Vote Miscounts or Exit Poll Error?

New Mathematical Function for Analyzing Exit Poll Discrepancy

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Acknowledgements

Contents

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This paper can be found at http://electionarchive.org/ucvAnalysis/US/exit-polls/Exit-Poll-Analysis.pdf

Why a Mathematical Function for Analyzing Exit Poll Discrepancy?

Electronic vote counting equipment makes it easy for a few persons to electronically manipulate vote counts and virtually impossible to independently audit vote count accuracy. Without routine independent audits of hand-countable voter verified paper ballots, insiders have freedom to manipulate vote counts with negligible possibility of detection.

This new exit poll discrepancy function allows us, for the first time, to know what patterns of exit poll discrepancy result from various combinations of

- vote miscounts,
- partisan exit poll completion rate differences, and
- random sampling error (by simulation).

These patterns can be compared with actual discrepancy patterns produced in elections to determine what causes are consistent with actual election discrepancy.

This paper also outlines statistical methods to determine the number of precincts with significant discrepancy, and how to test precinct-level exit poll and official election results data for consistency with partisan exit poll response rate explanations. Using these methods, mathematicians or statisticians can determine if vote miscounts are indicated prior to when candidates concede future elections.

What Data is Necessary?

The following data is needed for each precinct, to perform basic exit poll discrepancy analysis

1. exit poll shares
2. official vote shares
3. exit poll sample size

If analysis using the above data shows significant unexplained discrepancy or patterns consistent with vote miscounts, then additional data is needed for each precinct including:

1. information on the pollsters and polling conditions
2. voting equipment vendor, type and methods
3. county labels
4. detailed vote count data broken out by vote type (absentee, overseas, election day, provisional, early) for all precincts

If analysis with the above data shows significant unexplained discrepancy or discrepancy correlated with voting equipment or county, then additional data and measures are needed including

1. precinct identifiers,
2. detailed on-the-ground investigation of significant exit polled precincts, and
3. independent audits or hand-counts of voter-verified paper ballots in suspect precincts

All of the above steps should be taken, as indicated, prior to any candidate conceding an election or being sworn into office. If no exit poll data is available for a particular race, and no *independent* audits of hand-countable voter-verified paper ballots are performed, then candidates should, at the very least,
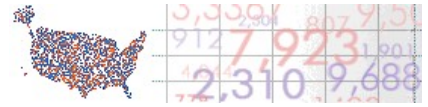
use open records requests to obtain and then analyze their own detailed vote count data prior to conceding any election.

Exit polling is currently performed by private independent polling firms, Edison/Mitofsky under the direction of the National Election Pool (NEP), comprised of ABC News, Associated Press, CBS News, CNN, Fox News, and NBC News. We urge that the NEP and Mitofsky change their policies and practices and make their exit poll data sufficiently publicly available in future elections to ensure that fair and accurate democratic elections are held in America. In any case, the public should, before any future candidate concedes or takes office,

1. take legal measures to obtain the exit polling data,
2. raise funds to provide public exit polling services, and
3. raise funds to build a national election data archive to collect and publicly release detailed vote count data broken out by vote type for every precinct. (The public already has legal right to obtain this data, but not one county in America routinely releases it - thus hiding evidence of possible vote miscounts.)

Definitions

Exit Poll Discrepancy is the "Within Precinct Discrepancy" (WPD) calculated by subtracting the exit poll margin (the difference between the two leading candidates) from the official vote count margin in a particular precinct.

WPD = (% Difference in Vote Count) - (% Difference in Exit Poll)   for a particular precinct.

Generally these differences (margins) are expressed in terms of percentages (of the total voters or poll participants). This is the same definition as the pollster Mitofsky uses for "Within Precinct Error" (WPE) in their January 19th report. "Discrepancy" is a more accurate term than "error" because the difference between exit poll and official vote margins is not necessarily caused by exit poll error.

Partisan Exit Poll Response Rate is the proportion or percentage of voters for one candidate who complete exit polls. For example, if 50% of Kerry voters complete exit polls and 52% of Bush voters complete exit polls, then the partisan exit poll response rate is K=50% for Kerry voters and B=52% for Bush voters.

Calculating Significant Discrepancies - "Expected versus Actual"

Exit poll discrepancies are considered "one tail significant at the five percent level" if there is less than a 5% chance of that amount or greater of discrepancy occurring due to the random chance of selecting voters as they leave the polling location. Statistically, the expected number of significant precincts is 5% of the number of precincts sampled in each of two tails where Kerry of Bush official vote shares were over-estimated by exit polls.

This statistical calculation of the probability of each precinct's exit poll discrepancy relies on principles of calculus, which is done for us in a spreadsheet by using the probability of each precinct's official vote share being different from its exit poll share by the observed amount or greater.

The probability of each precinct's vote counts and exit polls being as different as they are can be calculated using the single sample mean for proportions. In other words, its standard deviation can be estimated by $\sqrt{\dfrac{(k)(1-k)}{N}}$ where N is the number of exit poll respondents and k can be either the exit poll share or the official vote share depending on which you are assuming is the most accurate reflection of actual vote share. Its probability can be estimated using the normal distribution by using Excel formula NORMDIST(x, μ, σ, 1) to estimate the probability where μ is the assumed mean (the actual vote share or exit poll share) and x is the other (either vote share or exit poll share that is assumed to be the less accurate predictor of the actual vote share.)

Example 1:

In the Ohio 2004 presidential election, according to the exit pollsters, 49 precincts were sampled in the poll, so the *expected* number of significant precincts is 10% of 49. Thus, five (5) precincts in Ohio would be expected to show significant discrepancy. However, Ohio's actual number of calculated significant precincts is 22 (45%) if one assumes that official vote counts most accurately represent actual vote shares and is 20 (40.7%) if one assumes that exit poll shares are the most accurate estimate of actual vote counts. Three (6%) of Ohio's precincts have virtually zero chance of occurring.

Even after further analysis of Ohio's 2004 presidential election results is performed by conjecturing that a calculated portion of the overall exit poll discrepancy in Ohio is explained by 56% of the Kerry voters and only 50% of Bush voters completing exit polls that was hypothesized by pollster Mitofsky, 12 (24%) of Ohio's exit poll results are still significantly different than their corresponding official vote shares with four (8%) of significant precincts having less than 1 in 1,000 probability of occurring, with one precinct's chance virtually zero. As will be seen below, the pattern of discrepancy in Ohio is inconsistent with this 56% to 50% exit poll response bias explanation.

Discrepancy Patterns

When plotted by official vote count or by exit poll shares, we can see what patterns of exit poll discrepancy are produced by
1. different partisan exit poll response rates (such as the hypothesized Kerry-to-Bush voter response rate of 56% to 50% that was proposed by Mitofsky to explain the 2004 presidential discrepancies),
2. vote miscounts, and
3. random sampling error.

There are other factors which influence exit poll discrepancies, not listed above. However, not enough data has been released by exit pollsters to know whether or not these other factors would affect an analyses of WPD (within precinct discrepancy) patterns plotted by official vote count or exit poll shares. Common-sense tells us that such other factors will not significantly influence this analysis, but we do not know.

Algebraic Formula for WPD

A single function can be used to describe exit poll discrepancy (WPD) produced by vote miscounts, exit poll response bias, and random sampling error.

