



*The Gun is Smoking: 2004 Ohio Presidential Exit Poll Analysis*

US Count Votes  
National Election Data Archive

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The Gun is Smoking:  
2004 Ohio Precinct-level Exit Poll Data Show Virtually  
Irrefutable Evidence of Vote Miscount

*Six Percent of Ohio's polled precincts Show Virtually Impossible Vote Counts, and Over 40% Show Improbable Vote Counts, Given Their Exit Poll Results. The Patterns Of Ohio's Discrepancies Are Consistent With Outcome-Altering Vote Miscounts.*

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This paper was reviewed via The National Election Data Archive's email discussion list for statisticians and mathematicians. Interested statisticians and mathematicians are invited to join it.

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This paper can be found on the Internet at:  
<http://electionarchive.org/ucvAnalysis/OH/Ohio-Exit-Polls-2004.pdf>



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## Abstract

Ohio's electoral votes were pivotal in the 2004 presidential election, where its exit polls predicted a John Kerry win, but official vote counts gave the victory to GW Bush. Precinct level Ohio exit poll data show virtually irrefutable evidence of vote miscount. Ohio 2004 presidential vote counts can be considered plausible only if it can be shown that substantially more Bush than Kerry voters lied on exit polls, or massive exit poll error, unnoticed by pollsters, occurred. If vote miscounts are the cause of the Ohio's exit poll discrepancy pattern, they probably altered the outcome of Ohio's presidential election and caused Bush to win Ohio's electoral votes.

Ohio's exit poll discrepancy pattern includes three precincts with virtually impossible outcomes and an unusually high number of precincts with significant discrepancy.<sup>1</sup>

- 6% of Ohio's precincts each have virtually zero chance (less than one in 15,000) of occurring due to sampling error, given their Kerry official vote count.<sup>2</sup> Even if the "within precinct discrepancy" (WPD) is adjusted for all the precincts to remove any possible effect due to Kerry voters completing more exit polls, the probability of obtaining Ohio's exit poll discrepancies are virtually impossible.<sup>3</sup>
- Over 40% of Ohio's polled precincts have discrepancies having less than a 5% chance of occurring, given the official vote counts.<sup>4</sup> The expected number of such precincts in a sample of 49 precincts would be five such precincts, not the 20 found.
- Ohio's exit poll discrepancies, when plotted against precinct exit poll share show a pattern that is consistent with vote miscounts that benefited Bush, and
- The pattern of Ohio's exit poll discrepancies cannot be explained by random sampling error or partisan exit poll completion rate differences.

Without fair and accurate democratic elections, America is not a democracy.

- U.S. vote counts are *not* routinely *independently* audited to detect and correct errors;<sup>5</sup>
- election data reporting practices in virtually all counties hide evidence of vote miscounts<sup>6</sup>;

<sup>1</sup> All of the results in this paper are based on the most conservative (overall discrepancy reducing) estimates for matching ESI and UMICH/Roper precinct level data, as exact matches have not been released to the public - see appendices B and C. Though, for most precincts (where the matching is one-to-one) the match is determined by the data, specific odds figures for some precincts are estimates that could change if actual matching data were released. However, in this case, the overall conclusions of this paper are likely to be even more strongly supported

<sup>2</sup> If we assume that official vote counts more accurately reflect actual votes, then there is less than a one in 17,815, less than one in 867,205,553 and less than one in 294,832 chance in three precincts of the size of discrepancy occurring. If we calculate by assuming that exit poll shares more accurately reflect actual vote counts, then there is a less than one in 2,881,322,159, less than one in 874,855, and less than one in 18,603 chance in three precincts of the size of actual discrepancies occurring.

<sup>3</sup> If adjusted for a Kerry-to-Bush response rate bias of 56-to-50%, 12 (24%) of precincts have significant discrepancy when official vote counts are assumed more correct, and 16 (32%) of precincts have significant when calculations assume exit poll shares more accurately reflect actual vote. Note that this "adjustment" appears to be too large as it more than triples the number of precincts with pro-Bush exit poll discrepancy (all in partisan Kerry precincts) - see Appendix B, Table 2 and discussion below.

<sup>4</sup> If WPD is "adjusted" by subtracting WPD that would be caused by a 56%-to-50% Kerry to Bush voter completion rate, then, if exit polls are assumed more accurate, 20 of 49 (40.7%) of precincts have significant discrepancy. If official vote counts are assumed more accurate, then there are 22 of 49 (45.1%) of precincts with significant discrepancy. This is more than four times the expected number of precincts with significant discrepancy.

<sup>5</sup> It is hard to imagine why not. Banks, businesses, churches, and schools conduct independent audits to ensure accuracy and protect from insider embezzlement and it would be simple to do the same for elections.

<sup>6</sup> Insiders can pad votes for one candidate in one vote type (say absentee ballots), while simultaneously subtracting votes from another candidate in another vote type (say e-voting machines). Yet when these two vote counts are added together prior to



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- the payoff for election tampering is control of budgets, land use, and other issues in the millions of dollars just at the city or county level; and
- new voting equipment implemented under the 2002 “Help America Vote” Act empowers fewer persons to undetectably manipulate more vote counts and most digital recording electronic (DRE) voting machines are virtually impossible to independently audit.

In other words, today insiders have freedom to manipulate U.S. vote counts with negligible possibility of detection.

Without American democracy, the fate of civilization could be as precarious as when Hitler ended the German Republic government. We ensure the integrity of future democratic elections by publicly releasing detailed exit poll and vote count data and analyzing it immediately following elections prior to any candidate conceding or accepting office. Common-sense safeguards such as routine independent audits of vote counts using hand-countable voter verified paper ballots.

