White paper

Ballot simplicity, constraints, and design literacy

January 31, 2014

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Ballot design problems didn't start – or end – with Palm Beach County in 2000

The "butterfly ballot" used in Palm Beach County, Florida in the 2000 was just the most famous example of what turned out to be a common ballot design problem. Another 18 counties in Florida listed candidates on multiple pages or in multiple columns in the presidential election in 2000.[1] But it was the Palm Beach ballot and the ensuing recounts that inspired the widespread replacement of voting systems when the Help America Vote Act of 2002 passed. The problem was not the voting system. The original problem, causing thousands of voters to vote in ways they had not intended, was a ballot design problem.

The problem of ballot design and lost votes was not exclusive to Florida. For example, several Georgia counties encountered high residual vote rates. Up to 100,000 voters did not vote for president in 2000, and one of the likely causes was the ballot design.[2] But the media focused attention on Florida for a variety of reasons.

Arguably, the punch card system on which the Palm Beach ballot relied was old – first used in U.S. elections in the 1960s[3] – but it was efficient and reasonably inexpensive for conducting elections. The errors introduced by "hanging" and "pregnant" chads (the perforated boxes that voters "punched" out of the cards to mark their choices) that were not cleanly pushed out of the card are problems that this voting technology was prone to from the beginning of its use. Counts could change if the cards were run through the computer multiple times, and chads that were still attached in one count came off in successive runs.

At the time it seemed obvious that the solution was to replace punch card and mechanical lever systems with new, computerized electronic voting systems. But with new technology – primarily touch screen "direct record electronic" (DRE) voting systems and optical scanning systems – the problem of lost votes has not gone away. Voters still have difficulty voting as they intend.

This report focuses on circumstances of ballot design that cause voters to make mistakes, and why voters can still make mistakes even with newer voting systems.

[1] Kropf and Kimball, pp 73. 2012
[2] ib id pp 22
[3] Verified Voting, Votamatic article available at https://www.verifiedvoting.org/resources/voting-equipment/ess/votamatic/

Scope of the problem

Ballot simplicity – or lack thereof – derives from layers of intent. First, is the layout, graphics, and content of the ballot. Second, we have the performance of the voter.

Design is the rendering of intent.[4] Regardless of whether election materials feel the touch of a trained designer, intention is built into legislation, local election history and culture, and voting technology. This intention manifests not only in how a ballot looks visually, but also in how users navigate, understand, and interact with the ballot.

The combination of elements of layout, typeface and type size, contrast, and color along with the wording in instructions, headings, prompts, and the overall hierarchy of information on the ballot interact in ways that can help voters vote efficiently, effectively, and confidently or hinder them from carrying out *their* intent.

The combination of design, content, and hierarchy of information on ballots interact to help or hinder voters

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The result of poor ballot design is *residual votes*, a term coined by the CalTech-MIT Voting Technology Project.[5] Residual votes are overvotes or undervotes. Overvoting happens when a voter marks too many choices in a contest. This is a common problem when contests with many candidates span more than one page or column on a ballot, but there are other causes, too. Undervoting can be intentional or unintentional on the part of the voter. For example, it's common for voters to not vote on down ballot contests such as judge retention contests because they don't know enough about the candidates. The rate of undervoting on these contests can be as low as 1% and as high as about 40%. This means that up to 40% of ballots cast have no votes in a contest. But in contests at the top of the ballot – federal and state contests such as those for

[4] Jared Spool in a presentation about user experience design delivered at An Event Apart in 2012. Notes from the talk are available: http://www.lukew.com/ff/entry.asp?1770
[5] *Voting: What it is, what it could be.* 2001.

president, senator, representative, governor, and so on – undervote rates usually hover around 1%.[6]

Ballot design constraints

Ideally, you would want overvotes and unintentional undervotes to be as close to zero as possible. But there are several factors that contribute to lost votes and that constrain optimally usable design on ballots.

Ballot design is regulated

Every state and many counties have embedded within their election code regulations on typeface, type size, grid or layout of the ballot, and the wording for instructions to voters. Most of these regulations originated in the 1890s and continue to be supported and expanded by parties eager to ensure that their opposition gets no advantage. Most of these regulations have been only lightly revised or amended since then.

New York encountered particular problems with ballot instructions when it moved from mechanical lever machines in 2010 to paper optical scan voting systems. The voting system had been updated, but the election code had not, so the instructions that were required weren't suitable for the new system and may have caused some voters to vote incorrectly.