The formula for this function was algebraically derived using the 2004 presidential election between Kerry and Bush, so we use the following variable definitions, which are easy to generalize to any other two candidates whose vote shares are almost equal to 100% of the total votes:

k is the Kerry actual precinct vote share as cast by voters
b is the Bush actual precinct vote share as cast by voters
K is the proportion of Kerry voters who complete exit polls
B is the proportion of Bush voters who complete exit polls
s_b is the precinct vote miscount share for votes shifting to Bush from Kerry
s_k is the precinct vote miscount share for votes shifting to Kerry from Bush
e_s is the precinct random sampling error (see explanation below)
n is the precinct exit poll sample size

For example, if Kerry had an actual precinct vote share as cast by voters of 55%, then $k = .55$. Note further that, for the purposes of deriving WPD patterns, k and b are actual votes cast. We calculate both official recorded votes (which may not have been counted correctly) and exit poll shares (which are influenced by sampling error and partisan response rates).

We assume, for this calculation that $b + k = 1$ so that $b = 1 - k$. Using this, we derive the following equation 1, a function for WPD, by subtracting the exit poll margin from the official vote margin between the two candidates, as prescribed by the definition of within precinct error given by Mitofsky in the Edison/Mitofsky January 19, 2005 report. Details of the derivation are in appendix A.

Equation 1: $$WPD = 2k - 1 - 2s_b k + 2s_k(1 - k) - \frac{kK - B + Bk + e_s}{kK + B - Bk}$$

The random sampling error e_s is a measure of how far from the mean (the expected value) we expect the measured value (exit poll share) to be, assuming that the only source of error is statistical randomness (i.e., there is ideal exit polling). The mean (expected) value for exit poll share is k, the actual vote share. If x is the exit poll share actually found in a given precinct, then the random sampling error is the difference

$e_s = k - x$ (where k is known and polling is ideal).

This, of course, equals zero when the exit poll share exactly equals the actual vote share.

To estimate e_s we need the standard deviation of the exit poll distribution, which statistical theory tells us, for an assumed known value of the actual Kerry vote share k, is $\sigma = \sqrt{\frac{k(1 - k)}{n}}$. We simulate x, an exit poll share, by using a normal distribution with mean k by using the Excel function

$NORMINV(RAND(), k, \sigma)$ where
NORMINV(probability,mean,standard_dev)
Probability   is a probability corresponding to the normal distribution.
Mean = k is the arithmetic mean of the distribution.
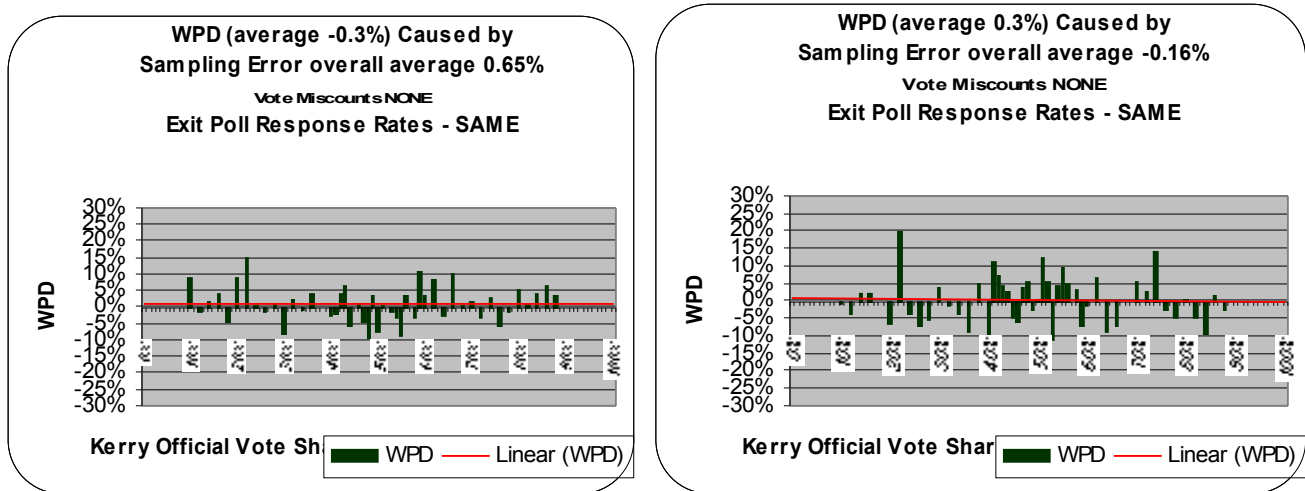Standard_dev   is the standard deviation of the distribution.

It returns the inverse of the normal cumulative distribution for the specified mean and standard deviation. Given a value for probability, NORMINV seeks that value x such that NORMDIST(x, mean, standard_dev) = probability.   So by using the randomization function, we simulate x, exit poll shares, with various probabilities of occurring to obtain values for $k - x = e_s$

Pattern produced by Random Sampling Error

Using equation 1, $WPD = 2k - 1 - 2s_b k + 2s_k(1 - k) - \dfrac{kK - B + Bk + e_s}{kK + B - Bk}$

and setting vote miscount to zero, $s_k = s_b = 0$, and exit poll response rates equal, $K = B$, then $WPD = e_s$ where random sampling error e_s is simulated as described above

Below are two examples of random sampling error. Notice the flat trend lines with close to zero slope.

WPD (average -0.3%) Caused by Sampling Error overall average 0.65%
Vote Miscounts NONE
Exit Poll Response Rates - SAME

WPD (average 0.3%) Caused by Sampling Error overall average -0.16%
Vote Miscounts NONE
Exit Poll Response Rates - SAME

Note that the overall average WPD caused by sampling error is almost always less than 2%, and the slope of the trend lines for WPD caused by sampling error have close to zero sloped trend lines.

Pattern Produced by Partisan Exit Poll Response Rate Differences

Exit poll discrepancy (WPD) patterns produced by different exit poll completion rates by voters supporting two different candidates can be calculated by setting s_b and s_k, the vote miscount factors and e_s, precinct sampling error to zero in Equation 1 from Appendix A

$WPD = 2k - 1 - 2s_b k + 2s_k(1 - k) - \dfrac{kK - B + Bk + e_s}{kK + B - Bk}$ where B and K are the Bush voter and Kerry voter

exit poll completion rates. This gives $WPD = 2k - 1 - \dfrac{kK - B + Bk}{kK + B - Bk}$, assuming that there is only exit

poll response bias with no random sampling error or vote miscounts. If K > B where K and B are constant, then when we plot WPD ordered by official vote share of the candidate whose vote share is k, then a U-shaped pattern emerges. If K < B, then an inverted U-shape occurs. The absolute value of the

exit poll discrepancy (WPD) is greatest where vote counts are closest to 50/50. The absolute value of the exit poll discrepancy drops off to zero when the vote share of either candidate is highest.