### **Definition**

Within precinct error (WPE) is the acronym that Edison/Mitofsky gave the difference between the exit poll and vote count within a particular precinct. Because the discrepancy is not necessarily caused by exit poll error, NEDA more precisely calls it within precinct discrepancy (WPD).

*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.

$$\text{WPD} = (\text{Kerry} - \text{Bush Difference in Vote Count}) - (\text{Kerry} - \text{Bush Difference in Exit Poll})$$

for a particular precinct.

### **Background: The 2004 Presidential Election**

The national exit poll data at the close of Election Day 2004 shows that Kerry beat Bush by approximately 3% of the vote nationwide. Yet, according to official vote counts, Bush won nationally by about 2.5%. This is a 5.5% discrepancy.

The National Election Data Archive (NEDA) and others calculated that the odds of this discrepancy occurring due to random sampling error in the national exit polls were between one in 9,600 and one in 16 million, depending on assumptions.<sup>7</sup> Edison/Mitofsky (E/M) who conducted the exit polls for the National Election Pool (NEP)<sup>8</sup>, acknowledged that the discrepancy could not be due to random chance and proposed that Bush voters were more reluctant than Kerry voters to complete exit polls. This was dubbed the “reluctant Bush responder” (rBr) hypothesis.<sup>9</sup>

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public reporting, the evidence cancels out and the data looks normal. In the New Mexico 2004 presidential election 2,000 more absentee ballot votes were counted than were cast while paperless DRE voting machines had an extremely high rate of no votes cast for U.S. president. These problems were discovered by the Green party investigation done with the cooperation of the Governor of New Mexico.

<sup>75</sup> For a comprehensive historical summary of the debate over the validity of the 2004 presidential election, see “History of the Debate Surrounding the 2004 Presidential Election” at <http://electionarchive.org/ucvAnalysis/US/Presidential-Election-2004.pdf>.

<sup>8</sup> ABC News, Associated Press, CBS News, CNN, Fox News, NBC News

<sup>9</sup> <http://exit-poll.net/election-night/EvaluationJan192005.pdf>



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NEDA mathematically tested the rBr hypothesis by mathematically estimating the Bush and Kerry voter exit poll response rates required to generate the actual reported exit poll WPD.<sup>10</sup> 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.<sup>11</sup>

Ohio's precinct-level exit polls over-estimated Kerry official vote by an average 5.8%. The overall discrepancy between exit poll margin and official vote margin was double that, 11.7%.

On June 6, 2005 The Election Sciences Institute (ESI) with Mitofsky<sup>12</sup> released a report on the Ohio precinct level exit poll data purporting to rule out vote fraud as the cause of the discrepancies. The (ESI) report entitled "*Ohio Exit Polls: Explaining the Discrepancy*" by Susan Kyle, Douglass A. Samuelson, Fritz Scheuren, Nicole Vicinanza, Scott Dingman and Warren Mitofsky, concluded:

"...the data do not support accusations of election fraud in the Ohio Presidential election of 2004".<sup>13</sup>

ESI's premise is that if there were vote fraud, then the 2004 exit poll discrepancy would be correlated with Bush vote share increases from the 2000 election. Finding no such correlation, ESI ruled out vote fraud as an explanation of the exit poll discrepancies.<sup>14</sup> ESI's method of exit poll analysis was included on October 14, 2005, in a presentation by Warren Mitofsky to the American Statistical Association fall conference in a talk entitled "The 2004 U.S. Exit Polls".

In an October 31<sup>st</sup> paper, NEDA mathematically proved that ESI's and Mitofsky's analyses were incorrect because many counterexamples exist to its basic premise.<sup>15</sup> In other words, NEDA proved mathematically that ESI's and Mitofsky's analysis of Ohio's and national exit poll data is of no *analytical* value and no conclusions about the presence or absence of vote fraud can be drawn from them.<sup>16</sup>

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<sup>10</sup> Edison and Mitofsky International had released its own report with some limited exit poll data on January 19<sup>th</sup>, 2005 one day before the swearing in of President Bush. NEDA used the data in the Edison/Mitofsky report to develop its own analysis.

<sup>11</sup> This is statistically significant using conservative estimates. See Appendix G of Sept. 8 USCV report op. cit. Precincts with Bush official vote share of 80% or higher would require a much larger Kerry-to-Bush voter exit poll response ratio, whereas precincts with Kerry official vote share of 80% or higher would require virtually equal response rates by Kerry and Bush voters. Common experience indicates that Kerry voters would be more reluctant to answer polls when surrounded by Bush voters rather than more responsive when surrounded by Bush voters and less responsive when surrounded by Kerry voters. If partisan Kerry pollsters caused this bias in exit poll response rates why would they be so prevalent in precincts with high Bush official vote. See July 8, 2005 and March 31, 2005 reports at: [www.uscountvotes.org](http://www.uscountvotes.org) and discussion below.

<sup>12</sup> of Kyle et. al. and Warren Mitofsky who is listed as an assisting author.

<sup>13</sup> See [http://www.votewatch.us/reports/view\\_reports](http://www.votewatch.us/reports/view_reports) , "ESI Brief - Analysis of the 2004 Ohio Exit Polls and Election Results".