Legislators who were elected on existing election code have a difficult time rationalizing reforming election code; it got them elected, so they're happy with it. Reforming election code can be contentious also because making a change may appear to signal something that could make it more difficult for upcoming opposition candidates to get elected. There is no known evidence that reforming election code to improve ballot design gives an advantage to any political party, however. Rather, the outcomes are often unintended. Legislators, who are not trained designers, make design rules without anticipating how the rules they write will affect voters and election administrators. They interpret election code legally, but don't pre-visualize what the ballot will look like and how it will perform for voters.

In addition, reform of election code at the state level about ballot design is generally not vote-getting compared to issues of jobs, education, and healthcare. Legislators rarely take it on except in reaction to a crisis, such as in King County, Washington in 2009. The county uses a 3-column layout on an optical scan ballot. Best practice ballot design strongly recommends not putting

[6] Kropf and Kimball, pp 86-89

anything in the left column under the instructions. When a ballot is laid out this way, there is a predictably high undervote. But to prevent the ballot going to 2 pages, the county decided to put a state measure there, anyway. Sure enough, there was a very high undervote rate. Two state legislators embraced this opportunity, and eventually encoded their contribution to ballot design. From 2010, on, ballots must show a "clear delineation between the ballot instructions and the first ballot measure or office through the use of white space, illustration, shading, color, symbol, font size, or bold type." It could have been worse.

Ballot design is constrained by voting systems

When the Election Assistance Commission published the work of AIGA's Design for Democracy Project in its report *Effective Designs for the Administration of Federal Elections* in 2007, the behavioral research behind the report and evidence from elections since 2002 demonstrated that there were common and easily remedied problems with paper optical scan ballots. The Brennan Center's report, *Better Ballots* published in 2008, presented analyses of 13 cases in which the number of residual votes was larger than the margin of victory.[7] In all of these cases, the likely culprit of lost votes was ballot design.

Only now do we see voting systems that can generate and process ballots that are better designed by default

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One major reason for the continuing poor ballot design was that even the newer voting systems rolled out after HAVA did not support best practice design. You could not actually make a ballot in existing election management systems that included most of the features that prevent voters from making mistakes on their ballots. If you created a well designed ballot using some other means, it is possible that your optical scanning tabulators might not be able to process it. Washington State mounted a special project with their voting system vendors to overcome this gap. After some negotiating, representatives from vendors accompanied a staff designer on a tour of counties to conduct usability test sessions on existing ballot designs. From this evidence, the vendors implemented support for better ballots. The importance of design literacy in the elections division in Washington is not to be missed: the project took persistence, planning, and commitment from both sides. Many election offices

[7] Norden et al, Better Ballots 2008

do not have awareness of the importance of design, let alone the skills for doing user research and design implementation that the AIGA Fellow staffing the Washington elections division had.

Only now, in 2014, do we see in voting systems under development and entering the marketplace that uniformly can generate and process ballots that are better designed, by default.

Ballot design is constrained by costs

Budgets in states and counties have shrunk over the years since HAVA was passed, and election officials work hard to administer elections with fewer and fewer resources. One area in which they can tighten spending is on the length of the ballot. In jurisdictions that use printed ballots, election administrators must constantly weigh having a longer ballot that uses space in ways that make it easier to read against creating a shorter, more condensed ballot. This applies to the length of the paper and to ballots long enough to require two sheets of paper. Shorter ballots are less expensive to print, can be tabulated faster (voting systems are typically optimized for processing shorter ballot sheets), and can be mailed less expensively (as more jurisdictions invite more voters to vote by mail) than longer ballots.

But electronic voting systems with touch screen marking or similar interaction are not cheap, either. In fact, one study for the state of Maryland found that using touch screen voting systems increased the cost per voter 179% from paper based systems.[8] Much of the increase came from programming electronic systems for each election, maintenance costs, and keeping the equipment and operating systems up to date. Upgrades are very expensive partly because much of the work must be done manually, on individual machines because for security reasons the voting systems cannot be networked.

Part of what makes voting systems expensive is that most models on the market right now are engineered and built for a single purpose, with very few off-the-shelf parts. The Presidential Commission on Election Administration in their report and recommendations called not only for component testing rather than full-system testing for certification, but also testing and certification of software systems that can run on consumer off-the-shelf components and systems.