The charts below show discrepancy (WPD) produced by a Kerry voter 56% to Bush voter 50% exit poll completion ratio (left chart) and Kerry voter 50% to Bush voter 57% exit poll completion rate (right chart).
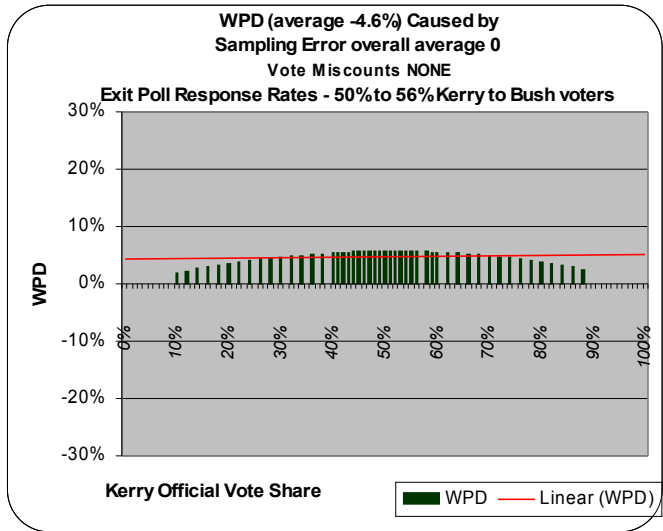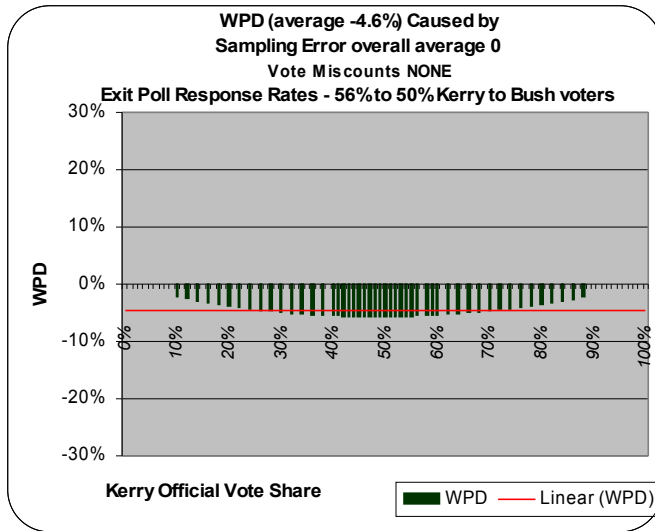
When plotted by exit poll share, discrepancies caused by partisan exit poll completion rate differences shift right or left and, if combined with sampling error, WPD may have trend lines with slight nonzero slopes when plotted by Kerry exit poll share.
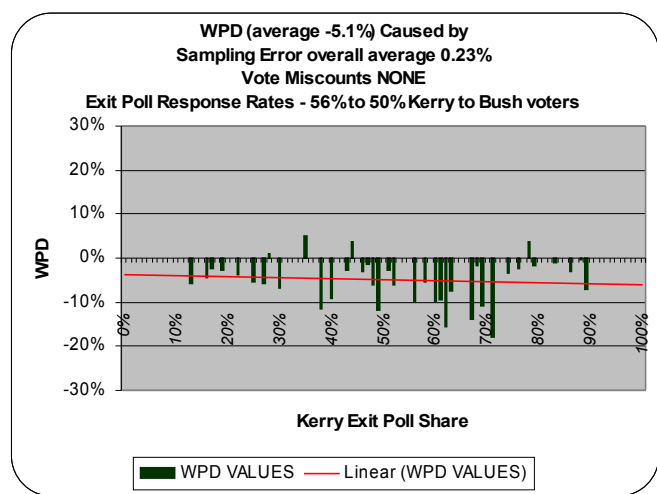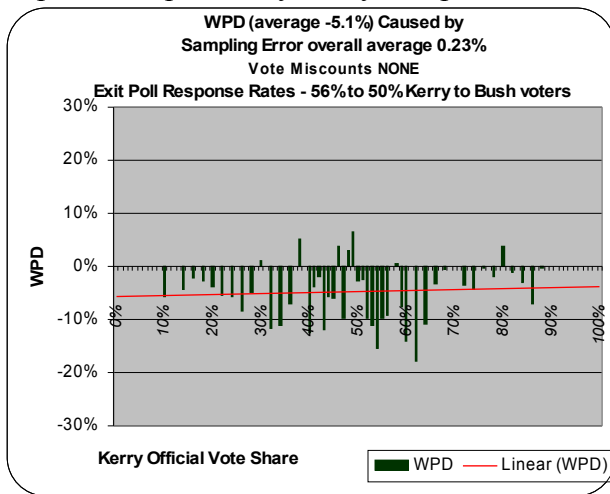
Testing Discrepancy for Consistency with Partisan Exit Poll Response Rate Differences

Exit poll discrepancy data can be tested to see if it can be explained by partisan exit poll completion rate differences by subtracting the amount of WPD that would be caused by a particular partisan exit poll response bias from the actual discrepancies. If the resulting "adjusted" pattern of discrepancy is consistent with random sampling error, than we can say that the data is explained by partisan exit poll response rate differences between the voters of the two candidates.

In other words, if the discrepancy can be explained by partisan differences in exit poll completion rates, then subtracting the WPD that would be produced by the partisan exit poll completion rates that produce the same overall WPD as seen in the actual data, then the remaining WPD should be consistent with the WPD that would be caused by exit poll random sampling error.[1] This adjusted WPD can then be evaluated to see if it is consistent with WPD produced by random sampling error.

The National Election Data Archive applies the above methods in our analysis of Ohio's 2004 presidential exit poll discrepancy data. Here is a pictorial representation of this method when applied to Ohio's exit poll discrepancy. Here are Ohio's actual exit poll discrepancies ordered by official vote:
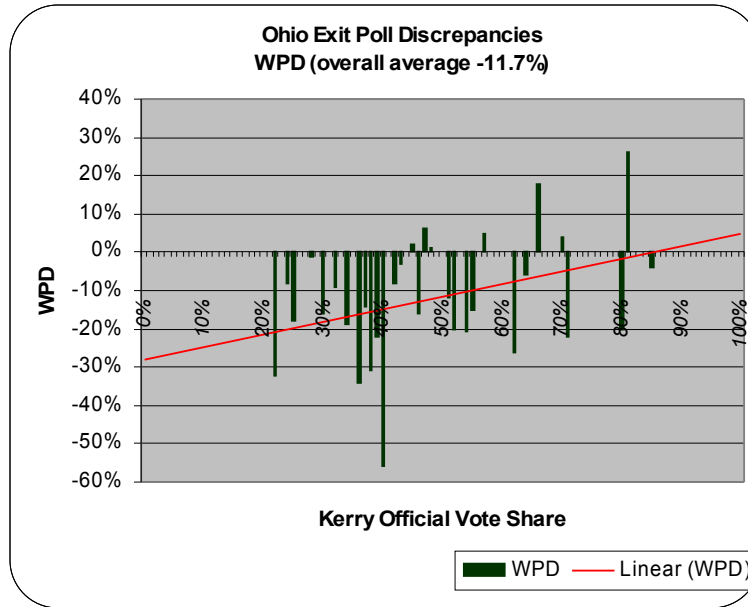

Ohio's overall average exit poll discrepancy is -11.7% and there are 20 precincts with significant negative discrepancy and 2 precincts with significant positive discrepancy.

A Kerry to Bush voter response rate ratio of about 1.3 (Kerry response rate of about 65% and Bush voter response rate of about 50%) also gives an overall average exit poll discrepancy of -11.7% using Ohio's precinct vote counts to calculate. We calculate WPD that would be produced by exit poll response bias and subtract it.[2] The chart below shows Ohio's WPD adjusted for a 1.3 K/B response bias. The adjusted WPD which has an overall average WPD of close to zero.

