THE CENTURY FOUNDATION

Issue Brief

AFRICAN AMERICANS, VOTING MACHINES, AND SPOILED BALLOTS: A CHALLENGE TO ELECTION REFORM

In the wake of the 2000 presidential election debacle, Congress passed the Help America Vote Act to help prevent a replay of the Florida punch card–counting embarrassment that left many Americans wondering about the reliability of our voting system. One important element of this legislation is a requirement that states employ voting systems that include features designed to minimize the number of uncounted ("spoiled") ballots. The law also specifically earmarked $650 million for states to replace punch-card and lever machines, systems shown to be particularly prone to high rates of ballot spoilage. Nonetheless, many states continue to use outmoded voting machines. Their inaction threatens to undercut the reliability of the 2004 election results for a variety of reasons, one of which has received far too little attention: African-American votes disproportionately go uncounted when punch-card and, to some extent, "central count" optical-scan machines are used. In contrast, the racial disparity nearly disappears when electronic voting machines are used. "Precinct-based" optical-scan machines may also reduce the gap.[1]

According to the Caltech/MIT Voting Technology Project, "punch cards have the highest rate of unmarked, uncounted, and spoiled ballots over the last four presidential elections."[2] In their report, the researchers noted,

> punch cards . . . lose at least 50 percent more votes than optically scanned paper ballots. Punch cards have averaged a residual vote rate of 2.5 percent in presidential elections and 4.7 percent down the ballot. Over thirty million voters used punch cards in the 2000 election. Had those voters used optical scanning there would have been 300,000 more votes recorded in the 2000 presidential election nation-wide and 420,000 more votes in Senate and gubernatorial elections.[3]

Yet four years later, even after the enactment of the Help America Vote Act, 32 million voters still live in jurisdictions that will use those same punch-card ballots.[4] This is due in great part to the controversy over more technologically advanced voting systems. Computer scientists and some reform advocates argue that computerized voting systems are vulnerable to hacking, error, and manipulation, and must be minimally equipped with a voter verifiable paper audit trail to ensure accuracy and reliability. Other groups, computer experts, many election administrators, and some legislators believe that these machines are not reliable and/or the paper trail would cause more problems than it would solve. This debate has slowed considerably the movement away from punch cards toward more advanced technologies. For example, while Ohio originally planned on replacing all punch-card voting machines in time for this November's election, because of the controversy, just four of thirty-one Ohio counties eligible to replace old machines with electronic voting equipment are actually doing so.[5]

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This means that once again in 2004, African Americans are at particular risk of not having their votes counted. There have been studies conducted by newspaper reporters and academics focusing on particular jurisdictions such as Florida and Chicago, studies of national voting patterns, and studies of elections from 1988, 1996, and 2000, and virtually all come to the same conclusion: punch-card machines mean that far fewer African-American votes will count relative to uncounted votes by white citizens.

National Studies

Both before and after the 2000 election, national studies were done on racial disparities in the number of votes counted by systems currently in use. Looking at all votes, researchers found a wide gap between the number of African-American and white votes counted. For example, the Civil Rights Project at Harvard University did a study of residual ballot rates that

> found a strong relationship between ballot spoilage and black population; specifically, as the black population in a county increases, the spoiled ballot rate correspondingly increases. . . . Examining the 100 counties with the worst (highest) spoilage rates nationwide, our analysis also found that 67 of these have black populations above 12%. Of the top 100 counties with the best performance (lowest spoilage), the reverse is true—only 10 had sizeable black populations, while the population of 70 of the counties was over 75% white.[6]

Moreover, looking at the country as a whole, studies have found much of the racial disparity is due to the use of punch-card ballot machines, and to some extent central count optical-scan machines.

Stephen Knack and Martha Kropf did a study of voting in the 1996 election. They came to the conclusion that minorities are more likely to have their votes tossed out and that this is exacerbated by the use of punch-card ballot machines. They say that an analysis of the 1996 election "shows that higher percentages of African Americans and Hispanics are associated with higher rates of invalidated ballots. These differences are absent, however, in counties using types of voting equipment that can be programmed to eliminate over-voting."

