

# **AN EVALUATION OF MARYLAND'S NEW VOTING MACHINE**

The Center for American Politics and Citizenship  
Human-Computer Interaction Lab  
University of Maryland  
College Park, MD 20742  
December 2, 2002

## **Paul S. Herrnson**

Center for American Politics  
and Citizenship  
Dept. of Govt. and Politics  
Univ. of Maryland,  
College Park, MD 20742  
pherrnson@capc.umd.edu  
(301) 405-4123

## **Benjamin B. Bederson**

Human-Computer Interaction Lab  
Computer Science Department,  
Univ. of Maryland,  
College Park, MD 20742  
bederson@cs.umd.edu  
(301) 405-2764

## **Owen G. Abbe**

Research Fellow  
Center for American Politics  
and Citizenship  
Univ. of Maryland  
College Park, MD 20742  
oabbe@capc.umd.edu  
(301) 405-9722

## **Executive Summary**

Four counties in Maryland used new touch screen voting machines in the 2002 elections, replacing their mechanical lever and punch card voting systems with the AccuVote-TS touch screen voting machine manufactured by Diebold Election Systems. The Center for American Politics and Citizenship (CAPC) and the Human-Computer Interaction Lab (HCIL) at the University of Maryland conducted an exit poll in Montgomery and Prince George's counties to evaluate the performance of the new voting machines.

In this second of two reports prepared by CAPC and HCIL on the new voting machines, we found that most voters like the new voting machines and trust them to accurately record their votes. However, a significant number of voters still have concerns about the new machines, many needed help using them, and some continue to report technical problems with the machines. Voters who do not frequently use computers or have not attended college had the most difficulty using the machines.

### Major Findings:

- Seven percent of voters felt that the touch screen voting machine was not easy to use, compared to 93 percent who felt it was easy to use or held a neutral opinion.
- Nine percent of voters did not trust the touch screen voting machine, compared to with 91 percent who did. Only 70 percent trusted the mechanical lever or punch card system they previously used.
- Three percent of voters reported encountering technical problems with the new machines.
- Nine percent of the voters asked for and 17 percent received assistance using the new machine.
- More than one-quarter of the voters who use computers once a month or less received assistance using the voting machine.
- One-third of voters who have not attended college received assistance using the voting machine.
- Voters in Prince George's County found the election judges to be more helpful than did voters in Montgomery County.

Four counties in Maryland used new touch screen voting machines in the 2002 elections. Alleghany, Dorchester, Montgomery, and Prince George's replaced their mechanical lever and punch card voting systems with the AccuVote-TS touch screen voting machine manufactured by Diebold Election Systems. All 24 of Maryland's counties will purchase AccuVote-TS voting machines by 2006.

The University of Maryland conducted an exit poll in Montgomery and Prince George's Counties to assess the performance of the new voting machine. Our sample included 1,276 respondents from 22 precincts in the two counties. The response rate was 74.6 percent.

## **Voter Acceptance**

Most voters gave positive evaluations of the new touch screen voting machine. Over 90 percent of the voters reported that the voting machine was easy to use and that they felt comfortable using the system (see Table 1). They also felt that the characters on the screen were easy to read, that the terminology was precise, and that mistakes were easy to correct. Most important, in light of Florida's experience in the 2000 election, 90 percent of the voters felt confident that their vote was accurately recorded.

Table 1. Voter Acceptance of the New Voting Machines

	Percent agree:
The voting system was easy	93.4%
I was comfortable using the system	92.8%
Characters on the screen were easy to read	94.4%
The terminology on the screen was precise	93.3%
Correcting my mistakes was easy	91.3%
I am confident that my vote was accurately recorded	90.0%

Nevertheless, there is significant room for improvement. The fact that one in ten voters were not confident their vote was accurately recorded should cause election officials to take pause. Moreover, that 9 percent did not think correcting mistakes was easy, and between 6 and 7 percent reported additional shortcomings, suggests that additional efforts should be undertaken to familiarize voters with the new voting machines.