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[1] Not enough data has been publicly released with respect to pollsters or polling conditions to evaluate the remaining error with such other factors. Public release of such other data for each precinct would not risk violating voter privacy, so there is no reason for it to be withheld.

[2] We use actual Kerry official vote share as k because we are assuming that the official vote is correct in our calculation, but it could be done by using exit poll share as k also.

**Ohio Exit Poll Discrepancies
Adjusted WPD VALUES
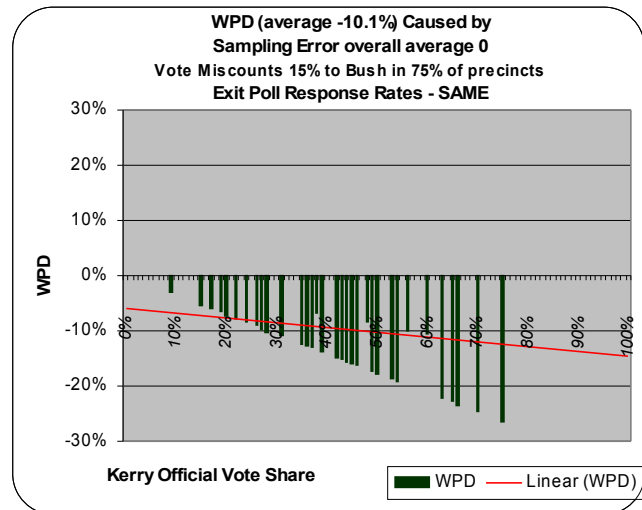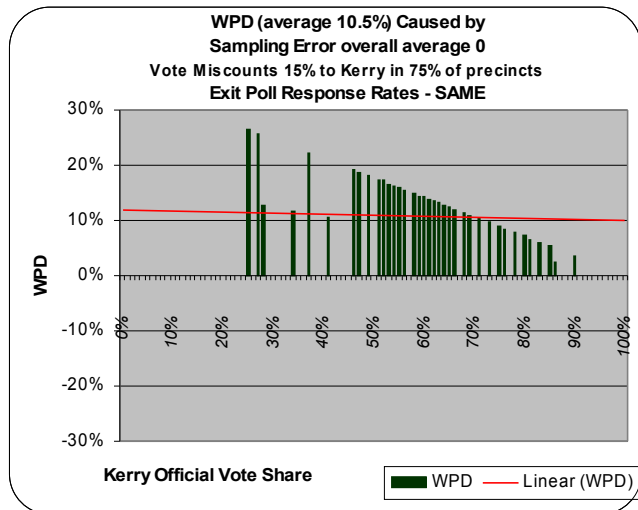(subtract WPD caused by 1.12 bias)**
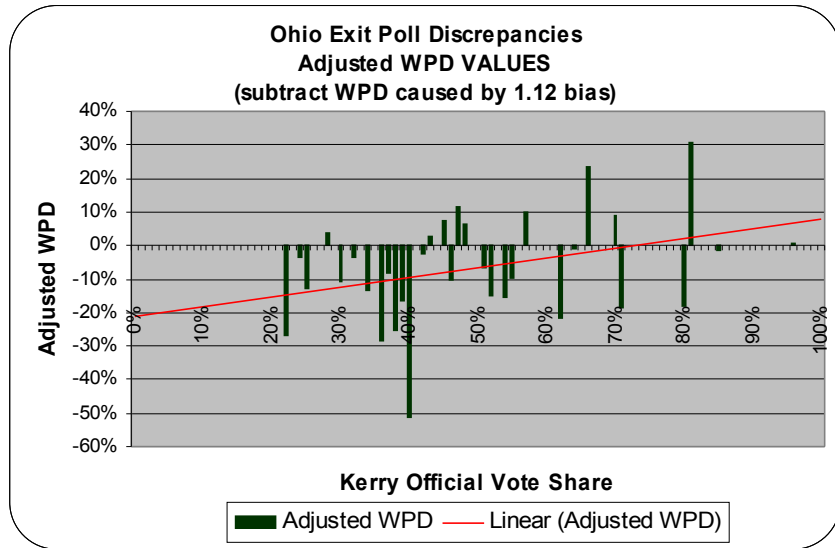
Clearly, the above pattern is inconsistent with a random sampling error explanation and we can therefore conclude that an overall 65% exit poll completion rate of Kerry voters, to a 50% exit poll completion rate of Bush voters does not explain the Ohio exit poll data.

Patterns produced by Vote Miscounts

Ignoring sampling error by setting it to zero, and ignoring different partisan exit poll completion rates by voters, we can calculate the WPD function produced only by vote miscounts. In other words, we set e_s to zero and $K = B$ where K and B are Kerry and Bush voter exit poll completion rates. Then

$$WPD = 2k - 1 - 2s_b k + 2s_k(1-k) - \frac{kK - B + Bk + e_s}{kK + B - Bk}$$ becomes $$WPD = -2s_b k + 2s_k(1-k)$$ which is the

discrepancy caused by vote miscounts.

The charts below show the WPD pattern that results when there is a 15% vote shift in 75% of precincts. Some precincts do not have vote miscounts, and end up with the same official vote shares. When there are duplicate official vote counts or exit poll shares, we average their WPD in the charts below.

**WPD (average 10.5%) Caused by
Sampling Error overall average 0
Vote Miscounts 15% to Kerry in 75% of precincts
Exit Poll Response Rates - SAME**

**WPD (average -10.1%) Caused by
Sampling Error overall average 0
Vote Miscounts 15% to Bush in 75% of precincts
Exit Poll Response Rates - SAME**

If the same discrepancies are plotted (charts below) by their precinct exit poll results then the best fit trend line has negative slope and positive WPD when votes are miscounted in favor of Kerry (chart on left), and negative slope and negative WPD when votes are miscounted in favor of Bush (chart on right).
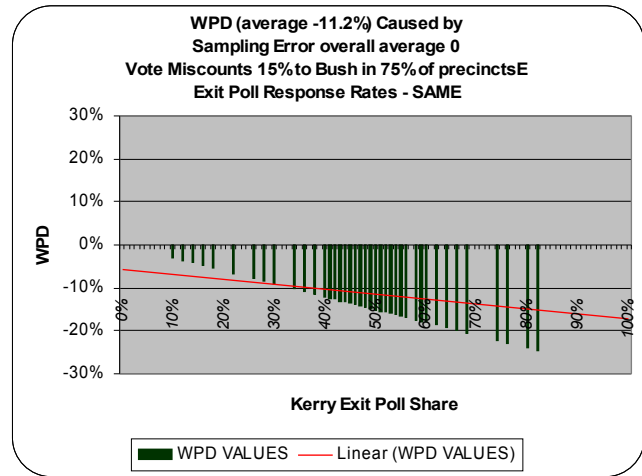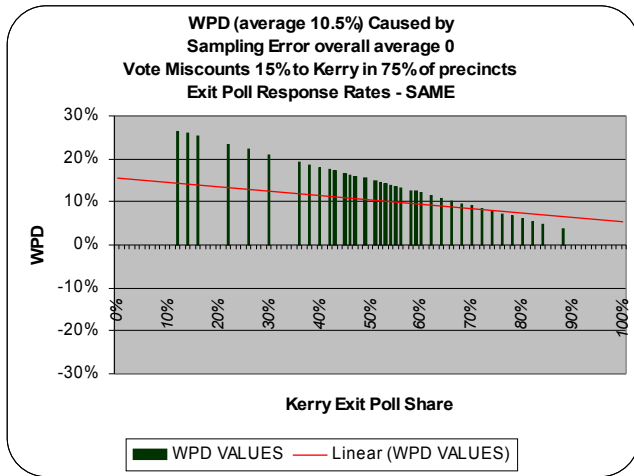
Combinations of Vote Miscounts, Response Rates, & Sampling Error