Knack and Kropf go on to state the pattern of racial and ethnic disparity in invalidated ballots

> is particularly strong in counties using punch cards, central count optically scanned ballots, and hand counted paper ballots. There is no link between ethnicity and invalidated ballots among counties using voting technology that can be programmed to prevent overvoting, namely lever machines, electronic voting systems, and precinct-count optical scan systems. [7]

Moreover, Knack and Kropf found that optical-scan machines where votes are counted in-precinct are favorable in terms of counting minority votes.

> Among the 78 counties with this [optical scan] "second chance" technology, percent black is actually negatively related to roll-off. Among the remaining 483 optical scan counties [with central counting], we observe the usual positive relationship between percent black and roll-off. This result strengthens the conclusion that voting systems more resistant to overvoting can reduce discrepancies in the roll-off rate between heavily black and mostly white counties.[8]

This is a critical finding: technology that allows the voter to fix mistakes is more fair and equitable in counting of votes.

After the 2000 presidential election, the United States House Committee on Government Reform launched a study of racial disparities in the vote. Again, as with every other study, it was clear that minorities in general had a far greater chance of having their vote thrown out than the rest of the population. The report says that,

> In the 20 districts with high poverty rates and a high minority population, 4.0% of ballots cast were not counted in the presidential race. In the 20 affluent districts with a small minority population, only 1.2% of the ballots cast were not counted. On average, voters in low-income, high-minority districts were over three times as likely to have their votes for president discarded as voters in affluent, low-minority districts. Voters in some low-income, high-minority districts were 20 times as likely to have their votes discarded as voters in other congressional districts.[9] (See Table 1.)

Table 1. Voters in Districts with High Poverty Rates and a High Minority Population Were More Likely to Have their Ballots Not Counted than Voters in Affluent Districts with a Low Minority Population

District Type	Number of Ballots Cast	Number of Uncounted Ballots	% of Uncounted Ballots
Low-Income, High-Minority	3,469,146	139,938	4.0
Affluent, Low-Minority	5,775,679	67,031	1.2
Total	9,244,825	206,969	2.2

Source: Minority Staff, Special Investigations Division, Committee on Government Reform, U.S. House of Representatives, "Income and Racial Disparities in the Undercount in the 2000 Presidential Election," Washington, D.C., July 9, 2001, pp. i–ii.

In keeping with the study by Knack and Kropf, these researchers found that

> Voters in low-income, high-minority districts had significantly higher rates of discarded ballots on older technologies like punch-card and lever machines than they did on newer technologies like electronic voting systems and precinct-counted optiscan machines. In low-income, high-minority districts, the undercount rate was 7.7% on punch-card machines, 4.7% on centrally counted optiscan machines, 4.5% on lever machines, 2.4% on electronic voting systems, and 1.1% on precinct-counted optiscan machines. . . .
>
> When voters used punch-card machines, the rate of uncounted votes was 7.7% in low-income, high-minority districts and 2.0% in affluent, low-minority districts, a disparity of 5.7 percentage points. But when precinct-counted optiscan machines were used, the size of the disparity dropped to only 0.6 percentage points.[10]

Again, precinct-count optical-scan machines are singled out as performing in a more equitable fashion.

Regional Studies

Studies on this topic have also been conducted in a number of cities and states, again coming to the same conclusions as the reports cited above.

Los Angeles

Betsy Sinclair and Michael Alvarez undertook an examination of ballots cast in 2000 in Los Angeles, a jurisdiction that used only punch-card ballot machines made by one manufacturer. In examining a jurisdiction where all voters, white and of color, used the same technology throughout, they also found that the punch-card ballot machines disproportionately discarded minority votes.

More specifically, they found that "In the overvote results . . . the race variables—Hispanic, Black, and Asian/Hawaiian/Pacific Islander—all have positive and significant estimated effects for all contests."[11] "For undervotes . . . the race variables are again all positive and significant for the President, Senate, and District Attorney contests but negative and significant for the Assessor contest. The Assessor's race is clearly an anomaly, both due to the extremely high undervote rate (22.98%), and to the large number of candidates contesting this election."[12]

Sinclair and Alvarez come to the following conclusion:

> Normatively, race and gender should have no significant role in the residual vote. The relatively higher levels of residual votes in Los Angeles County, attributable to the punch card system, magnify the effects of race and gender in voting. While our analysis does not universally demonstrate that race and gender have a role to play in every contest, it is true that in most contests, minorities and women have a greater propensity to over- or undervote. The implication is that the voices of these voting populations may be under-represented in close elections as they are more likely to over- or undervote.[13]

Chicago

Chicago has also been studied for this purpose too—and for good reason. The worst case of racial disparity in spoiled ballots in 2000 was actually in Illinois, not Florida. In Cook County, where Chicago is located, voters used punch-card ballot machines, while in many other counties voters used more modern machines.