[8] Wilson, 2008

Ballot design interacts with the voting system design

Most of the discussion in the election field about ballot design has centered on printed optical scan ballots. It's true that more and more voting systems are supporting best practice ballot design for printed optical scan ballots. It is also true that many more jurisdictions are adopting some or all of the best practice design. But even with printed ballots, there is interaction with a computer system on precinct counting tabulators. The feedback displays on tabulators have been getting larger. In early models, they were a cryptic few characters. Now it is common for the displays to be about the size of a touch screen tablet. While more information in a large space might seem better, the information and actions required by the voter can often be baffling.

NY State, for example, has fusion voting. This means that a candidate may appear multiple times on a ballot as the nominee from multiple parties. The practice originated when New York used mechanical lever machine voting systems, which prevent voters from voting more times than allowed in any one contest. New York moved to printed optical scan ballots in 2010. The ballot design itself includes instructions for voting, but there is no way to prevent voters marking a candidate more than once. Instead, the feedback comes when the voter slides the marked ballot in to the optical scan tabulator and a message appears on the shiny new large screen display.

But as delivered, the systems showed confusing overvote messages that seemed to encourage voters to cast their ballots without correcting their mistake while the systems held onto the ballot (rather than pushing it back out to the voter). After comparative usability testing on three versions of the screen, which included different treatments of the error messages and the button labels, the voting system vendors have adopted the "winning" design, which we now see in action in other jurisdictions such as Florida and Minneapolis that use the same system.

Ballot design interacts with available feedback

The assumption is that all voters vote in the polling place and that ballots are tallied in the precinct on Election Day. This scenario provides several opportunities for voters to recover from mistakes. For example, the voter can realize they've made a mistake and ask for a replacement ballot. They could ask questions of a poll worker or another voter about the mechanics of marking the ballot or for clarifications on instructions. Or, if they mark their ballot with an overvote, when they put the paper ballot in the scanner, they get a message that they've done so, allowing them to spoil the existing ballot, get a new one,

and vote again. In the case of voting on an electronic voting system, they'd get feedback immediately if they tried to overvote, as the system must be configured to prevent overvoting.

The precinct-count scenario gives us rich interactions among people and systems that help ensure the voter intent as well as a cleanly administered election.

But central counting of ballots and voting by mail present different scenarios that mean we see a higher residual vote rate – mostly overvotes – than when voters vote at a central place with precinct counting.

The design of the entire vote-by-mail package and the clarity and usability of the instructions included have to replace a helpful poll worker and feedback from the system

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When voters vote at a polling place with central counting (rather than precinct counting) as they do in 308 counties in 12 states and 23 municipalities[9], their job is done when they've completed marking the ballot. Voters drop their marked ballots into a box, get their "I voted!" sticker and leave. Voters get no feedback at the polling place about whether they've marked their ballots correctly. At the end of Election Day, all the ballots are collected at a central point and processed in high-speed scanners.

[9] According to data from VerifiedVoting.org, as of 2012, these jurisdictions conducted central counts (separate from voting by mail):
Arkansas (20 counties)
California (27 counties)
Colorado (5 counties)
Idaho (25 counties)
Kansas (22 counties)
Minnesota (1 county)
Missouri (12 counties)
Montana (20 counties)
Nebraska (57 counties)
Ohio (3 counties)
Pennsylvania (3 counties)
South Dakota (statewide - 66 counties)
Texas (64 counties)
West Virginia (15 counties)
Wisconsin (23 municipalities)

Voting by mail presents an even more extreme scenario than voting at a polling place with central counting, with even less opportunity for feedback. The voter gets their ballot mailed to them between 45 and 10 days before Election Day. They mark it on their own, put it into a secrecy envelope, put that into a mailing envelope, and return it to Election HQ.

There is rarely an easy or fast way to get a replacement ballot if the voter makes a mistake and realizes it early enough. Some jurisdictions do include instructions for voters to mark up their ballot to indicate mistakes and corrections. When this happens, the election department has procedures in place to review the ballot, interpret intent, and remake the ballot to be scanned. In addition to marking the ballot, it is common for absentee voters to make other mistakes that prevent their votes from being counted, such as not signing the outer envelope or not including a secrecy envelope.