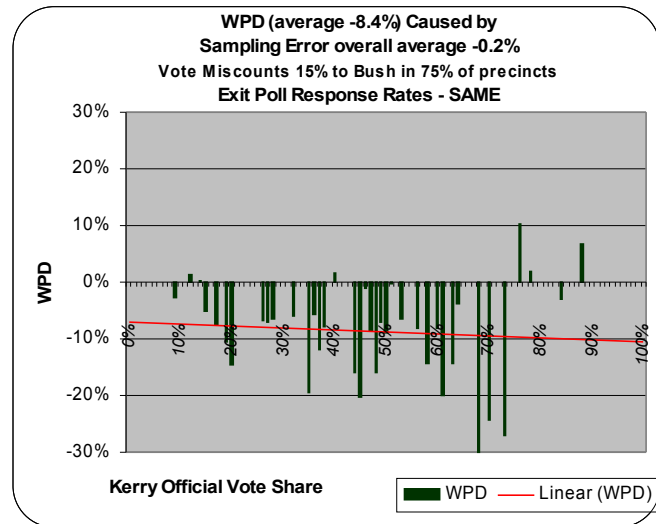The charts below show WPD caused by a combination of sampling error and vote miscount. The chart on the left shows vote miscounts favoring Kerry which shift 15% of Bush votes to Kerry in 75% of precincts. The chart on the right shows vote miscounts favoring Bush which shift 15% of Kerry votes to Bush in 75% of precincts.

Notice that, in both charts, some of the WPD produced by sampling error cancels with that produced by vote miscounts. First, WPD plotted by Kerry official vote share.
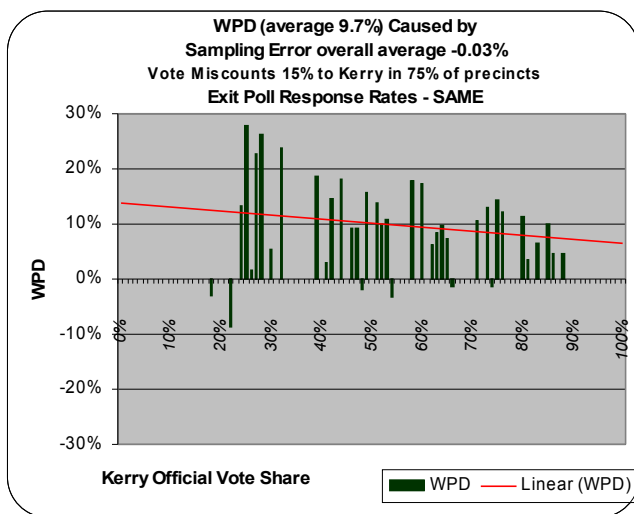
Next (below), WPD plotted by exit poll share.

WPD (average 9.7%) Caused by
Sampling Error overall average -0.03%
Vote Miscounts 15% to Kerry in 75% of precincts
Exit Poll Response Rates - SAME

WPD (average -8.4%) Caused by
Sampling Error overall average -0.2%
Vote Miscounts 15% to Bush in 75% of precincts
Exit Poll Response Rates - SAME
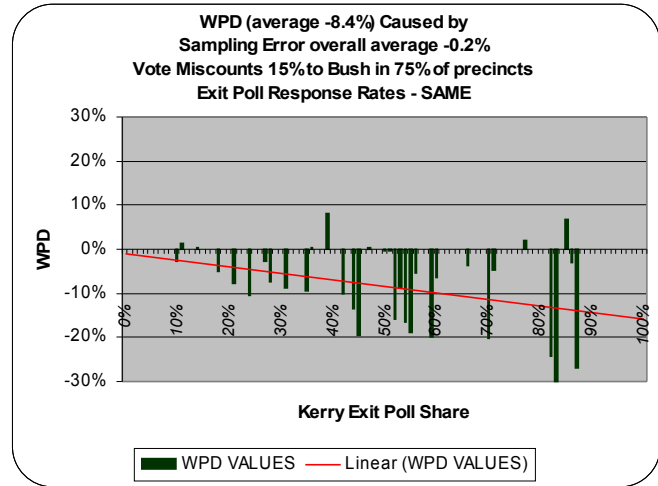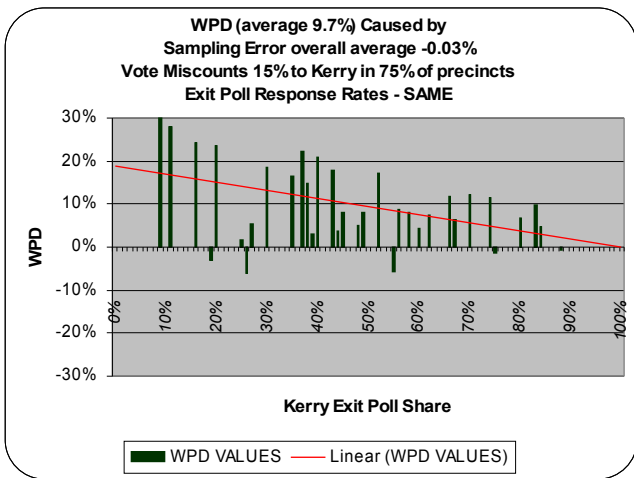
The same discrepancies plotted below by Kerry exit poll share show negative slope trend lines whenever there are vote miscounts. For comparison, here (below) are Ohio's actual 2004 presidential exit poll discrepancies, plotted by exit poll shares:

Ohio Exit Poll Discrepancies
WPD (overall average -11.7%)
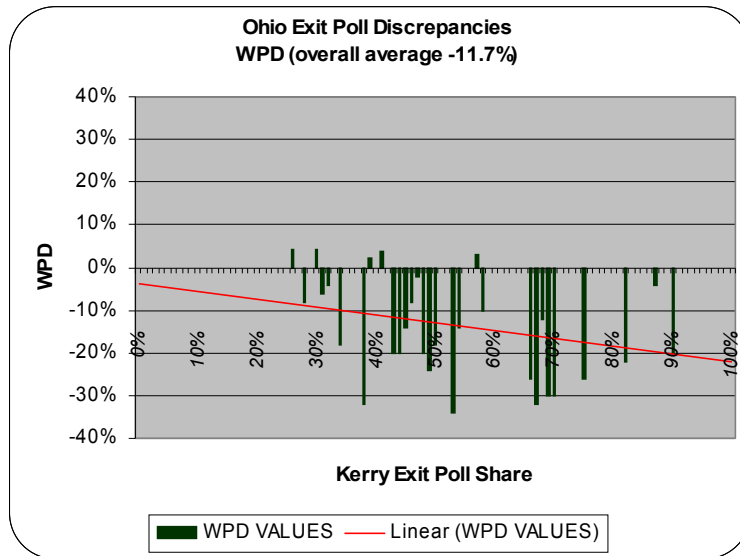
When plotted by exit poll share, Ohio 2004 presidential exit poll discrepancies have a trend-line and pattern that is consistent with vote miscounts and sampling error.