In a *Washington Post* survey, reporters found that

> The rate of disqualified ballots in Cook County ranged from one of every 20 ballots in precincts that are less than 30 percent African American to one of every 12 in precincts that are more than 70 percent African American. . . . In Chicago, there were 51 precincts where at least one of every six ballots lacked a valid presidential vote. Ninety percent of the residents in those precincts are black or Latino, and they voted 94 percent for Gore. [14]

Interestingly, this racial disparity already was known to Chicagoans. As the articles relates,

> Ten years ago a candidate for Cook County clerk, Joanne Alter, released a detailed 48-page study showing how disproportionate numbers of votes cast by black voters were being discarded.

> "The punch-card voting system used in Cook County has effectively disenfranchised poor voters by the tens of thousands," the study said.
>
> It noted that in the 1988 presidential election, no vote was registered on 9 percent of the ballots in some of Chicago's black sections, while in the affluent suburb of Elk Grove the proportion was 1 percent. The report said high numbers of uncounted black votes helped defeat Democratic gubernatorial candidate Adlai E. Stevenson III in an extremely tight race in 1982.[15]

Louisiana and South Carolina

Recently, academics Michael Tomz and Robert Van Houweling took a look at voting in Louisiana and South Carolina. Through studying precincts in those states in the 2000 election, the researchers found that the black-white gap in voided ballots was substantially lower with direct-record electronic (DRE) and lever machines than with punch-card and optical scanners.[16]

As they state,

> In South Carolina, the estimated racial gap is 4.2 percentage points in precincts that use punch cards and 6.2 percentage points in those with optical scanning devices. . . . On the other hand, we estimate a difference of only 0.3 percentage points… between nonwhite and white invalidation rates in precincts with DREs. For Louisiana, the regressions suggest only a mild relationship between invalidation and race. . . . We find a racial gap of only 0.7 percentage points for lever machines and 0.5 percentage points for DREs.[17]

Table 2. Mean Estimated Racial Gap in Voided Ballots (Percentage Points)

	Nonwhite	White	Gap
South Carolina			
Punch Card	8.7	4.5	4.2
Optical Scan	9.5	3.3	6.2
DRE	3.6	3.2	0.4
Louisiana			
Lever	1.0	0.3	0.7
DRE	0.9	0.4	0.5

Source: Michael Tomz and Robert Van Houweling, "How Does Voting Equipment Affect the Racial Gap in Voided Ballots?" *American Journal of Political Science*, June 12, 2002, p. 39.

The researchers found a similar gap with respect to absentee ballots, another form of paper ballot. In Louisiana, they found that 10.3 percent of nonwhites and 5.3 percent of whites invalidated their absentee ballots, for a racial gap of 5 percentage points.[18]

After taking into account poverty and education levels, the results were the same: the racial gap was much bigger with punch cards and optical ballots than with lever machines and DREs. In South Carolina, the estimated racial gaps were about 6.6 percentage points for punch cards and 6.9

percentage points for optical ballots, compared with only 2.1 percentage points for DREs. In Louisiana, the gap was 0.8 percentage points for both lever and DRE machines.[19]

While African Americans do seem to intentionally leave ballots blank more often than other groups, the researchers say the difference is too small to explain the discrepancies.[20]

California

Michael Alvarez, Betsy Sinclair, and Catherine Wilson took a look at the entire state of California. These researchers state flat out in their findings that

