

# INSIDE THE WITHIN PRECINCT ERROR

Michael Butterworth  
CBS News

## ABSTRACT

Like any measurement, exit polls have both systematic and random error. The distinction is important for the reliability of the statistical models used to project the results of elections. We estimate both types of error for the 1996 US presidential election. Although the exit polls in 1996 were fairly accurate, individual precincts had substantial systematic errors, an indication that the overall accuracy might not be dependable for other elections. We also investigate interviewer and precinct characteristics that affect precision.

**Keywords:** Precinct, Vote, Bias, Exit poll, Interviewer

## 1 DATA

We have a data set from the 1996 US presidential exit poll conducted by Voter News Service. It includes for each precinct: exit poll tallies and election day reported counts by candidate; and the responses of the interviewer to a post election questionnaire.

## 2 METHODS

For any group of precincts, including the group consisting of all exit poll precincts in the election, we can write the exit poll error in precinct  $i$  as

$$E_i = WPE + S_i + \text{Ens}_i$$

where:

WPE is the systematic error for the group.

$S_i$  is the sampling error for precinct  $i$ .

$\text{Ens}_i$  is the remaining error. Its expected value is zero, but it is not due to sampling.

By convention WPE is the error in the lead, about twice the error for an individual candidate. It is negative if the Democratic candidate does better in the exit poll than in the reported count. A large WPE can lead to incorrect projections of election results.

Projections are based on a  $t$  statistic, so, like  $S_i$ , the unbiased error component  $\text{Ens}_i$  should not lead to incorrect projections. However, depending on its source, non-sampling error may be nearly unbiased in one election but not in others. For example, whether interviewer effects (interviewers are confounded with precincts) cancel out may depend on how interviewers are recruited for a given election.

For different groups of precincts we estimate WPE and the standard deviation of  $\text{Ens}_i$ . We also estimate the 90% confidence intervals of these estimates. For the WPE this is straightforward. We estimate the variance of  $\text{Ens}_i$  by subtracting the sum of precinct sampling variances (with finite sampling correction, Groves (1989), p. 245) from the total precinct variance. Because the precinct errors are not identically distributed, we use the bootstrap (Sheskin (2004), pp. 440 ff.) with 1000 replications to estimate the confidence intervals.

## 3 RESULTS

In the figures below the bars are 90% confidence intervals.

### 3.1 VOTERS FROM OTHER PRECINCTS

Much of the non-sampling error is due to interviewing voters from the wrong precinct. Because of its symmetry, we expect this error to be unbiased. We remove precincts that share a polling place from our sample, along with a few outliers and precincts with few respondents.

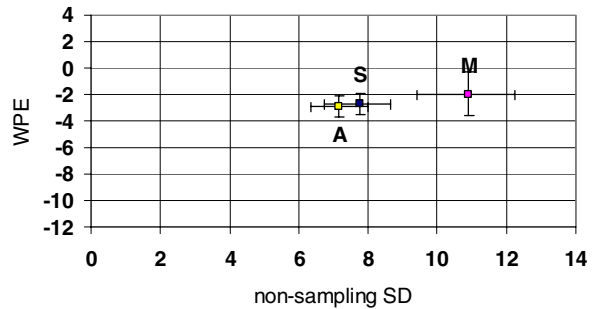


Figure 1: Effect of shared polling places

M = Multiple precincts at polling place, N=316

S=Single precinct polling places, N=885

A=After eliminating outliers and precincts with few respondents, N=875

### 3.2 INTERVIEWER PARTY

The interviewer’s party identification strongly affects the WPE. Although the WPE is small for Republican interviewers, the non-sampling standard deviation is about the same as for Democratic interviewers. This suggests that the better results for Republican interviewers are not because those interviewers were inherently more accurate.