Next we combine sampling error and partisan exit poll response rates differences with no vote miscounts and examine the WPD pattern it produces.

Ordered by precinct official vote count:

WPD (average 3.3%) Caused by Sampling Error - overall average -0. 6%, and Vote Miscounts - NONE Exit Poll Response Rates - Kerry voter 56% Bush voter 50%

Kerry Official Vote Share

WPD — Linear (WPD)

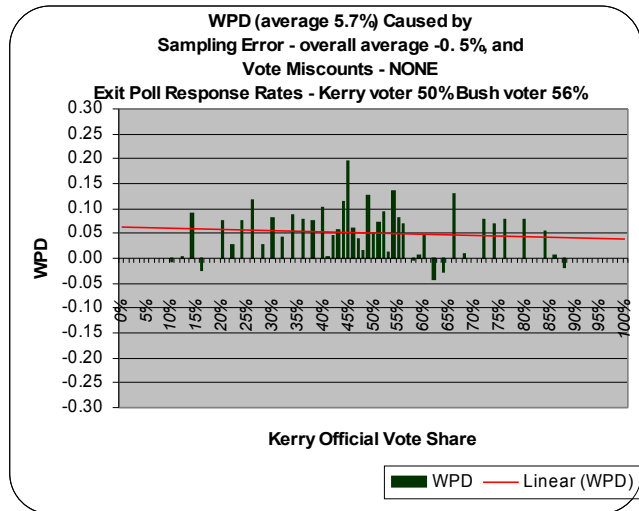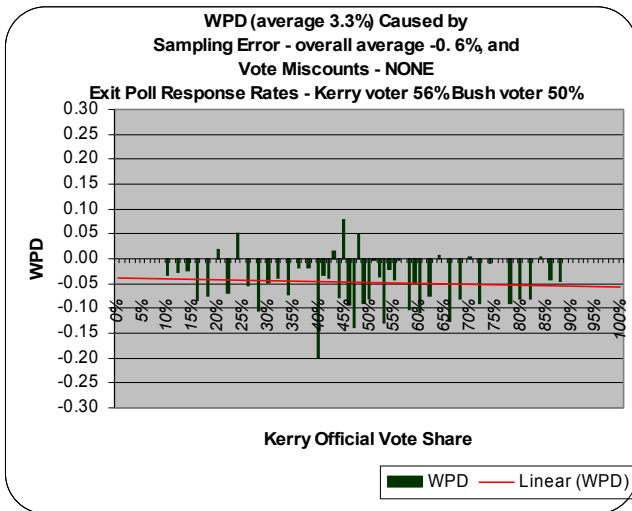**WPD (average 5.7%) Caused by Sampling Error - overall average -0. 5%, and Vote Miscounts - NONE Exit Poll Response Rates - Kerry voter 50% Bush voter 56%**

Kerry Official Vote Share

WPD — Linear (WPD)

Ordered by exit poll share:

WPD (average 3.3%) Caused by Sampling Error - overall average -0. 6%, and Vote Miscounts - NONE Exit Poll Response Rates - Kerry voter 56% Bush voter 50%

Kerry Exit Poll Share

WPD VALUES — Linear (WPD VALUES)

WPD (average 5.7%) Caused by Sampling Error - overall average -0. 5%, and Vote Miscounts - NONE Exit Poll Response Rates - Kerry voter 50% Bush voter 56%

Kerry Exit Poll Share

WPD VALUES — Linear (WPD VALUES)

Notice there is a slight negative slope to the trend lines due to shifted WPD caused by partisan response bias but there is not as negative a slope as that produced by vote miscounts.

Now, let's try Bush voters responding to exit polls slightly more than Kerry voters and vote miscounts primarily favoring Bush.

WPD caused by this combination of vote miscounts and partisan response bias, causes pronounced negative trend lines when precinct WPD is plotted by exit poll share and again produces similar WPD patterns to those found in Ohio's actual 2004 exit poll data. The signature for WPD caused by vote miscounts seems to be a negative slope trend line whenever WPD is plotted by exit poll share irregardless of which candidate vote miscounts benefits.
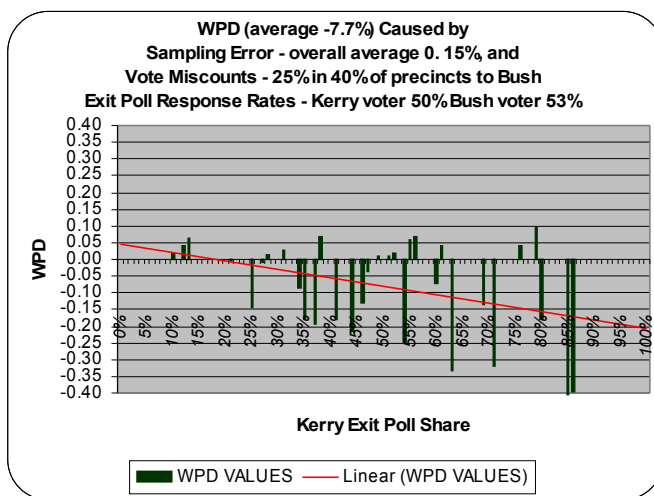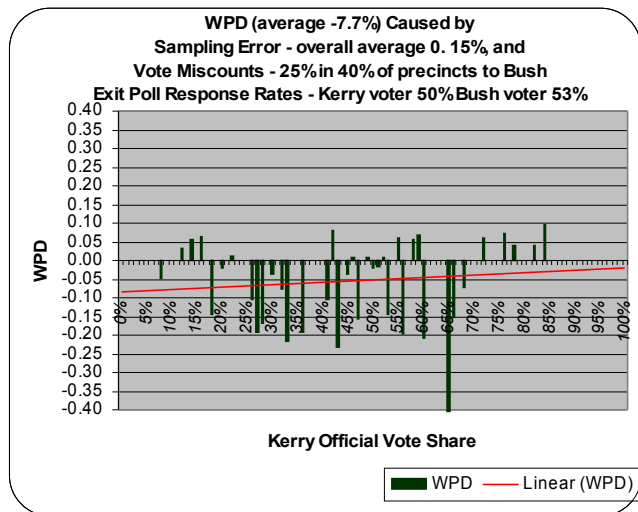
Summary - Methodology for Exit Poll Discrepancy Analysis

Evaluating exit poll data involves:
1. Statistical analysis of the actual within precinct discrepancies (WPD) to determine the number of precincts with significant discrepancies. This analysis can be done two ways:
   a. Assuming exit poll shares are the best estimate of actual vote
   b. Assuming official vote counts are the best estimate of actual vote
   The most conservative results can be used.
2. Plotting the pattern of actual and significant precinct discrepancies according to their official vote share and exit poll shares, and comparing the patterns to those produced using the WPD function presented in this paper for varying rates of vote miscount, differing partisan exit poll response rates, and sampling error.
3. Testing to see if differing partisan exit poll response rates explain the actual discrepancies by adjusting actual precinct discrepancies by subtracting WPD that would be caused by various partisan, and examining the pattern for consistency with random sampling error or vote miscount.

Three inputs are required for initial analysis of exit poll discrepancy data:
1. exit poll shares,
2. official vote count shares,
3. sample sizes for each precinct.