> We provided substantial evidence, examined from a number of methodological perspectives, documenting that there are higher rates of uncounted ballots in counties with large nonwhite populations in the 2000 presidential election in California. We also showed that this effect is particularly noticeable in California counties that employ punchcard voting systems, especially counties with high populations of nonwhites. . . .
>
> Furthermore, our study indicates that in California counties using punchcard voting systems, the rate of uncounted ballots increases with the size of the nonwhite population.
>
> The same does not appear to be true in counties using other voting systems. This raises the possibility that Section 2 of the Voting Rights Act might be used as the basis for additional litigation in other election jurisdictions using punchcard voting systems, where similar patterns can be observed.[21]

More specifically, in looking at "correlations between nonwhite population and residual vote rates for punchcard counties relative to optically scanned counties," the researchers found "moderately strong and positive in the case of the punchcard counties (0.44) while weakly negative in optically scanned counties (-0.15). . . . (The correlation coefficient ranges from one to negative one; a positive correlation close to one indicates a strong positive relationship between the percent nonwhite and the uncounted ballot rate, while a correlation close to zero indicates no real relationship between the two variables.)"[22] (See Table 3.)

Table 3. Correlation Between Race, Residual, Over- and Undervotes

	Correlation between nonwhites and residual	Correlation between nonwhites and overvotes	Correlation between nonwhites and undervotes
Punch card	0.44	0.06	0.53
Datavote	0.16	0.17	-0.05
Votomatic	0.17	0.70	0.43
Pollstar	0.23	0.52	0.14
Optical scan	-0.15	-0.03	0.10
Central	-0.22	-0.26	-0.35
Precinct	-0.11	0.27	-0.28
Electronic	NA	NA	NA
Note: Table entries are bivariate correlation coefficents.			

Source: Michael Alvarez, D. E. Betsy Sinclair, and Catherine H. Wilson, "Counting Ballots and the 2000 Election: What Went Wrong?" in *Rethinking the Vote*, ed. Ann N. Crigler, Marion R. Just, and Edward J. McCaffery (New York: Oxford University Press, 2004), pp. 21–22.

Ohio

The ACLU of Ohio brought a lawsuit after the 2000 election alleging that the use of punch-card ballot machines in that state violated the Equal Protection Clause of the Fourteenth Amendment and the Voting Rights Act. According to the complaint, punch-card precincts and counties with a majority of African-American voters had much higher ballot spoilage rates than white areas that similarly used punch-card ballot machines. As with other studies, a researcher hired for the plaintiffs found that such disparities were reduced when electronic voting machines were used. The complaint and study use two counties, Hamilton and Summit, as examples. The researcher used three different statistical methods of analysis in producing this table: ecological inference (EI), which takes into account all of the precincts in which votes are cast but does not assume a linear relationship between the variables; ecological regression (ER), which provides estimates based on all of the votes cast in all of the precincts; and homogeneous precinct (HP) analysis, which reports the percentage of voters that overvoted in the precincts in which over 90 percent of the voting age population was not African American and in those in which over 90 percent was African American.

Table 4. The Overvote in Hamilton and Summit Counties, by Race

	African American Overvote %	Non-African American Overvote %	Difference (AA minus non-AA)
Hamilton			
EI	2.48	0.43	2.05
ER	2.65	0.34	2.31
HP	3.04	0.43	2.61
Summit			
EI	4.83	0.30	4.53
ER	2.88	0.39	2.49
HP	2.89	0.46	2.43[23]

Source: Steward V. Blackwell, Richard L. Engstrom, analysis for the plaintiffs in *Effie Stewart, et al.* v. *J. Kenneth Blackwell, et al.*, Case Number 5:02-CV-2028, United States District Court for the Northern District of Ohio, Eastern Division at Akron, October 17, 2003, pp. 5–6.