<sup>14</sup> ESI's invalid hypothesis is that, "If systematic fraud or error in vote counting [favoring Bush] occurred [in precincts] in 2004 but not in 2000, [then] Bush would have done significantly better in those precincts in 2004 [than in 2000], and we would see larger differences between the reported vote and exit poll in those precincts [than in other 2004 exit-pollled precincts]." NEDA showed in its paper "*Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud is Logically Incorrect*" that any relationship between Bush vote share differences in 2000 and 2004 is compatible with vote fraud or error in vote counting.

<sup>15</sup> Any mathematics department at a reputable university can verify this by examining both ESI's report and NEDA's mathematical logic proof.

<sup>16</sup> "Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud Is Logically Incorrect", November 2, 2005. See <http://electionarchive.org/ucvAnalysis/US/exit-polls/ESI/ESI-hypothesis-illogical.pdf> An empirical analysis provided in Appendix D of this report also shows that the ESI analysis is inadequate and inconclusive.



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The ESI report had made *no* attempt to *explain or mathematically analyze* the actual 2004 exit poll discrepancies and the ESI report was missing key data. To date, Mitofsky and ESI have provided no explanation for the exit poll discrepancy that is supported by data and analysis.

The faulty analysis by ESI, the evidence of vote count corruption in Ohio and elsewhere<sup>17</sup>, and the exit poll discrepancy patterns increase doubts about the accuracy of the 2004 presidential election results.

**Virtually Impossible Vote Counts or Massive Unexplained Exit Poll Error in 6% of Polled Precincts**

Exit polls were conducted in a representative sample of 49 of Ohio's 11,360 precincts in the 2004 election.<sup>18</sup> Three virtually impossible Ohio precincts have results indicating either massive vote miscount or psychologically implausible behavior such as Bush voters lying much more than Kerry voters.<sup>19</sup> In all three precincts Kerry won according to exit polls, yet Bush won according to official vote counts. There are two ways to calculate the odds of the exit poll discrepancies:

- by assuming that official vote counts are the best estimate of actual votes, or
- by assuming that exit poll shares are the best estimate of actual votes.

NEDA calculates the probabilities both ways and uses the most conservative results.

Calculation Assumes Exit Poll Share Best Estimate of Actual Vote							
Mitofsky Precinct Number	Official Vote	ESI Table 1: "Exit Poll Original"	WPD Official Vote minus Exit Poll margins	Standard Deviation for Kerry Exit Poll Discrepancy	Number of Respondents = 2 times # Roper Data Surveys	Probability of Official Kerry Vote Given Exit Poll	Odds of Kerry Official Vote Being this Low
27	38%	67%	-5.8%	4.70%	100	0.000000%	2,881,322,159
25	40%	68%	-5.6%	5.92%	62	0.000114%	874,855
4	55%	70%	-3.0%	3.87%	140	0.005376%	18,603

Calculation Assumes Official Vote Count is Best Estimate of Actual Vote							
Mitofsky Precinct Number	Official Vote	ESI Table 1: "Exit Poll Original"	WPD Official Vote minus Exit Poll margins	Standard Deviation for Kerry Exit Poll Discrepancy	Number of Respondents = 2 times # Roper Data Surveys	Probability of Official Kerry Vote Given Exit Poll	Odds of Kerry Exit Poll Share Being this much Higher than Official Vote Share
27	38%	67%	-5.8%	4.85%	100	0.000000%	867,205,553
25	40%	68%	-5.6%	6.22%	62	0.000339%	294,832
48	22%	38%	-3.2%	4.14%	100	0.005613%	17,815

Assuming that official vote counts are the best estimate of actual vote gives us less than a one in 867,205,553, a one in 294,832, and a one in 17,815 chance that random sampling error would cause

<sup>17</sup> See <http://www.flcv.com/ohiosum.html> for a list of evidence of vote miscounts in Ohio's counties, and see <http://electionarchive.org/ucvAnalysis/US/Presidential-Election-2004.pdf> for evidence of vote miscounts in other states.

<sup>18</sup> ESI's report stated that "47 of 49 precincts" fell within the "non-responder ranges" and thus acknowledged, in a casual way, that two (4%) of the Ohio polled precincts were virtually impossible. Precinct #25 is one of these ESI "out of range" precincts, but precinct #27 is not. The other ESI outlier is #47— see Appendix B.

<sup>19</sup> labeled "Mitofsky Precinct Numbers" 25 and 47 in ESI Table 1, and in Table 2 of Appendix B of this report.





these precincts to have such high discrepancies between their exit poll and official vote margins.<sup>20</sup> On-the-ground investigation of these precinct vote counts is needed.

It is not unusual for survey data to include a number of “impossible” outliers. However, such outliers are usually omitted from reports if they are clearly erroneous. The Edison/Mitofsky January 19 report states that it omitted data in its national and state samples from 20 precincts from which vote returns were not obtained; precincts with fewer than 20 respondents; and three precincts “with large absolute WPD (112, -111, -80) indicating that these three precincts' vote counts were recorded incorrectly.”<sup>21</sup>

The fact that they were not omitted from the data, suggests that there were no obvious reporting, low response, or other exit poll errors for these precincts. Note that:

- the *magnitudes* of these discrepancies are statistically impossible to attribute to random chance;
- these virtually impossible discrepancies all occur in precincts with Bush official vote shares of 60% or higher when plotted by official vote<sup>22</sup>; and
- no explanation is offered by E/M or ESI for the three Ohio precincts with virtually impossible exit poll discrepancies.

If vote miscount caused Ohio's virtually impossible results and precinct selection was random with regard to this characteristic, then the overall estimated number of precincts in Ohio with virtually impossible results would be approximately 695 (6.1% of 11,360).<sup>23</sup>

### **Significant Discrepancies in over 40% of Ohio Polled Precincts**

Over 40% of Ohio's exit polled precincts have statistically significant discrepancies. This is over four times the number of expected precincts with significant discrepancy.