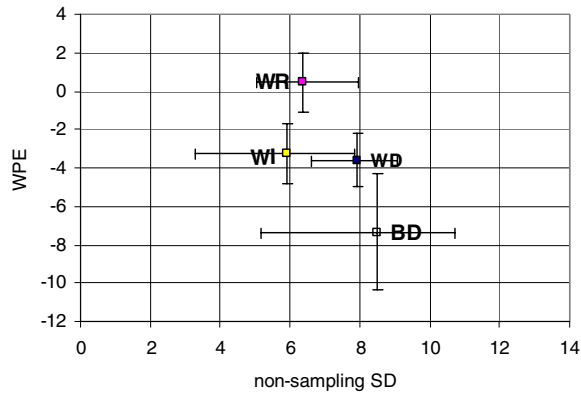


Figure 2: Effect of interviewer race and party identification

WR=White Republican, N = 218  
 WD=White Democrat, N=304  
 WI=White Independent/other party, N=195  
 BD=Black Democrat, N=49

### 3.3 INTERVIEWER EXPERIENCE

More experienced and competent interviewers should be more consistent, and have smaller non-sampling variance. Surprisingly, interviewers with telephone interviewing experience and no face-to-face experience had total variance slightly less than their theoretical sampling variance. This was the only group we found for which there may have been no precinct with bias. Interviewers with face to face experience, some of whom also had telephone experience, had high non-sampling variance. Since exit polling is a kind of face to face interviewing, we would have expected more consistency from interviewers with that kind of experience. People with no interviewing experience had intermediate non-sampling variances.

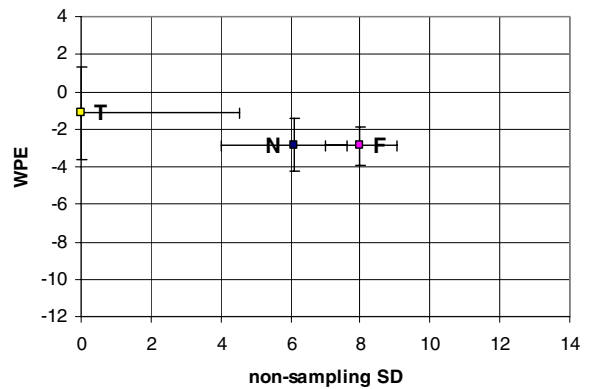


Figure 3: Effect of interviewer experience  
 F=Some face-to-face experience, N=532  
 N=No interviewing experience, N=243  
 T=Telephone interviewing experience only, N=54

### 3.4 OTHER PRECINCT CHARACTERISTICS

We expected that being located outside the polling place would provide more opportunity for selection and response bias, increasing systematic as well as random error. The effect, if any, is small.

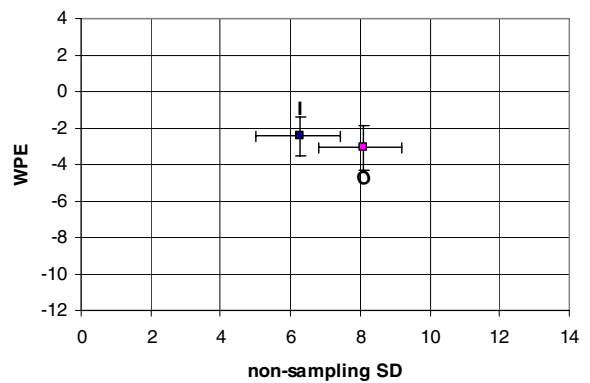


Figure 4: Effect of Interviewer location  
 I=Inside, N = 400  
 O=Outside, N = 419

### Acknowledgements

I thank Murray Edelman and Clyde Tucker for assembling and annotating the Voter News Service data. The responsibility for any misinterpretations is mine.

### References

Edison Media Research and Mitofsky International (2005), *Evaluation of Edison/Mitofsky Election System 2004* (<http://www.exit-poll.net/election-night/EvaluationJan192005.pdf>, accessed April 26, 2006).

Groves, R.M. (1989), *Survey Errors and Survey Costs*, John Wiley and Sons, New York

Sheskin, D. J. (2004) *Handbook of Parametric and Nonparametric Statistical Procedures*, Chapman & Hall/CRC, Boca Raton