Differences in the composition of midterm and presidential electorates further indicates the need for more outreach efforts on the part of election officials. Voters in midterm elections are, as a group, more interested in politics, well educated, and more likely to be aware of changes in the political system, such as the introduction of new voting technologies. Moreover, the midterm voters who cast ballots in the 2002 elections will have had experience with the new voting machines prior to voting in 2004, whereas this will not be true of voters who not cast ballots in 2002. Given that a large number of voters who have relatively limited interest in politics and lower levels of education will encounter the new voting machines for the first time in 2004, election officials should be take steps to introduce the voters to the new machines prior to Election Day and be prepared to offer these voters assistance in using the machines.

## **Voter Trust**

Previously Montgomery County had used a punch card voting machines and Prince George's County had been using a mechanical lever system. Voters expressed higher levels of trust in the new touch screen voting machines over these older voting systems. Ninety-one percent of the voters stated they trust the AccuVote-TS voting machine, and only 71 percent trust the system they previously used, (see Table 2). There were no significant differences in voters' assessments of the punch card and mechanical lever systems.

Table 2. Trust Voting Machine

	Percent
Trust voting machine used in previous elections	70.5%
Trust the touch screen voting machine	90.7%

## Problems Using the System

Voters prefer the new voting technology over older systems, but no voting system is perfect. Introducing new voting systems can involve challenges as both election officials and voters learn to use the new equipment. Nine percent of voters found it necessary to ask for help using the AccuVote-TS voting machine (see Table 3). Seventeen percent of the voters reported receiving assistance, indicating that election workers were proactive in helping voters even if they did not ask for assistance.

Table 3. Percent of Voters Who Experienced Difficulty Using the Voting Machine

	Percent:
Asked for help using the voting machine	9.1%
Received help using the voting machine	17.2%
Experienced technical problems	2.9%

The technical problems voters reported are of a more serious nature. Fewer voters will require assistance as they gain experience with the system, but technical problems persist unless corrected. Three out of every one-hundred voters experienced technical problems using the new voting machines. The most common problem involved activating the voting machine with the card, a deficiency that we discussed in our initial study of the AccuVote-TS voting machine. The card must be inserted into the voting machine with some degree of force until it positively engages. This operation is foreign to most people familiar with motorized card readers found in most ATM machines and credit card readers that require the card to be swiped through a slot. Election judges in many precincts addressed it by inserting cards into the voting machines for voters rather than giving the cards to them.

A second problem voters reported involved navigating between screens. A few voters stated that the voting machine would jump multiple screens when using the screen navigation buttons or felt that the navigation buttons were too close together.

Other less common but important issues involved ballot review, language features, screen visibility, and privacy. A number of voters had trouble with the ballot review feature. The ballot review screen is the only one that uses a scroll bar, and the voters who had difficulty did not realize they needed to scroll down to review all of the votes they had cast. Voters who accidentally selected the wrong language for their ballot could not find a way change their language selection. A few voters also had difficulty using the machine due to glare on the screen.

Many voters also expressed concern regarding privacy. Voters felt that the small panels attached to the sides of the voting machine did not adequately protect the privacy of their vote. The 9 percent of all voters who asked for help and the 17 percent who received assistance, also voted with less privacy than did others.

Voters in different counties had somewhat different voting experiences in terms of the helpfulness of the election judges. Voters in Prince George's county were no more likely to ask for assistance than voters in Montgomery County, but the percentage of Prince George's County voters who reported getting help using the voting machine was twice as high as the percentage of Montgomery County voters (see Table 4). In keeping with this pattern, a slightly higher percentage of Prince George's County voters felt that the election judges were knowledgeable and helpful.

Table 4. Differences by County

	Montgomery	Prince George's
Got help using voting machine	10.6%	22.2%
Election judges were knowledgeable and helpful	87.5%	91.2%

## Usability Issues

Certain segments of the population may experience more difficulty using electronic voting machines. Extensive problems with voting systems can lead to the partial disenfranchisement of segments of the population and undermine the legitimacy of the democratic process. We analyzed voter responses to identify potential problems resulting from familiarity with computers, education, age, race, and gender.