Florida

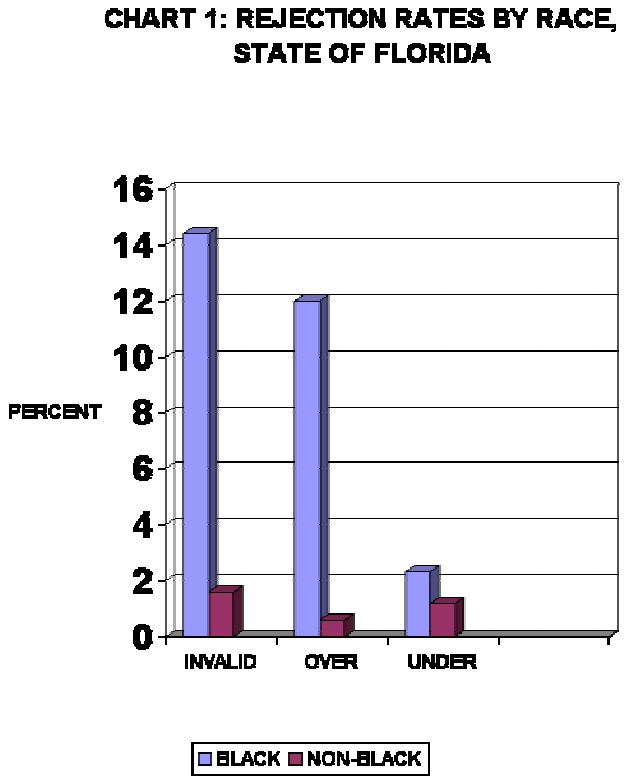
Predictably, a flurry of reports came out in the aftermath of the 2000 election regarding Florida's punch-card machines. As had happened nationwide, every study found that African Americans in Florida had a profoundly higher rate of votes thrown away than whites. For example, *USA Today* reported that voters in Florida's majority-black precincts were four times as likely to have their 2000 ballots invalidated than white precincts: 8.9 percent versus 2.4 percent. Among the one hundred precincts with the highest numbers of disqualified ballots, eighty-three were majority black.[24]

What is more to the point here is further studies demonstrated that, even within punch-card voting machine areas (and to some degree central count optical-scan machine areas), there was a big difference between lost vote rates.

Allan Lichtman, a professor of history at American University, conducted a study of ballot rejection rates in Florida for the United States Commission on Civil Rights. He found that overall, there was enormous difference in the rate of white votes and African-American votes counted in Florida.

> When one looks at the variation in the ballot spoilage rates for each Florida county, about one-fourth of the variation can be explained solely by knowing how many African American voters were registered there. Controlling for the number of high school graduates and literacy failed to diminish this relationship. . . . For the entire state, the rate of spoiled ballots for African Americans was 14.4 % while it was 1.6% for non-African Americans.[25]

Figure 1. Rejection Rates by Race, State of Florida



Source: Allan J. Lichtman, "Report on the Racial Impact of the Rejection of Ballots Cast in the 2000 Presidential Election in the State of Florida," Appendix VII to United States Commission on Civil Rights, Voting Irregularities in Florida During the 2000 Presidential Election, June 2001, pp. 9–11.

More to the point, Lichtman found that this disparity was far more egregious where punch-card ballot machines were used. "Within the counties using punch card or optical scan machines with central recording, not only is the relationship between race and rejected ballots strong, but is even stronger than the relationship for all Florida counties combined."[26]

In a series of articles, the *Washington Post* also examined Florida's ballots in the wake of the 2000 election. Again, the paper found that overall blacks were much more likely to not have their votes counted than whites.

> One reason black voters had more uncounted ballots, according to the study by the *Washington Post* and other media organizations, was that ballots in predominantly black neighborhoods were twice as likely to have no indication of any vote for president. In heavily black areas, 13 of every 1,000 ballots had no mark, compared to 6 in 1,000 in white neighborhoods.
>
> Another reason was the disproportionate number of "overvotes"—instances where more than one mark was made on a ballot. Black precincts had a heavy concentration of overvotes that were rejected by counting machines on election day. White precincts using the same

> technology—Votomatic punch cards—had a different pattern of errors: They had a higher rate of incomplete punches such as dimples or "hanging chads."
>
> . . . Overall, 136 out of every 1,000 ballots in heavily black precincts were set aside—a rate of spoiled ballots that was three times higher than in predominantly white precincts. Those precincts, where at least 80 percent of the voters were white, had 45 out of 1,000 ballots disqualified.[27]

The *Washington Post* found great disparities also existed when central-count optical-scan machines were used and there was no opportunity for the voter to fix a spoiled ballot. The paper reports:

