date has been on just the opposite phenomenon—large contingencies of white voters voting against an African-American candidate.

Estimating Racial Bloc Voting

The literature details several ways for testing and measuring racial bloc voting.[2] Two techniques—*homogeneous precinct analysis* and *bivariate regression*—are commonly discussed. *Multivariate analysis* and *logit modeling* will be described.

Homogeneous Precinct Analysis

Homogeneous precinct analysis is by far the easiest and most straightforward technique for estimating vote dilution. Homogeneous precinct analysis requires that the statistician isolate two groups of precincts: one group with precincts of 90 percent or more potential African-American voters and another group of precincts with less than 10 percent African-American voters. For each precinct, the level of voter participation by whites and African Americans and the votes cast by these two groups for different candidates are compared. Again, we can use Table 1. If the preferred candidate of African-American voters receives a substantially smaller percentage of votes by white voters, then there is the possibility that votes for the preferred candidate of African Americans are diluted by bloc voting by whites.

Returning to Table 1, we see that there are clear racial voting patterns. African Americans primarily voted for Candidate A. Only 10 percent of non-African Americans voted for Candidate A. Given the size of the African American population when compared to the general population, African Americans will never be able to elect their candidate of choice unless there is a large number of cross-over votes.

There are several significant problems in conducting homogeneous precinct analysis. First, the estimates of bloc voting are normally based on a small, possibly unrepresentative, sample of the electorate. The population within homogeneous precincts may make up only a small number of voters within all precincts. Second, only the behavior of voters in homogeneous areas is examined; the electoral behavior of those residing in heterogeneous or mixed precincts is ignored. And third, in many political jurisdictions there is an absence, or near absence, of precincts that can be considered homogeneous. Thus, in those jurisdictions one would be unable to estimate racial bloc voting.

For the most part, homogenous precinct analysis may give us very biased conclusions. Given that the precincts have to be homogeneous, one may also question the attitudes and preferences of those who live within these neighborhoods and their willingness to vote for candidates who are very different from themselves. Those who live in more heterogenous neighborhoods may be willing to consider candidates from other backgrounds. In addition, in some localities it may be difficult to find precincts which meet the homogeneity requirements, while there may be many heterogeneous precincts. Thus, behavioral information from voters in these heterogenous precincts is lost in homogeneous precinct analysis. These potential problems force us to consider other possible techniques for analysis.

Bivariate Regression Analysis

Bivariate regression analysis allows the inclusion of information about voting behavior in *all* of the precincts in a political jurisdiction. These models consist of one dependent variable and one independent variable. The dependent variable is what we are trying to predict. In our example, we will let the dependent variable equal the percent of votes Candidate A receives. The independent variable, which is the data by which we are using to predict the dependent variable, will be the percent of African Americans who voted in the election. In much of the research to date, variables such as the percent of the voting population that is African American or the percent of African Americans who voted in the election have been the more commonly used independent variables.

For bivariate regression models, we only need to collect data on the dependent variable and the independent variable from each precinct. The results from the statistical analysis give the information for drawing a straight line: $Y = a - bX$,

where Y is the dependent variable
X is the independent variable
a is the Y-intercept
and, b is the slope of the line.

The bivariate regression gives estimates of a and b. The value of the Y-intercept is a measure of how many votes Candidate A received if no African-American voted for Candidate A. The value of b, the slope, is the value of the increase in Y for every one percentage increase in X. Given information on a and b, one is able to input a value for X and obtain an estimate of Y—the percent of votes Candidate A receives. From the behavior of the electorate in past elections, one is able to predict how the electorate of each precinct within the sample will vote for Candidate A. Of course, the same methodology can be conducted for examining whites voting for non-African-American candidates.

Another product of the bivariate regression is the Pearson product-moment correlation coefficient (r). The Pearson product-moment correlation coefficient measures the relationship between the dependent variable and the independent variable. In our case, r measures the relationship between the racial composition of the population and the number of votes a candidate receives. The value of r can range from -1 to 1. A positive r suggests

that as one variable increases, the other variable also increases. A negative r suggests as one variable increases, the other variable decreases. An r value of zero suggests that there is no relationship between the two variables.