- 45.1% (22 of 49) of Ohio's polled precincts have significant discrepancy when calculations assume that official vote counts most accurately estimate actual vote share, and
- 40.7% (20 of 49) of Ohio's polled precincts have significant discrepancy when calculated by assuming that exit poll results are a better estimate of real vote share.

The following two tables list Ohio's precincts with significant discrepancies, calculated using different assumptions. Each table row show's one precinct's vote count, exit poll discrepancy, and odds of occurring due to random chance.

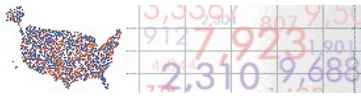
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<sup>20</sup> See Table 2, Appendix B. As E/M has not released sample sizes for the Ohio exit polled precincts. NEDA has estimated both based on UMich/Roper data. Email communication from Warren Mitofsky indicates that actual sample sizes were roughly double the number of individual surveys stored at UMich/Roper. - see Appendix B. The publicly released “raw data” is thus apparently only about 50% of the actual data. Moreover, one of two precincts (Mitofsky #4) with a large (greater than  $\pm 3\%$ ) discrepancy between ESI reported and UMich/Roper reported “exit poll” results would have *had by far the largest and most implausible official Kerry result* (odds of less than 187 trillion!) with a “raw data” Kerry exit poll value of 79%, rather than the ESI “original exit poll” value of 70% for this precinct. The other of these two precincts (Mitofsky #35) would be much more highly significant odds (of less than 526,000) that the Kerry official result actually occurred given the exit poll. Mitofsky has not offered any explanation for this deviation of the ESI exit poll results from the UMich/Roper results. These large and suggestive data inconsistencies underscore the need for a full release of *all* the relevant data – see below.

<sup>21</sup> E/M January 19, 2005 report, op. cit., p. 34.

<sup>22</sup> Ignoring independent votes they had official Bush vote shares of 60% (#25), 62% (#27), and 70% (#4) – see appendix B.

<sup>23</sup> Three precincts are 6.1% of the 49 Ohio precincts at which exit-polls were conducted in 2004. Probabilities for obtaining *at least* one corrupted precinct from a random pick of 49 out of 11,360 with different proportions of corrupted precincts among the 11,360 are calculated in Appendix A.



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Assumes Correct Official Count		
Official Vote	WPD	Odds - One in
22%	-32%	17,815
25%	-18%	23
30%	-22%	36
32%	-22%	1,449
34%	-20%	71
34%	-18%	38
36%	-34%	3,844
37%	-24%	134
38%	-58%	867,205,553
39%	-22%	21
40%	-56%	294,832
46%	-16%	20
52%	-28%	430
54%	-30%	125
54%	-24%	102
55%	-30%	5,550
57%	-22%	76
57%	32%	128
62%	-26%	154
71%	-22%	399
80%	-20%	173
81%	26%	360

Assumes Correct Exit Polls		
Official Vote	WPD	Odds - One in
22%	-32%	2,042
30%	-22%	27
32%	-22%	775
34%	-20%	55
34%	-18%	31
36%	-34%	2,364
37%	-24%	107
38%	-58%	2,881,322,159
40%	-56%	874,855
46%	-16%	20
52%	-28%	705
54%	-30%	211
54%	-24%	142
55%	-30%	18,603
57%	-22%	109
57%	32%	134
62%	-26%	373
71%	-22%	2,178
80%	-20%	2,627
81%	26%	101

Ohio's significant exit poll discrepancies overwhelmingly over-estimated Kerry's official vote share:

- Over 35% of precincts had official Kerry vote counts and exit poll share that had less than a 5% chance of occurring. In other words, Kerry official vote share was much smaller than expected given Kerry exit poll share in these precincts, and
- 4% (2) of Ohio's exit polled precincts had official Bush official vote that had less than a 5% chance of occurring. In these precincts Bush official vote share (assumed to be one minus their Kerry share) was much smaller than expected, given Bush's exit poll share. See Graph 1 below.<sup>24</sup>

In a perfect exit poll sample, the “votes” of the exit poll responders would on average split in the same proportion as the actual vote count. It is important to include sampling error probability estimates when reporting exit poll data in order to differentiate between random sampling error and other sources of exit poll error.<sup>25</sup> Exit-pollsters are unlikely to obtain a perfect random sample of voters due to factors such as education level and partisanship of the pollsters, and how far from the precincts pollsters have to stand when conducting polls.<sup>26</sup> If the pattern of discrepancies that cannot be explained by random sample

<sup>24</sup> Detailed data and calculations are shown in Table 2 of Appendix B. Precinct sample sizes can be estimated from the Roper raw surveys which Mitofsky says contain roughly 50% of the survey results for Ohio. NEDA uses precincts' sample sizes to calculate standard deviations and obtain 95% one-tail sample error confidence intervals for the discrepancies between exit poll results and official election results. The vote count data is not provided with the Roper survey data, allegedly to protect voter privacy and to keep the public from knowing exactly which precincts showed these gross discrepancies.

<sup>25</sup> The average exit poll response for Ohio was 2042/49=41.7 – see [www.exit-poll.net/election-night/MethodsStatementStateGeneric.pdf](http://www.exit-poll.net/election-night/MethodsStatementStateGeneric.pdf) (see E/M Jan. 19 report, p. 37).