> The difference in spoiled ballots between white and black voters was greatest in some counties that use paper ballots marked with a pencil and are read by optical scanning machines. In those "optical-scan" counties that transport ballots to the county seat to be tallied, black voters were almost four times as likely as whites to have cast ballots where no votes were counted.
>
> The rate of spoiled votes was much lower in the state's 26 optical scan counties, where the ballots are tallied at the polling places, and voters who make an error in filling out the ballot are alerted and allowed to revote. Because of this "second chance" technology, black voters were just under two times as likely as whites to have ballots tossed out. The technology reduced the difference in spoilage rates by more than half.[28]

In another analysis, *Washington Post* reporters focused on punch-card machines. They found that "In Miami-Dade County [where punch-card machines are used] precincts where fewer than 30 percent of the voters are black, about 3 percent of ballots did not register a vote for president. In precincts where more than 70 percent of the voters are African American, it was nearly 10 percent."[29]

The *New York Times* conducted its own study after the 2000 election. Although the *New York Times* says that African Americans had a higher spoilage rate regardless of technology employed, the study seems to only include paper-based voting systems.

According to the *New York Times*,

> Black precincts had more than three times as many rejected ballots as white precincts in last fall's presidential race in Florida, a disparity that persists even after accounting for the effects of income, education and bad ballot design, the *New York Times* found in a new statistical analysis of the Florida vote.
>
> The analysis of 6,000 precincts uses far more definitive data than previous studies and shows a strong pattern of ballot rejection in black precincts that is not explained by socioeconomic differences or voting technology. Similar patterns were found in Hispanic precincts and places with large elderly populations. It did not matter whether the precinct used punch cards or paper ballots, whether the neighborhoods were rich or poor or the ballot was straight or butterflied. Precincts with more black, Hispanic and elderly voters had substantially more spoiled ballots, the *Times* found.[30]

Finally, the Florida-based *Sun Sentinel* did an examination of the Florida votes. Somewhat at odds with other reports, the *Sun Sentinel* did find a correlation between income and education level and spoiled ballots that exceeded the correlation between race and spoiled ballots.

> The most common characteristics among Florida's 175,000 disenfranchised voters were income and education, more so even than race, a *Sun-Sentinel* analysis found.
>
> Civil rights activists have charged that votes cast by blacks were far more likely to be disqualified than those cast by whites. That pattern held true in South Florida, where poor precincts are largely made up of minorities.
>
> But in central and north Florida, most uncounted ballots came from poorer white precincts. [31]

In an analysis of the precincts with the highest percentage uncounted votes, the paper found

> that 86 percent of those precincts were in areas where the median household income fell below the state average of $37,346. Also, 86 percent of the precincts had populations where one out of three adults did not have a high school degree.
>
> Race played a less significant role. Only 44 percent of the problem precincts had higher than average minority populations.[32]

Nonetheless, even this examination found a disproportionate number of the precincts with high spoilage rates was majority minority.

Explanations and Implications

Why is it that controlling for all obvious other possible factors, including income and education, the racial disparity persists? No one seems to really know.

Some have suggested that the disparity is due to the number of new African-American voters who cast ballots in the 2000 election. Is this true? According to the study by Knack and Kropf, it isn't:

> Turnout increases in Florida and elsewhere, coupled with complicated punch card voting equipment, were blamed for high voter error in the 2000 election. However, the coefficient on turnout change is negative and significant in the 475 punch card counties. . . . Only in DRE counties is there any indication that turnout increases might increase roll-off, and even then it is significant only at the .11 level.[33]

Is the discrepancy caused by a larger number of African-American voters intentionally not casting a vote? Again, Knack and Kropf say no:

> Previous studies have found that African Americans are not much more likely than whites to deliberately undervote in presidential elections . . . and are no more likely to live in counties using punch card equipment. . . . These findings suggest that racial disparities in roll-off are attributable to differences in the frequency of mistakes using a given type of equipment.[34]