### *Computer Use*

Voters who use computers infrequently had more difficulty with the new voting machines. Voters who use computers once a month or less did not find the touch screen voting machine as easy to use or the terminology as precise as voters who use computers more often (see Table 5). Voters who rarely use computers were also more likely to need assistance in using the voting machine.

Table 5. Computer Use and Voting Experience

	Frequency of Computer Use		
	Once a month or less	Twice a month to twice a week	Three or more times a week
Voting system easy to use	88%	95%	94%
Terminology was precise	89%	96%	94%
Asked for help using voting machine	18%	11%	7%
Got help using voting machine	26%	20%	16%

### *Education*

Education is the most important factor influencing voters' experience with the new voting machines. Voters who have not attended college were twice as likely to need assistance using the voting machine as voters who have attended college (see Table 6). Fully one-third of voters who have not attended college received help using the voting machine.

Table 6. Education and Voting Experience

	Education Level		
	No college	Some college to four year degree	Graduate school
Asked for help using voting machine	18%	9%	8%
Got help using voting machine	33%	16%	14%

### *Race*

Although black voters were no more likely to ask for help using the new voting machines than whites voters and voters of other races, a higher percent of black voters reported receiving assistance (see Table 7). A slightly lower percent of black voters expressed trust in the new voting machines when compared with white voters. Higher levels of computer ownership among white may account for these differences.

Table 7. Race and Voting Experience

	Race		
	Black	White	Other
Asked for help using voting machine	9%	10%	6%
Got help using voting machine	22%	16%	17%
Trust voting machine	88%	93%	90%

### *Gender*

Although female voters were no more likely to ask for help using the new voting machines than male voters, a higher percentage of female voters reported receiving assistance (see Table 8). Women expressed slight higher levels of trust in the new voting machines than men.

Table 8. Gender and Voting Experience

	Gender	
	Female	Male
Asked for help using voting machine	10%	8%
Got help using voting machine	21%	14%
Trust voting machine	94%	87%

### *Age*

Introducing electronic voting machines has raised concerns about special concerns about older voters' ability to transition to the new machines. Voters who are 65 or older asked for and received more help using the voting machine than voters in most other age categories (see Table 9). Surprisingly, voters in the 18 to 24 age category also reported asking for and receiving more help than other voters. Young voters might be expected to be more comfortable with computer user interfaces, but many also may be voting for the first time and require more assistance.

Table 9. Age and Voting Experience

	Age				
	18 to 24	25 to 34	35 to 49	50 to 64	65 or older
Asked for help using voting machine	16%	6%	5%	9%	21%
Got help using voting machine	27%	19%	11%	20%	28%

## **Related Publications**

Bederson, B. B., Lee, B., Sherman, R., Herrnson, P. S., Niemi, R. G. (2003). Electronic Voting System Usability Issues. CHI 2003, ACM Conference on Human Factors in Computing Systems, CHI Letters, 5(1), (in press).

Benjamin B. Bederson and Paul S. Herrnson, "Usability Review of the Diebold DRE System for Four Counties in the State of Maryland," Human-Computer Interaction Lab and Center for American Politics and Citizenship, University of Maryland, College Park, MD, 20742, [http://www.capc.umd.edu/rpts/MD\\_EVVoteMach.pdf](http://www.capc.umd.edu/rpts/MD_EVVoteMach.pdf).

Paul S. Herrnson, Richard G. Niemi, Scott Richman, "Characteristics of Optical Scan and DRE Voting Equipment: What Features Should Be Tested," Center for American Politics and Citizenship, University of Maryland, College Park, MD, 20742, [http://www.capc.umd.edu/rpts/MD\\_EVVote\\_HerrnsonNiemi.pdf](http://www.capc.umd.edu/rpts/MD_EVVote_HerrnsonNiemi.pdf).