<sup>26</sup> See Edison Mitofsky report of January 19, 2005 for a discussion of factors causing exit poll error (except for partisanship of the pollster - see text and footnote below) at: [www.exit-poll.net/election-night/ EvaluationJan192005](http://www.exit-poll.net/election-night/EvaluationJan192005)

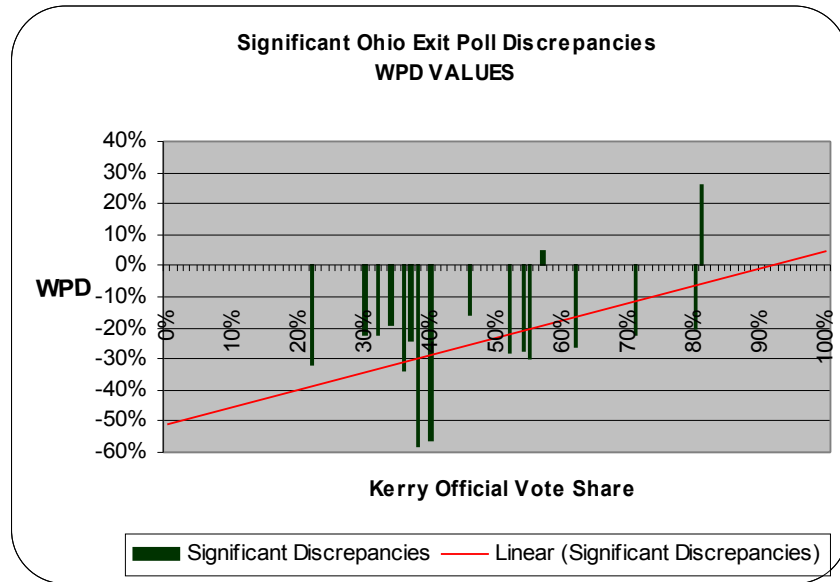




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error is a result of “exit poll error” rather than vote miscount, it should be possible to link the discrepancies to these non-statistical sources of potential exit poll error

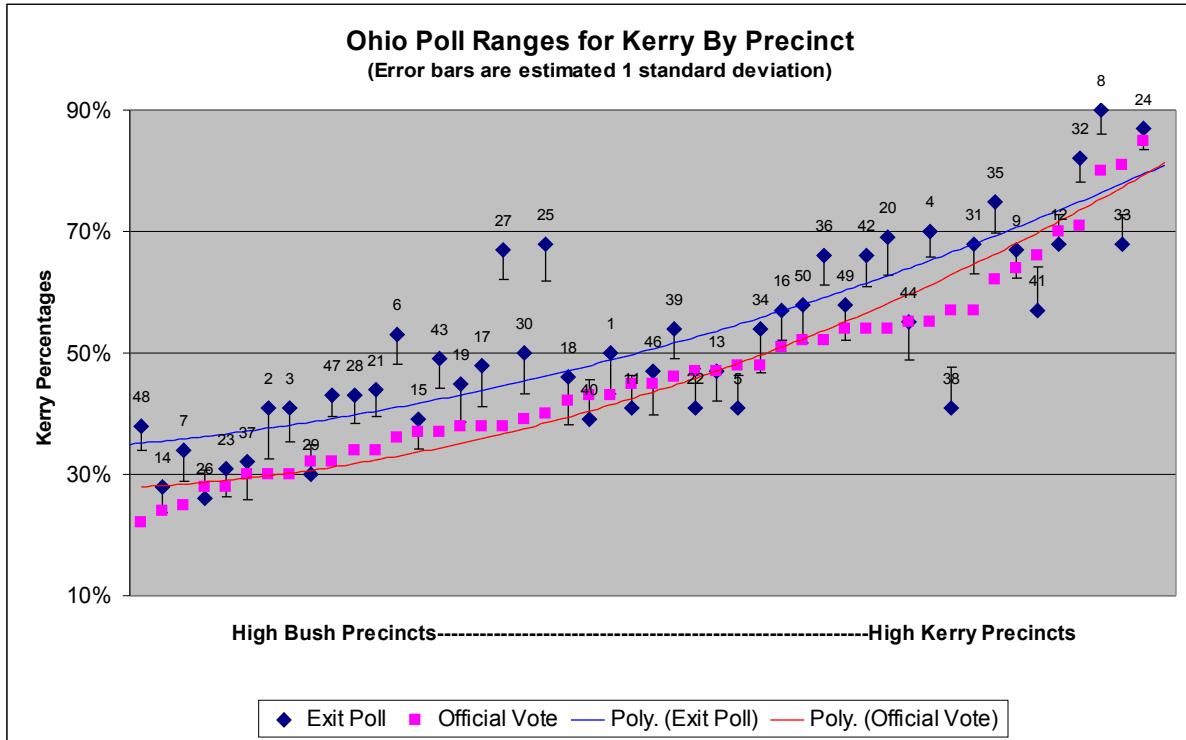
The graph below shows Ohio’s statistically significant discrepancies plotted by their precinct official vote share. Precincts with highest Kerry official vote share are plotted on the right and precincts with highest Bush official vote share are plotted on the left.



The vertical bars show the discrepancies or WPD. WPD in precincts with less official Kerry vote than exit polls predicted appear as negative vertical bars. WPD in precincts with less official Bush vote share than predicted appear as positive bars.

The graph below shows

- Kerry official vote count share for each precinct (square boxes),
- exit poll share for each precinct (diamonds), and
- estimated one-sided confidence intervals of one standard deviation (one-tail probabilities of about 84%) (vertical bars).



