Voters’ Abilities to Cast their Votes as Intended

Paul S. Herrnson
Richard G. Niemi
Michael J. Hanmer
Benjamin B. Bederson
Frederick G. Conrad
Michael Traugott

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Selected Voting Tasks

- Vote for candidates for 18 offices and 4 ballot questions
- Vote for 2 candidates in a multi-candidate election
- Change a vote
- Cast a write-in vote
Accuracy Measures

- **Correct Vote**
  - Selection matches candidate circled in voting booklet (cue sheet)

- **Types of voting errors**
  - Vote incorrectly cast for the candidate listed before or after candidate circled ("proximity error")
  - Vote cast for some other candidate
  - No vote cast
  - Write-in incorrectly cast
## Voting Accuracy and Errors

### Vote for President

<table>
<thead>
<tr>
<th>Percent of votes</th>
<th>ES&amp;S Model 100</th>
<th>Diebold AccuVote-TS</th>
<th>Avante Vote-Trakker</th>
<th>Zoomable Prototype</th>
<th>Hart InterCivic eSlate</th>
<th>Nedap LibertyVote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voted as intended</td>
<td>95.8</td>
<td>96.7</td>
<td>97.3</td>
<td>97.5</td>
<td>96.3</td>
<td>96.3</td>
</tr>
<tr>
<td>Proximity error</td>
<td>3.0</td>
<td>2.4</td>
<td>1.7</td>
<td>1.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Voted for another candidate</td>
<td>1.0</td>
<td>0.4</td>
<td>1.0</td>
<td>0.5</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>No vote cast</td>
<td>0.2</td>
<td>0.5</td>
<td>0.0</td>
<td>0.6</td>
<td>0.9</td>
<td>0.8</td>
</tr>
</tbody>
</table>
Features Criticized
## Impact of Voting Tasks on Errors

<table>
<thead>
<tr>
<th>Office</th>
<th>ES&amp;S Model 100</th>
<th>Diebold AccuVote TS</th>
<th>Avante Vote Trakker</th>
<th>Zoomable Prototype</th>
<th>Hart InterCivic eSlate</th>
<th>Nedap Liberty Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>US President</td>
<td>95.8</td>
<td>96.7</td>
<td>97.3</td>
<td>97.5</td>
<td>96.3</td>
<td>96.3</td>
</tr>
<tr>
<td>Vote for Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Rep. (1)</td>
<td>95.0</td>
<td>97.0</td>
<td>95.1</td>
<td>97.5</td>
<td>88.6</td>
<td>94.1</td>
</tr>
<tr>
<td>State Rep. (2)</td>
<td>94.0</td>
<td>95.2</td>
<td>94.3</td>
<td>95.2</td>
<td>88.4</td>
<td>92.9</td>
</tr>
<tr>
<td>Change Vote</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probate Judge</td>
<td>87.1</td>
<td>91.0</td>
<td>84.1</td>
<td>91.7</td>
<td>89.9</td>
<td>88.4</td>
</tr>
</tbody>
</table>
## Number of Errors Voters Make

<table>
<thead>
<tr>
<th></th>
<th>ES&amp;S Model 100</th>
<th>Diebold AccuVote-TS</th>
<th>Avante Vote-Trakker</th>
<th>Zoomable prototype</th>
<th>Hart Inter-Civic eSlate</th>
<th>Nedap Liberty Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Office bloc ballot</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>80.2</td>
<td>78.4</td>
<td>78.3</td>
<td>79.9</td>
<td>75.1</td>
<td>80.4</td>
</tr>
<tr>
<td>1</td>
<td>11.9</td>
<td>14.7</td>
<td>13.6</td>
<td>12.8</td>
<td>15.9</td>
<td>11.0</td>
</tr>
<tr>
<td>≥ 2</td>
<td>7.9</td>
<td>6.9</td>
<td>8.1</td>
<td>7.3</td>
<td>9.0</td>
<td>5.3</td>
</tr>
<tr>
<td><strong>Straight party ballot</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>71.4</td>
<td>74.7</td>
<td>60.7</td>
<td>72.4</td>
<td>73.4</td>
<td>61.7*</td>
</tr>
<tr>
<td>1</td>
<td>16.8</td>
<td>14.6</td>
<td>14.9</td>
<td>17.0</td>
<td>15.7</td>
<td>16.9</td>
</tr>
<tr>
<td>≥ 2</td>
<td>11.8</td>
<td>10.7</td>
<td>6.3</td>
<td>10.6</td>
<td>10.9</td>
<td>21.4</td>
</tr>
</tbody>
</table>