When an unexpected number of unexplained statistically significant discrepancies or patterns consistent with vote miscounts are found, then additional data is needed for each precinct including:
1. information on the pollsters and polling conditions
2. voting equipment vendor, type and methods
3. county labels

4. detailed vote count data broken out by vote type (absentee, overseas, election day, provisional, early) for all precincts

If analysis with the above data still shows significant unexplained discrepancy or discrepancy correlated with voting equipment or county, then additional data and measures are needed including

1. precinct identifiers,
2. detailed on-the-ground investigation of significant exit polled precincts, and
3. independent audits or hand-counts of voter-verified paper ballots in suspect precincts

All of the above steps should be taken, as necessary, prior to any candidate conceding an election or being sworn into office. If no exit poll data is available for a particular race, and no *independent* audits of hand-countable voter-verified paper ballots are performed, then candidates should, at the very least, use open records requests to obtain and then analyze their own detailed vote count data prior to conceding any election.

It is hoped that the new WPD function and description of how to analyze exit poll discrepancy data will be useful to other analysts who will further develop and improve the mathematics of exit poll analysis.

Lessons Learned - How *Not* to Analyze Exit Poll Discrepancy Patterns

Liddle/Lindeman Exit Poll Response Bias Measures Distort Discrepancy Pattern

The Liddle/Lindeman exit poll response bias measure(s) were presented by Warren Mitofsky at both the May AAPOR spring conference and at the October ASA fall conference. The original Liddle measure was defined as $\ln(K/B)$ where K is the Kerry voter exit poll completion rate and B is the Bush voter completion rate. A similar Liddle/Lindeman measure is defined as $\arctan(K/B) - \arctan(1)$ where K=(Kerry exit poll share/Kerry official vote share) and B=(Bush exit poll share/Bush official vote share). Both bias measures distort the effects of random sampling error, and are not useful for analyzing exit poll discrepancy data. Slope of the trend line of the Liddle/Lindeman measures wobble due to the effects of random sampling error alone. The left chart shows WPD caused by sampling error. The right chart shows the Liddle/Lindeman WPD measure for the exact same data.
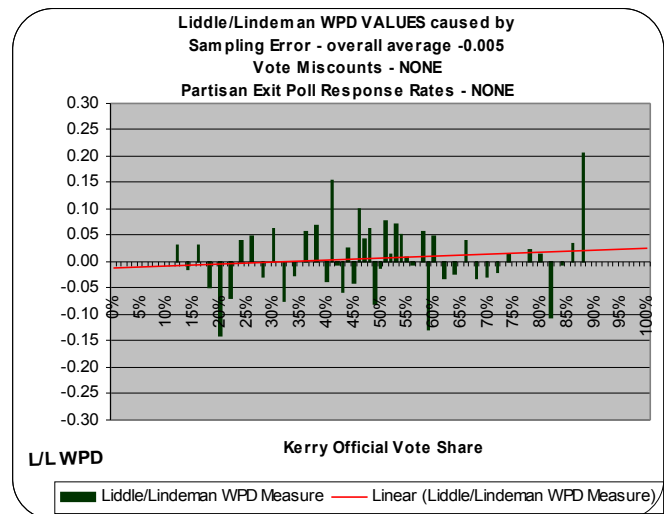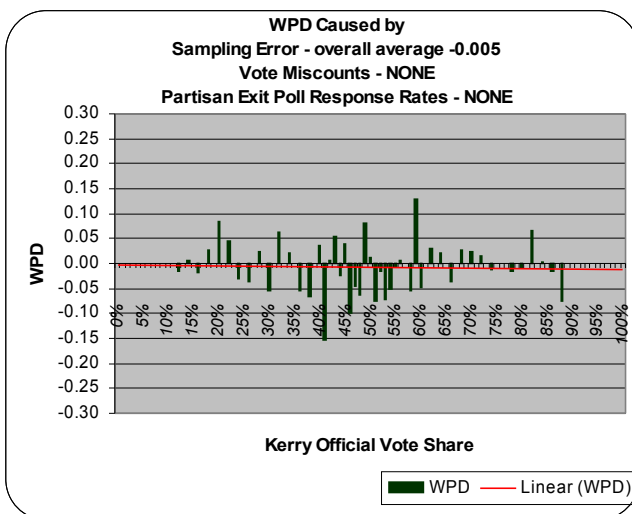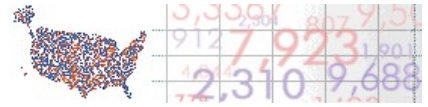
You can see that the Liddle/Lindeman measure distorts the shape of WPD caused by random sampling by exaggerating WPD that occurs near the endpoints and shrinking, relatively, the WPD caused by sampling error occurring where Kerry and Bush vote is close to 50/50. The Liddle/Lindeman bias measures are not useful for analyzing exit poll discrepancies, because their primary effect seems to be to distort the shape of the discrepancy pattern prior to analysis. More valid information can be obtained by looking at the true shape of exit poll discrepancy.

Election Science Institute - Vote Fraud Does Not Cause Correlation between Discrepancy & Previous Election Vote Share Differences

In June, the Election Science Institute (ESI) publicly released a plausible-sounding hypothesis which it applied to show that Ohio's exit poll discrepancies do not support vote fraud. The problem is that ESI's hypothesis was invalid and mathematically illogical, so that the ESI analysis which was signed by Warren Mitofsky, Fritz Scheuren, and others was useless for determining whether or not exit poll data is consistent with vote fraud.

The invalid premise presented by ESI in June, and later presented to the ASA conference in Philadelphia by Mitfosky, was:

> "ESI argued that if exit poll error evinced vote fraud, one would expect exit poll error to be correlated with the change in Bush vote share between 2000 and 2004. That is, where Bush did better in the 2004 vote count than in the exit poll (Kerry vote was overestimated), Bush vote would be higher in 2004 when compared to 2000, than in precincts where the exit polls actually overstated Bush's 2004 vote share."

ESI and Mitofsky used this invalid inference by showing that there was no positive correlation between Bush official vote increases over his 2000 official vote, with exit poll discrepancy, so that:

> "We conclude that the data do not support accusations of election fraud in the Ohio presidential election of 2004."

However, there are a plethora of counterexamples to ESI's basic premise. The reality is that outcome altering vote fraud could occur without any correlation, or with a negative correlation, between Bush vote share increases from the prior 2000 election and exit poll discrepancy. A math logic proof of the invalidity of ESI's inference, "*Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud Is Logically Incorrect"* was written by Kathy Dopp is available at http://electionarchive.org/ucvAnalysis/US/exit-polls/ESI/ESI-hypothesis-illogical.pdf

Mitofsky, presented the Liddle response bias measure at the May, 2005 AAPOR conference and presented the Liddle/Lindeman response bias measure at the October 14, 2005 ASA conference along with the invalid ESI analysis using the national exit poll data. None of these measures or analyses have scientific merit for analyzing exit poll discrepancies, and therefore nothing can be concluded from using them.

Mitofsky/NEP - Unsupported Hypothesis & Inadequate Data Released

Mitofsky International and Edison Research conducted the 2004 presidential exit polls for the National Election Pool. According to the exit poll results, Kerry won, but according to official vote counts, Bush won. Mitofsky proffered what was later dubbed the "reluctant Bush responder" (rBr) hypothesis in a January 19th, 2005 report without any evidence or analysis to support it, by stating:

"While we cannot measure the completion rate by Democratic and Republican voters, hypothetical completion rates of 56% among Kerry voters and 50% among Bush voters overall would account for the entire Within Precinct Error that we observed in 2004."