Official reported Kerry vote share falls below the 95% confidence intervals for Kerry vote estimates in over 35% of the 49 precincts, indicating significant overestimates of Kerry vote counts.<sup>27</sup> Kerry official vote share is above the confidence interval in two precincts where exit polls overestimated Bush vote counts.<sup>28</sup> As Kerry official vote share increases, exit poll discrepancy trends to zero.<sup>29</sup> As Bush vote share increases, exit poll overestimates of Kerry vote share rises.

Ohio's exit poll discrepancy pattern is statistically implausible and has not been supportably explained in terms of any factors that cause exit poll error.<sup>30</sup> Edison/Mitofsky and their NEP media clients have not publicly released information on the exact sample sizes, type of voting system, locations of precinct, or other exit poll factors to allow investigation or independent analysis. All precincts with statistically significant discrepancy deserve on-the-ground investigation especially when there are so many more such precincts than would be expected due to random sampling error.

### Ohio Discrepancy Pattern is Consistent with Vote Miscounts

A method for analyzing exit poll discrepancy is presented in US Count Votes' paper "*Vote Miscounts or Exit Poll Completion Bias? - New Mathematical Function for Analyzing Exit Poll Discrepancy*" which derives a new mathematical function for WPD in terms of vote miscounts, partisan exit poll completion rates, and sampling error.<sup>31</sup> This new WPD function can be used to examine patterns of WPD that are produced by vote miscounts.

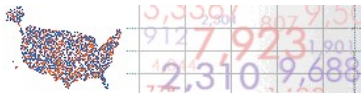
<sup>27</sup> If we assume that our confidence interval estimates are correct, precinct level exit polls should fall outside this one-sided confidence interval in about 16% of the precincts.

<sup>28</sup> This indicates a significant pro-Kerry exit poll discrepancy as there should be underestimates of the Kerry reported vote share that falls below (on the other side) of confidence interval in about 16%, not 4%, of the precincts.

<sup>29</sup> This is similar to that in the national exit poll data. See national data results in footnote above.

<sup>30</sup> For a review of possible factors, see E/M January 19, 2005 report, op. cit., and discussion below.

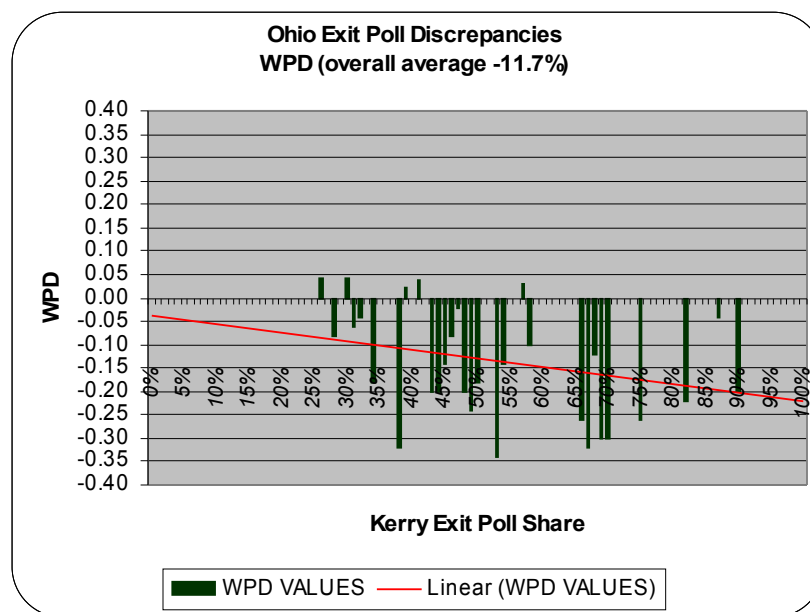
<sup>31</sup> Published January 16, 2006 and found at <http://ElectionArchive.org/uevAnalysis/US/exit-polls/Exit-Poll-Analysis.pdf>



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Vote miscounts that leave the total number of votes counted equal to the total number of votes cast, could take a portion of votes belonging to one candidate and add them to the total of the other candidate, or could simply add votes to one candidate, or simply subtract votes from one candidate. In all cases, if we plot WPD by exit poll share, then WPD produced by vote miscounts benefiting Bush will become more negative as Kerry exit poll share increases, WPD produced by vote miscounts benefiting Kerry similarly increase in magnitude as Bush exit poll share increases.

If vote miscounts benefiting Bush occurred in Ohio, then precincts with larger negative discrepancy “shift” from precincts with lower Bush vote share leftwards to precincts with higher Bush official vote share. Ohio's WPD plotted by precinct exit poll shares is consistent with a WPD pattern produced by vote miscounts. Y values (WPD) in precincts having the same exit poll share are averaged in the graph below.



Ohio's WPD plotted against precincts' exit poll share show

- the slope of the trend line is negative (consistent with vote miscounts);
- WPD is negative and decreases as Kerry vote share increases;
- Bush vote overestimates occur primarily where exit polls predict a Bush win; and
- Kerry vote overestimates occur primarily where exit polls predict a Kerry win.

If vote miscounts cause discrepancies, then the trend line is negatively sloped when WPD is ordered by exit poll shares. Combined with a trend line with positive slope when WPD are ordered by official vote and the fact that the discrepancies shift across the 50/50 line when ordered by exit polls, Ohio's WPD is consistent with vote miscounts that altered the outcome of Ohio's presidential election.