The design of the entire package and the clarity and usability of the instructions included have to replace a helpful poll worker and feedback from the system – and in many cases, this support is sorely lacking. The residual vote rate for votes cast by mail is as high or higher than centrally counted ballots.[10]

The importance of language on ballots and in voter information

The importance of language on ballots cannot be understated. In a study for the National Institute of Standard and Technology that I did with Janice Redish[11], we observed 45 voters in 3 geographic locations comparing a ballot with typical instructions to a ballot with plain language instructions. We collected both performance and preference data. Participants voted more accurately on the ballot with plain language instructions. Participants who voted on the plain language ballot first did significantly better on the ballot with typical instructions than participants who voted the ballot with typical instructions first. Voters with lower education levels made more errors when they voted on both ballots, but they made more errors on the ballot with the typical instructions than the ballot with plain language instructions. Participants overwhelmingly preferred the plain language ballot. Kline, et al at Georgia Tech Research Institute, in a study for the Accessible Voting Technology Initiative of

[10] Kropf and Kimball, pp 88-93
[11] Redish and Chisnell, NIST IR 7556

the EAC that repeated our protocol with Spanish and Chinese speakers found similar results.[12]

Kimball and Kropf show in their research that even on long ballots, when instructions and ballot measures are in simple language, voters are more likely to vote the entire ballot. "Ballot fatigue" seems to be a function of difficulty in reading and use, not of length or number of contests.[13]

When instructions and ballot measures are in plain language, they are easier to translate into other languages, as well. Plain language minimizes or explains jargon or terms of art that don't translate well. There is less interpreting for the translator to do and therefore less opportunity for error or bias. In addition to making voting easier for voters with limited English proficiency, starting with plain English instructions and measures can save costs in translating to other languages and makes using the ballot easier and more efficient for all voters.

Election administration has poor design literacy

Many elements of design of ballots are dictated by factors that appear to be out of control of the local election official, as I've already said. Legislation, technology, and cost saving create pressures on election officials that make it easy to forget about the importance of usability and accessibility for voters. In fact, the key concern of election officials about ballots is *Can they be counted accurately?*

This mentality of focusing on ballots counted as cast is embedded in the way elections work. We assume that voters know what they want to vote for and how to mark a ballot; a ballot is simply a vehicle for delivering that intent. When election administrators conduct logic and accuracy tests (L&A), they're determining whether the voting system is counting pre-marked ballots accurately. Usability tests at the time of L&A testing (or just before) in which voters mark ballots would show whether voters can vote the way they intend. Even if there were not time to redesign or rewrite the ballot before an election, there would still be time to take other remedial actions: training poll workers to give additional instructions or help; adding printed instructions in the voting booth; adding staff to call centers to handle more questions from voters.

Election officials are primarily administrators, managing the operations of conducting elections. Usability and accessibility for voters is a fairly new

[12] Kline, K., et al A study of plain language writing style for ballots in English, Spanish, and Chinese. Available at http://elections.itif.org/wp-content/uploads/AVTI-014-GTRI-PlainLanguage-2013a.pdf
[13] Kropf and Kimball, pp 91-92

concept in elections in the United States. Even election administrators who come to their jobs with education in public administration (most don't) rarely have exposure to the importance of design in processes and operations, let alone an understanding of how good design makes every step of any process more effective, more efficient, and possibly even pleasurable.

Usability and accessibility for voters is a fairly new concept in elections in the United States

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Programs in election administration education tend to emphasize history, regulations, administration, hiring, management, media strategies, and politics. No program that we know of includes any instruction in design, usability, or communicating in plain language. Most election officials are unlikely to have skills for making ballots as simple as possible within their constraints. They need additional exposure and training.

Though nearly all states have organizations of election officials that hold meetings at least once a year, it is unusual to include sessions that instruct election officials on how to conduct usability testing or simple design changes they can make that cost nothing, fit within constraints, and will make whatever they are working on (ballots, forms, procedures, user interfaces) easier to use for the users and more efficient for them to administer. These meetings are a great opportunity for training in design literacy, and we hope they'll routinely include sessions on usability and plain language as tools to improve the experience of voters, poll workers, and election administrators.

What we know

Design can help compensate for some issues, but many election officials lack skills and design literacy. There is more awareness of the importance of design, usability, and accessibility than ever. I expect that over time, election officials will gain more knowledge about how good design will improve their processes as well as voter and poll worker performance. For example, the team at the Center for Civic Design has seen more requests for workshops and skills practice at state and national conferences of local election officials over the last few years. .

