Dumb Voters or Bad Design at Root of Ballot Confusions?

The close election has brought to the surface many stories of confusing ballot layouts, punch card problems, and machines that throw out votes. Many have mocked the stupidity of voters, saying that people only had to follow the arrows or that elderly voters were at fault for misreading the ballots.

Respect for users is a basic value in the science of Ergonomics. When problems like ballot confusions occur, we do not stop with the idea that people are stupid. Instead we use techniques of engineering and science to analyze and study the interface or interaction of people and device, and often find poor design and traps that could lead any of us to err. As Don Norman stated in one of his popular books on human-machine design, "Things can make us smart or dumb."

The science of Ergonomics begins with the insight that problems like the ballot confusions are *human-machine interaction* problems. We are *all* vulnerable to err when the interface between users and machines is designed in certain ways. Let's consider the layouts of the Florida "butterfly" ballot as one example of how science and engineering looks at interface design.

First, the Florida "butterfly" ballot layout violates a variety of rules of thumb about how to avoid confusions in interface design that were developed from work on critical tasks like flying aircraft, maintaining military equipment, and operating nuclear power plants. With punch holes to the right of some candidates and to the left for others the butterfly ballot violates one cardinal design rule--avoid mirror images in the layout of options.

Alignment is another important factor. The arrows have been added to try to make up for the poor layout. But to determine how this will affect voters, one has to look at more than the layout of the paper but also look at the geometry of the voting booth to determine the effects of other factors such as parallax, i.e., angular displacement of two objects at different distances along (or near) the viewer's line of sight.

Second, it is not simply the butterfly layout that creates difficulties. Many kinds of ballots can be designed that fail to give feedback to the voter that the machine has registered their vote as they intended. For punch card systems voters can unknowingly fail to completely punch out the hole, thus invalidating their vote. As one colleague commented following the controversy, those who buy state lottery tickets get immediate and effective feedback that the machine registered their choice of numbers accurately.

Third, how easy is it to correct a mistake if a voter is concerned he or she erred? What do voters know about how correct a misentry? What outside factors effect people's ability to ask for help (staffing at polling places; long lines of voters)?

In addition, standard human-machine interface guidelines specify that the computer should check for illegal entries, such as entering two choices for a single office. Simple techniques are available to make it impossible to vote inadvertently for two candidates.

Fourth, Ergonomics is a science. This means the factors that help or mislead voters in a particular ballot design are not opinions to be debated, but hypotheses that are easily testable. Arguments about how the layout did or did not confuse voters or how likely voters were to make errors can be settled by collecting data through basic usability evaluations.

But more importantly, usability testing conducted before the election could have detected and prevented any problems with ballot layout. Usability testing was developed and adopted throughout the software industry because it is hard to anticipate the difficulties a design may create until people actually try to use it under realistic conditions.

The Ergonomic results do not tell us how to resolve the dilemma of the close election, but they do expose the 'blame game' as a destructive myth. The overconfident belief--'I am more careful than those other people and could never have fallen into any of these traps'--ignores basic science and engineering results. This myth is destructive because it has led officials to tolerate antiquated technology, poor design, and high failure rates in the voting and tabulation process for years. This myth is destructive because it leads us to ignore the predictable effects of poor design until disaster strikes--preventable disasters that often cost human lives in others areas such as transportation and health care.

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