One major weakness of bivariate analysis in voting dilution research is that it can sometimes predict a value for the dependent variable beyond the normal range of zero to 100 percent. This is especially a concern if the data shows that the dependent variable lies close to zero or 100. In voter dilution research, the dependent variable is usually the percent of votes a candidate receives and the percent is likely, in some cases, to come close to zero or 100. This problem has led to a number of suggestions by political scientists and statisticians. The econometric literature suggests constraining the predicted value of the dependent variable within the zero to 100 percent range through the use of a logit model.

Logit Model

The logit model has not been used in litigation before the courts. However, these models correct for the major disadvantage of the bivariate model. The logit model recasts the dependent variable into a log odds format. The logit model is represented as:

$$Log\ (P/1–P) = a + bX + e$$

where P equals the percent of votes the candidate of choice receives. The error term (e) represents the error associated with a predictive model. The new dependent variable is the log of the odds of the percent of votes the candidate of choice receives. As stated earlier, the predicted value of this new dependent variable is constrained to be within the zero to 100 percent range. Now, we are estimating what are the log odds of a candidate to receive votes.

After one obtains a technically feasible value of the dependent variable, one seeks to explain the relationship between the race of the voting population to the number of votes a candidate receives. This can be done through the transformation: $@P/@X = P(1–P)b$. The result from this transformation tells us how a one percentage increase in X (in our case, the percent of the voting population that is black) will change the percentage of votes a candidate receives.

The benefits from using the logit model outweighs the cost of the model. The logit model produces a technically possible number within the appropriate range. This model does not require collection of additional data beyond the bivariate regression case. In addition, the logit model does not require extensive rewriting of existing bivariate regression programs. Although the use of these models has not been discussed in court cases, the benefits of these models should be explored.

Multivariate Regression

Another extension of the bivariate framework is multivariate regression analysis. Multivariate regression analysis does not constrain the model to one explanatory variable. Other variables in addition to the race of the voting population can be used to predict the percentage of votes a candidate receives. Other possible variables to include in the model would be: 1) the median household income of the population; 2) the percent of the population with greater than a four-year college education; and 3) the average age of the resident population.

There have been a number of elections in the past decade where the racial composition of the electorate would have been a poor predictor of the percent of votes a candidate would receive. Attorney Douglas Wilder won the Governorship of Virginia although African Americans made up a small percentage of the total electorate. Multivariate regression analysis may give a greater insight into what factors other than race are important to a candidate's success in winning an election. In addition, multivariate analysis may help us crystalize what is happening when a large number of whites cross over to vote for a minority candidate.

Multivariate analysis can also be used in conjunction with the logit mode. Thus, the logit model would incorporate more than one explanatory variable. The new form of the logit model would be $Log\ (P/1–P) = a + bX + cY + dZ + ..+ e$, where X, Y, Z, and others, would represent different variables to explain the log odds of the percent of votes a candidate receives.

Conclusion

Although *Thornburg* v. *Gingles* eased the burden of proof on the plaintiff in proving racial bloc voting, much of that proof has been based upon the simplest forms of statistical analysis. These forms of statistical analysis would be sufficient if they did not produce incorrect and, in some cases, impossible results.

These authors suggest the use of a multivariate logit model in vote dilution analysis. Not only does the multivariate logit model constrain the predicted value of the percentage of votes for the candidate within the appropriate range, but it also allows for inclusion of variables other than race as explanatory variables.

The 1990 census and the 1992 election give us much new data to measure the levels of racial bloc voting in elections. Let us analyze this information with the most appropriate tools available.

Notes

[1]Frank R. Parker, *Reapportionment in a Nutshell: An Outline of Constitutional and Statutory Requirements* (Lawyers' Committee For Civil Rights Under Law, Suite 400, 4400 Eye Street, Northwest, Washington, D.C. 20005).

[2]Richard L. Engstrom and Michael D. McDonald, "Quantitative Evidence in Vote Dilution Litigation: Political Participation and Polarized Voting," *The Urban Lawyer* 17, no. 3 (Summer 1985).

Sheila D. Ards, is an assistant professor in the Hubert Humphrey Institute of Public Affairs, the University of Minnesota.

Marjorie Lewis, is an assistant professor in the Public Policy School, the University of Colorado at Denver.