Plain language makes a difference in whether voters can vote the way they intend. However, election legislation rarely allows plain language in instructions or the text of ballot measures. Research supports use of plain language, and in practice, when information on the ballot isn't plain, voters turn to information supplied either election departments or by third parties such as the League of Women Voters.

Voting systems that lack usability – from election management systems to DREs and scanners – make election administration more difficult, more expensive, and less secure than voting systems that are designed and engineered for usability and accessibility. This comes through most clearly in poll worker performance, because that's what the media sees on Election Day. But any poor performance by poll workers really is the end of a long series of processes that rely on multiple interfacing systems and databases, and different types of users who have a wide range of skills.

U.S. ballots are complex – perhaps the most complex in the world. As far as we know, the United States has the most variation in types of contests on ballots in the world. In most of the European Union countries, for example, referenda are relatively rare and there are few offices on a ballot. If you take a typical ballot from California or Minnesota for a general election as an example, you might see several different voting modes on the same ballot:

> Vote for 1 pair: president and vice president together.
>
> Vote for 1: governor, senator, and representative.
>
> Ranked choice: for mayor and board of supervisors.
>
> Vote for n: where voters can choose multiple candidates for commissions or councils.

Judge retention contests to determine whether incumbent judges can keep their seats.

State propositions and county ballot measures, as well as voter initiatives.

In addition, 17 states still allow straight-party voting.

Civics education for voters is lacking. In new work by the Center's Whitney Quesenbery based on interviews with new voters, we see that even well educated, middle class young people don't know what elections are about. They asked questions such as, "What do you actually do when you vote?" We have seen this type of gap in several studies. People who are eligible to vote have questions ranging from the specific mechanics of voting to what the offices they are voting for actually do.

Typically, voter information from election departments doesn't describe what each office does and what the requirements for candidates are. It also does not help voters know what to expect at a polling place or just how they go about marking and casting ballot. My guess is that this information is not covered in election materials because officials don't hear these questions. The questions that come into call centers and by email are about process: finding a polling place, registering to vote, voting by mail. It may be that people are too embarrassed, or simply don't know whom to ask.

What we don't know

There is more to voting than marking a form. There are some factors that might affect voter performance on ballots that we don't have data about.

Would getting information to voters ahead of Election Day about what is on the ballot make ballots easier to use? Only about 20% of jurisdictions send information to voters ahead of Election Day.[14] Many voters learn what is on the ballot for the first time when they enter the voting booth.

Would improved design in vote-by-mail packets – including the ballot, instructions, and envelopes – lower the rates of residual votes and rejected ballots? For example, Oregon and Washington, which are all vote-by-mail have residual vote rates that are comparable to precinct-counted optical scan jurisdictions. Much of this success is by design. Some is by legislation. What are they doing that other jurisdictions are not?

How many languages can be on a ballot before voters have more problems voting than having the languages might help? Putting multiple languages on a ballot saves poll workers from guessing or having to ask voters which language they would like to have. But we don't know if, when there are 3 or more languages on a ballot, what problems voters encounter *because* there are multiple languages.

How might the overall experience of preparing to vote, getting to the polls, and being in a busy, unfamiliar place doing a complex, stressful task add to the difficulty of marking a ballot the way the voter intends? One thing we hear from new voters is that when ballots are large, especially, voting can feel like a test. What other factors contribute to that feeling?

[14] Ongoing research by Stephen Ansolabehere of Harvard University started in 2013.

Possible solutions

Many of the factors that prevent ballots from being simple, usable, and accessible are embedded in legislation. But not all of the legislation that affects ballot design is directly related to type, layout, and instructions. Procurement rules and processes, design literacy and skills, and best practices for election administration also contribute to the ease with which ballots are cast as intended and counted as cast. Here are some ideas for solutions:

- Legislative reforms at the state and county levels to eliminate or minimize design specifications that are in regulations, while putting in place procedures to ensure that ballots and other election materials are designed well and tested for usability.
- Incentives for voting system vendors to design usable, accessible systems that support best practice ballot design.
- Reforming procurement processes to demand demonstrable usability and accessibility in election management and voting systems.
- Teaching election officials how to do simple usability tests of ballots and voter information.
- Teaching election officials how better design of ballots and voter information will create less work for them, may prevent recounts, and will make poll workers' jobs easier.
- Combining usability testing with L&A testing.

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