Some WPD would of course be due to random sampling error. However, the pattern of Ohio exit poll disparity clearly cannot be explained by random sampling error. The pattern of Ohio's exit poll discrepancy is consistent with a pattern that would be produced by substantial vote miscounts that shift precincts with high discrepancy into precincts with official vote counts that are higher for the candidate benefiting from vote miscounts.



## **Discrepancy Pattern is Inconsistent with Differing Exit Poll Completion Rate Explanation**

E/M's previous report<sup>32</sup> on the national sample data explained the massive exit poll overestimate of Kerry vote share 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.”<sup>33</sup>

E/M's analysis that supports their statement above has never been publicly revealed and is unlikely to be correct because:

- NEDA's calculations, using Mitofsky's aggregate national exit poll data, show that an exit poll response ratio of at least 58% for Kerry voters to 50% Bush voters would be necessary to produce the overall *average* WPD values in the national data and *cannot explain* the pattern of discrepancy or overall exit poll completion rates shown in the national exit poll sample in E/M's report.<sup>34</sup>
- Implausible exit poll response rates of 65% for Kerry voters and 50% for Bush voters would be required to cause such high overall average discrepancy (-11.7%) as is seen in Ohio.
- If we subtract the WPD that a 56%-to-50% Kerry-to-Bush voter completion rates would produce from Ohio's actual WPD, the remaining pattern is inconsistent with WPD that would be produced by random sampling error alone, and the pattern is consistent with WPD that would be produced by vote miscounts.
- No exit poll response rate hypothesis can explain the high WPD which exists in precincts that have high Bush official vote share. To explain such a pattern by exit poll completion rate differences goes against common sense because voters of one party do not usually become more extrovert about their opinions when surrounded by voters of another candidate. Common sense leads us to expect that Bush voters would respond more when surrounded by Bush voters, and Kerry voters would respond more when surrounded by Kerry voters, not less.
- It has not been shown that partisanship of pollsters is correlated with precinct vote share in such a way as to cause higher Kerry voter response rates in precincts with high official Bush vote.<sup>35</sup>
- No valid mathematical analysis has yet been presented to support the exit poll completion rate hypothesis.

If exit poll discrepancy (WPD) were caused by exit poll response bias, as ESI claims, then a “U” shape pattern would be produced when WPD is plotted against precinct official vote share with longer bars in the center where vote shares are 50/50 and shorter negative bars appear on either side, tending to zero at the endpoints, and this “U” shape would vanish when adjusted for exit poll response bias.<sup>36</sup> This is not the case in Ohio's exit polled precincts.

<sup>32</sup> See E/M Jan. 19, 2005, and USCV March 31, reports, op. cit.

<sup>33</sup> E/M Jan. 19 report op. cit., p. 31.

<sup>34</sup> July 8 USCV Report op. cit., Table 6, Appendix F. These calculations are based on random sample “expected values”.

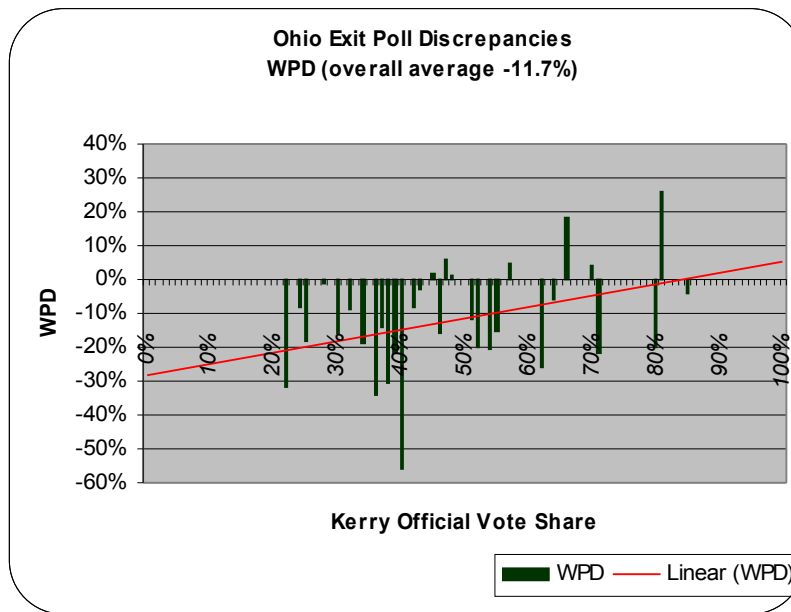
<sup>35</sup> Though not discussed in the Jan. 19, 2005, E/M report, sources claiming to be from within the “National Election Pool” Media Consortium that commissioned E/M to do the 2004 exit polls, have told us that substantive statistical analysis that has not been publicly released (see discussion of this point in NEDA Sept. 8 paper, op. cit.), suggests that the partisanship of the exit pollsters, and particularly the large share of them that who were Kerry supporters, is the single most important factor generating pro-Kerry WPD. We note above, that though this could plausibly explain some level of *overall* pro-Kerry exit poll discrepancy, it does not appear to plausibly explain the irregular *pattern* of exit poll discrepancy revealed by the data.

<sup>36</sup> This was shown in a previous NEDA analysis. See USCV Sept. 8 report op. cit.