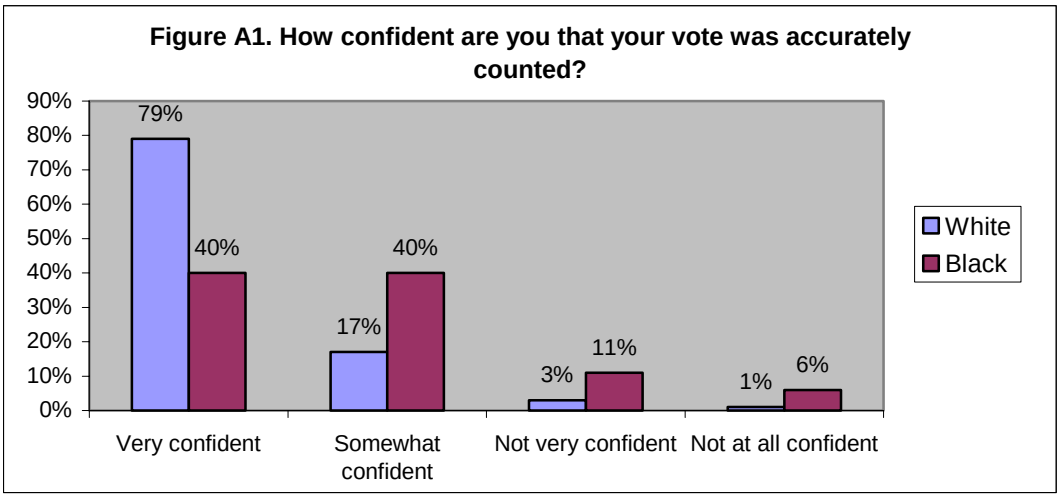
Clearly some questions and further study are needed. We must examine other aspects of the voting process to answer this critical question. For example,

- Is government-sponsored voter education inferior in minority jurisdictions?
- Is there a difference in the quality, training, and experience of poll workers in minority versus those in nonminority areas?
- Do poll workers in minority districts interact with voters differently than in majority white areas?
- Are fewer poll workers assigned to minority areas?
- Are there differences in the method or personnel assigned to count votes in minority areas?
- Are there any differences in ballot design in majority minority areas that might contribute to the disparity?
- Are instructions, such as sample ballots, less consistently delivered to minority voters? Are public exhibitions of voting machines less frequent in minority areas?

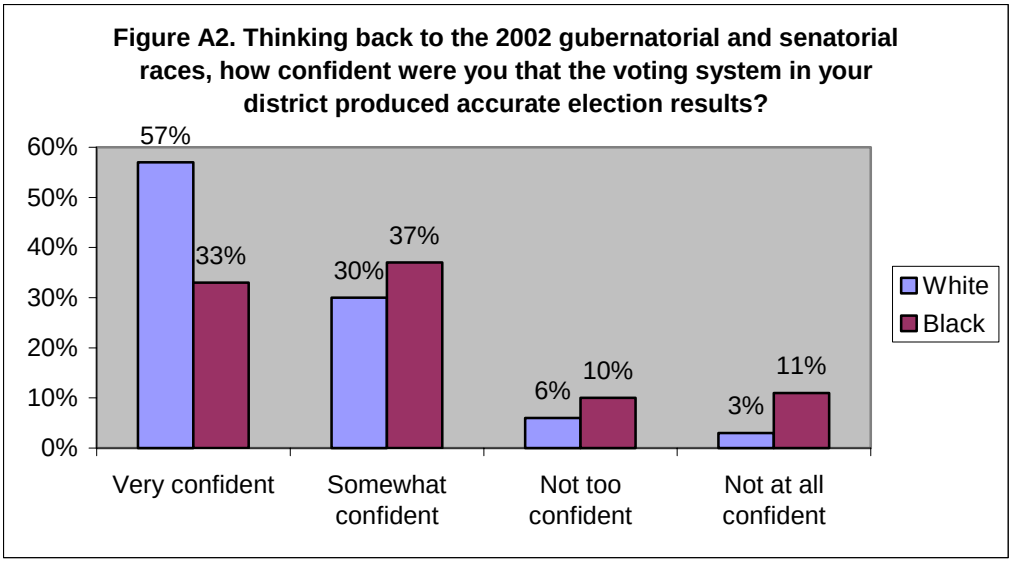
In the meantime, the obvious response is to stop using punch-card and central count optical-scan machines. As it stands now, if history repeats itself, these machines will disenfranchise thousands of voters, and a disproportionate number of them will be African Americans. Without endorsing the reliability or security of any alternative technology, both optical-scan machines with poll site counting and computerized voting machines—systems that allow the voter to double check and then recast a vote—render the racial gap virtually nonexistent.

