An Assessment of Voting Technology and Ballot Design

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Lessons from the 2000 Presidential Election

- Voting technology and ballot design can influence election outcomes
- Technology is in need of updating
- Need to improve understanding of human-computer interaction as it relates to voting
- Election judges are in need of better training
- Voting procedures affect voter confidence
- Minorities and the poor are more likely to cast their ballots on outdated systems

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Our project

- Brings together an interdisciplinary team of social scientists and computer scientists
- Uses a variety of research designs, data collection methodologies, and analysis techniques
- Is guided by interaction with practitioners and policy makers
- Is funded by National Science Foundation Grant 0306698

Proposed Research

- Test existing voting technology and ballots
- Create and test new technology and ballots
- Assess the impact of changing voter interfaces
- Develop guidelines for system manufacturers and election officials
- Develop a protocol for testing technology and ballots
- Disseminate findings and archive data

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Testing Existing Technology

- Expert Review
- Usability Tests
- Natural Experiments

Expert Review

- Quality of paper or on-screen ballots
- Quality of instructions and help commands
- Ease of moving from one place on the ballot to another
- Feedback or warnings for under- or over-voting
- Ease of inserting or removing voting cards, paper ballots, or other mechanisms
- Adequacy of review screens
- Ability to accommodate disabled voters
- Privacy afforded to voters

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Usability-Laboratory Tests

- Produce detailed observations of voters' interactions and reactions
- Measure voters' intentions
- Assess voters' beliefs about the security, accuracy, and privacy of their votes
- Provide early feedback on technology we develop
- Contribute to formulation of field tests and natural experiments

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Usability-Field Tests I

- Involves “think aloud” method
- Time voters spend reading instructions
- Response to paper or on-screen ballot
- Response to the reporting of under- or over-voting
- Ability to change a vote
- Complications and malfunctions of DRE or Optical Scan Readers

Usability-Field Tests II

- Extend observations to individuals in circumstances more similar to those faced by voters on Election Day
- Involves a larger and more heterogeneous group
- Consists of observation of voters using systems, administration of post-voting questionnaires, and data analysis
- Simulate voting experience in Maryland, Michigan, New York, and other states

Natural Experiments

- Assess impact of new voter interfaces and procedures on spoiled ballots, residual votes, roll-off, split-tickets, and turnout
- Analyze impact of variations in technology, ballot formats, and procedures among states
- Allow pre- and post- reform analyses
- Analyze data using interrupted time series models
- Control for voter demographics, registration systems, and other elements
- Informed speculation about voter education campaigns

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Create and Test New Technology and Ballot Designs

- Develop new voter interface designs
- Prototype of a zoomable voting system: http://www.cs.umd.edu/~bederson/voting/

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Develop Guidelines for Manufacturers and Election Officials and Create a Testing Protocol

- Develop general principles and statements from our laboratory and field testing
- Create a protocol that will enable election officials to quickly assess the technology and ballots they intend to use on Election Day
- Provide other researchers with the tools to replicate our research

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Disseminate Findings and Archive Data

- Present our work at a variety of professional and public forums
- Archive all of the data for this project at the ICPSR in Ann Arbor, Michigan
- Make data available on CD-ROM and a web site

Partners and Participants

- Partners and participants include
  - Election officials in several states and localities
  - Research organizations and universities
- New partners and partnerships sought
  - Election officials
  - Research organizations
  - Voting machine manufacturers

Benefits From This Research

- Improve understanding of human-computer interaction as it relates to voting
- Develop a new approach to data collection and analysis in the study of voting interfaces and voting behavior
- Archive data
- Improve voting technology, ballot design, and administration of elections

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