However, Mitofsky gave offered no data and analysis to support the rBr hypothesis. NEDA mathematically tested the rBr hypothesis by deriving equations to estimate the Bush and Kerry voter exit poll response rates which would be required to generate the actual E/M reported exit poll discrepancies.[3] In March, NEDA issued a report showing that the rBr explanation cannot sufficiently explain the exit poll discrepancies in the national sample because the rBr explanation could not produce the exit poll discrepancies (WPD) and response rates given by pollsters Edison/Mitofsky. [4]

Mitofsky International has yet to release either the data or analysis to support its rBr hypothesis, and has not released the precinct-level exit poll data that would enable independent analysts to evaluate fully the 2004 exit poll results.

US Count Votes - Discrepancy Ordered by Official Vote Share Does Not Indicate Where Vote Miscounts Occur

US Count Votes, now called the National Election Data Archive, erred in releasing an alternative hypothesis in its March 31st analysis by stating:

> Alternate hypothesis: "Bush Strongholds have more Vote-Count Corruption" (Bsvcc)

Although the exit poll discrepancies were substantially higher in precincts where Bush had received the most vote share, this pattern does not indicate that more vote miscounts occurred in Bush strongholds. High discrepancy resulting from vote miscounts in precincts where Kerry received more than 50% of the vote share, when ordered by their official vote share, show high discrepancy in precincts with high rates of Bush votes. To find out where vote miscounts originate, discrepancies must be ordered by exit poll share, rather than by official vote share. The signature of vote miscounts is a pattern that shows increasing discrepancies overestimating the Kerry vote as Kerry vote share increases, and increasing overestimates of the Bush vote as Bush vote share increases.

About the National Election Data Archive

The National Election Data Archive is a 501(c)(3) nonprofit working to implement mathematical methods for analyzing exit poll and vote count data for the purpose of ensuring that U.S. vote counts accurately reflect the intention of voters. USCV welcomes volunteers in every state to help obtain the detailed vote count data which no county or state routinely releases today but which every state's open records laws gives the public a legal right to obtain. USCV needs other volunteers and additional Board members to help do the PR/marketing and obtain the funding needed to hire the technical staff to implement its public election data archive. Patriotic citizens every where can help educate the public and candidates about the measures which need to be taken prior to conceding any election and to push for implementation of routine independent audits and detailed election data monitoring of every election, race, and issue.

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[3] Edison and Mitofsky International had released its own report with some limited exit poll data on January 19th, 2005 one day before the swearing in of President Bush. NEDA used the data in the Edison/Mitofsky report to develop its own analysis.

[4] See July 8, 2005 and March 31, 2005 reports at: www.uscountvotes.org.

Appendix A: Derivation of the Exit Poll Discrepancy (WPD) Function

Variables:

 WPD   within precinct discrepancy is defined as   Exit Poll Margin - Official Vote Margin

 k   proportion of Kerry votes in the precinct grouping

 b   proportion of Bush votes in the precinct grouping

 s_b precinct vote miscount share for votes shifting to Bush from Kerry
 s_k precinct vote miscount share for votes shifting to Kerry from Bush
 K   proportion of Kerry voters in the sample who complete exit polls

          (Kerry voter response rate)

 B   proportion of Bush voters in the sample who complete exit polls

          (Bush voter response rate)

 e_s random sampling error in exit polling

Example: We have a polled precinct with the following values:

 200   voters cast votes, 108 of them for Kerry; 92 of them for Bush
          Thus, *k* = .54 and *b* = .46
 100   voters are asked to be polled so. Ignoring random sampling error for now we can assume
          that 54 of the sample are Kerry voters and 46 of the sample are Bush voters.
  55   of the 100 voters asked agree to be polled
          31 (31/54=57.4%) of Kerry voters complete exit polls
          24 (24/46=52.17%) of Bush voters complete exit polls

So, in this example K=31/54=0.574, B=24/46=0.5217, k=0.54, and b=0.46. These values can be substituted into the equation derived below to calculate within precinct discrepancy. This will result in a WPD of -8% due to the disparity in exit poll completion rates between Kerry and Bush voters. WPD due to exit poll response bias is always greatest in precincts in which vote counts are closest to 50/50.

WPD = Official Vote Margin - Exit Poll Margin

$$\text{WPD} = \frac{KerryOfficialVote - BushOfficialVote}{KerryOfficialVote + BushOfficialVote} - \frac{KerryExitPollShare - BushExitPollShare + e_s}{KerryExitPollShare + BushExitPollShare}$$

$$WPD = \frac{[k - s_b k + s_k b - (b + s_b k - s_k b)]}{[k - s_b k + s_k b + (b + s_b k - s_k b)]} - \frac{(kK - bB + e_s)}{(kK + bB)}$$

Vote miscounts affect only the official vote count margin and do not affect the exit poll margin. I assume that vote miscounts occur in a way that allow the number of total votes cast to equal the number of total votes counted in any precinct, so as to avoid raising red flags. In other words, vote miscounts that favor one candidate are taken from the actual vote share of the opposing candidate. In some cases, this may mean that a proportion of votes of one type are taken from one candidate and given to another.

In other cases, when election officials add vote counts together before publicly reporting them[5], it may mean that votes are padded for one candidate in one ballot type, and subtracted for another candidate in another ballot type so that a proportion of one candidate's votes overall are taken from one candidate and added to the other.   The assumption, that the total votes cast will equal the total votes counted, causes absolute value of WPD due to vote miscounts favoring one candidate to increase as precinct exit poll share for the benefiting candidate decreases - giving a distinctive pattern for WPD caused by miscount.

Exit poll completion rate differences of voters for candidates would modify the exit poll margin only and not the official vote count margin.

Simplifying, we get

$$WPD = \frac{[k - b - 2s_bk + 2s_kb]}{k + b} - \frac{(kK - bB + e_s)}{kK + bB}$$ Using $k + b = 1$ and simplifying, we get

$$WPD = \frac{2k - 1 - 2s_bk + 2s_k(1 - k)}{1} - \frac{kK - B + Bk + e_s}{kK + B - Bk}$$

Gives us Equation 1: $$WPD = 2k - 1 - 2s_bk + 2s_k(1 - k) - \frac{kK - B + Bk + e_s}{kK + B - Bk}$$

Equation 1 gives us a function for WPD that is produced by vote miscounts, differing partisan exit poll response rates and random sampling error. The random sampling error portion must be simulated, using a randomization function, the sample size, and the value of k, due to its randomness. We use the Normal distribution to simulate random sampling error.

To fill in a small missing step in the above derivation, sampling error originally is incorporated into the exit poll margin as:

((kK+0.5e)-(bB-0.5e))/(kK+0.5e + bB - 0.5e) and then simplified.

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[5] Unfortunately, it is common practice to add together before publicly reporting election results, the vote counts of absentee, overseas, military, Election Day, Election Day - provisional, early, and early- provisional voting in all counties in America as of the date of this paper. This unfortunate practice hides the evidence of vote padding in one vote type for one candidate while simultaneously subtracting votes for another candidate in another vote type. Under every state's open records laws, we have the right to obtain the detailed counts and U S Count Votes has plans to obtain and analyze this data once it obtains the funding to build a public national election data archive.