Addendum

Given the evidence above, it is interesting to note that African Americans actually trust electronic voting machines *less* than do white voters. In surveys of Georgia voters in 2002 and 2003, African-American voters were significantly less sure of the accuracy and reliability of electronic voting machines than whites, who overwhelmingly expressed confidence in these machines.



Source: Peach State Poll, "Georgians Express Confidence in New Electronic Voting System," Carl Vinison Institute of Government, February 27, 2003, available online at http://www.cviog.uga.edu/peachpoll/2003-02.html.



Source: Peach State Poll, "Georgians Favor Electronic Voting," Carl Vinison Institute of Government, January 23, 2004, available online at http://www.cviog.uga.edu/peachpoll/2004-01.html.

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[1] With optical-scan voting systems, voters record their choices by filling in boxes or ovals, or completing an arrow next to the candidate's name or the issue. The ballot is then scanned into a computer and the vote recorded. "Optical scan equipment based in precincts can be programmed to detect and reject both overvoting and undervoting (i.e., not registering a vote for every race and/or issue on the ballot). Using such error correction technology could allow voters to fix their mistakes before leaving the polling place. If ballots are tabulated centrally, voters do not have the opportunity to correct mistakes that may have been made." (General Accounting Office, "Statistical Analysis of Factors that Affected Uncounted Votes in the 2000 Presidential Election," Washington, D.C., October 2001.)

[2] Caltech/MIT Voting Technology Report, "What Is; What Could Be, Fast Facts," July, 2001, p.1.

[3] Caltech/MIT Voting Technology Report, "What Is; What Could Be," July 2001, p. 21.

[4] Election Data Services, "New Study Shows 50 Million Voters Will Use Electronic Voting Systems, 32 Million Still with Punch Cards in 2004," Washington, D.C., February 12, 2004.

[5] Jim Provance, "Four Counties Adopt Electronic Voting," *Toledo Blade*, June 8, 2004.

[6] Harvard Civil Rights Project, "Democracy Spoiled: National, State, and County Disparities in Disenfranchisement Through Uncounted Ballots," Cambridge, Mass., October 22, 2002, p. 8.

[7] Stephen Knack and Martha Kropf, "Invalidated Ballots in the 1996 Presidential Election: A County-Level Analysis," *Journal of Politics* 65, no. 3 (August 2003): 2.

[8] Ibid., p. 29.

[9] Minority Staff, Special Investigations Division, Committee on Government Reform, U.S. House of Representatives, "Income and Racial Disparities in the Undercount in the 2000 Presidential Election," Washington, D.C., July 9, 2001, pp. i–ii.

[10] Ibid.

[11] D. E. Betsy Sinclair, Michael Alvarez, "Who Overvotes, Who Undervotes, Using Punchcards?" *Political Research Quarterly*, March 2004, p. 12.

[12] Ibid., p. 13.

[13] Ibid., p. 18.

[14] John Mintz and Dan Keating, "A Racial Gap in Voided Votes," *Washington Post*, December 27, 2000, p. A1.

[15] Ibid.

[16] Michael Tomz and Robert Van Houweling, "How Does Voting Equipment Affect the Racial Gap in Voided Ballots," *American Journal of Political Science*, June 12, 2002, p. 18.

[17] Ibid., p. 22.

[18] Ibid., p. 23.

[19] Ibid., pp. 26–27.

[20] Ibid., p. 30.

[21] Michael Alvarez, D. E. Betsy Sinclair, Catherine H. Wilson, "Counting Ballots and the 2000 Election: What Went Wrong?" in *Rethinking the Vote*, ed. Ann N. Crigler, Marion R. Just and Edward J. McCaffery (New York: Oxford University Press, 2004), pp. 21–22.

[22] Ibid., p. 13.

[23] Steward V. Blackwell, Richard L. Engstrom, analysis for the plaintiffs in *Effie Stewart, et al.* v. *J. Kenneth Blackwell, et al.*, Case Number 5:02-CV-2028, United States District Court for the Northern District of Ohio, Eastern Division at Akron, October 17, 2003, pp. 5–6.

[24] Laura Parker and Peter Eisler, "Ballots in Black Florida Precincts Invalidated More," *USA Today*, April 6, 2001, p. A1.

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