*Nedap used party column ballot.
INSTRUCTIONS TO VOTER

1. To vote, completely blacken the CIRCLE (?) to the LEFT of the candidate. Do not vote for more than the authorized number of candidates.
2. Use only the #2 pencil provided.
3. To vote for a person whose name is not on the ballot, write in the candidate’s name on the Write-In line AND completely blacken the CIRCLE (?) to the LEFT of your choice.
4. If you make a mistake while voting, return the ballot to the election official for a new one. A vote that has been erased or changed will not be counted.
5. To vote for every candidate of one party, blacken the CIRCLE (*) to the LEFT of the name of the party for which you wish to vote. To vote for non-partisan offices, blacken the CIRCLE (*) to the LEFT of the candidate for whom you wish to vote.

PARTISAN OFFICES

President & Vice-President of The United States (Vote for ONE.)
- Edward Z. Jones - President
- Steve Kaiser - Vice-President

Secretary of State (Vote for ONE.)
- Michael R. McCloud - Secretary of State
- Larry Herman - Secretary of State

State Senator District 5 (Vote for ONE.)
- John Fisher - State Senator District 5
- Linda Fisher - State Senator District 5

State Senator District 3 (Vote for no more than TWO.)
- Steve Kaiser - State Senator District 3
- Jonathan Davic - State Senator District 3

State Representative District 28 (Vote for ONE.)
- Larry Herman - State Representative District 28
- Rebecca Rehberg - State Representative District 28

Write-In
- Write-In
- Write-In
- Write-In

PARTISAN OFFICES

United States Senator (Vote for ONE.)
- Frank Seer - Democrat
- Alan Slocum - Republican
- Linda Fisher - Libertarian

U. S. Representative District 28 (Vote for ONE.)
- Larry Herman - Democrat
- Rebecca Rehberg - Republican

STRAIGHT PARTY VOTING
- Democratic Party
- Republican Party
- Libertarian Party
- Green Party
- Natural Law Party

Sources of confusion

Least problematic
A Comparison of Errors

- **Residual votes** (overvotes, uncast votes, and uncountable ballots)
  - About 2% of voters had a residual vote for president in 2000 (Caltech/MIT).

- **Voting for the wrong candidate**
  - More than 2.5% of voters in our field experiments voted for the wrong candidate for president.
  - More serious error – the preferred candidate loses a vote and the opponent gains a vote.
## Errors Associated with Write-Ins

<table>
<thead>
<tr>
<th>Percent of ballots</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Perfect</td>
<td>70.1</td>
<td>90.4</td>
<td>91.8</td>
<td>89.3</td>
<td>86.1</td>
<td>88.1</td>
</tr>
<tr>
<td>Blank</td>
<td>3.1</td>
<td>2.9</td>
<td>3.2</td>
<td>2.3</td>
<td>3.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Spacing problems</td>
<td>0.0</td>
<td>2.7</td>
<td>0.1</td>
<td>3.5</td>
<td>5.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Spelling Problems</td>
<td>2.1</td>
<td>3.4</td>
<td>2.3</td>
<td>4.3</td>
<td>5.3</td>
<td>4.9</td>
</tr>
<tr>
<td>Bubble not filled</td>
<td>26.0</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>
Voter Characteristics and Accuracy

- Significant evidence of the digital divide
  - Computer usage
  - Education
  - Age
  - English as primary language
  - Race/ethnicity
- Strength of partisanship
- Prior voting experience had no impact
- Straight-party device → increased errors
Conclusions

- Voting technology and ballot styles influence voters’ abilities to cast their votes as intended.
- Voting for the wrong candidate is the most frequent and most serious error.
- Optical scan systems pose problems with write-ins.
- Voter characteristics influence voting accuracy.
For More Information

- www.capc.umd.edu

Thank you!