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The graph below includes all of Ohio's 49 exit polled precincts, not just the statistically significant ones. Not all precincts appear as separate bars because some precincts have the same official vote share and their WPD is averaged for these charts.<sup>37</sup>

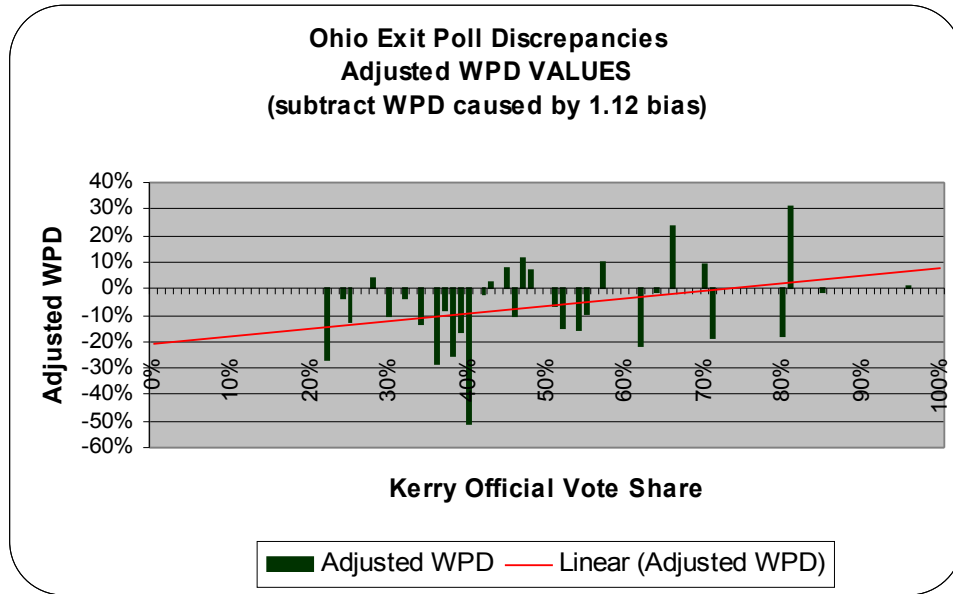


To evaluate whether or not Ohio's discrepancies are likely to be explained by the 56-to-50% Kerry-to-Bush voter exit poll response rates proposed by Mitofsky, we adjust Ohio's exit poll discrepancies by subtracting the WPD that would be caused by such differing partisan exit poll response rates. The WPD that would be caused by a uniform 56% to 50% (1.12) Kerry-to-Bush voter response ratio produces only about -5.0% WPD, not the overall -11.7% average WPD as seen in the actual Ohio data. However, we subtract what would be produced in each Ohio precinct by this 1.12 response bias and evaluate the remaining WPD pattern to see if it is consistent with WPD caused by random sampling error.

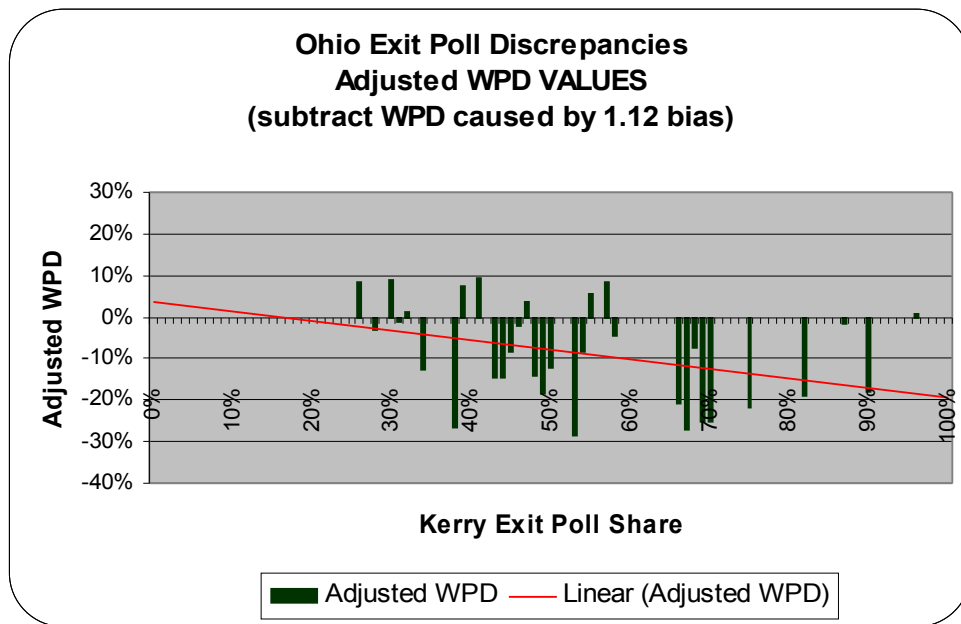
In the absence of WPD caused by exit poll response bias or vote miscounts, WPD caused by random sampling error, both positive and negative, would be interspersed more or less randomly along the x axis and the slope of the trend-line would be zero. Deviations overestimating Kerry and Bush votes would be distributed more or less randomly throughout the precincts (equally above and below the horizontal axis) and there would be a normally expected number of precincts with significant discrepancies. When normalized by subtracting a 1.12 response bias and plotted against official vote share, as seen in the graph below, at least 24% of Ohio's polled precincts still have significant discrepancy. Differing partisan exit poll response rates, such as that proposed by Mitofsky, reduces the amount of significant discrepancy in the Ohio data by at most 45% when calculations are done assuming that official vote counts provide the best estimate of actual vote shares. *This leaves an overall unexplained WPD of -6.6% which is still more than the margin of victory in Ohio's election, and a pattern of WPD that is inconsistent with sampling error.*

Below is the chart showing remaining WPD after subtracting WPD caused by a 56%-to-50% Kerry-to-Bush voter exit poll completion rate. It is inconsistent with a pattern that would be due to random sampling error.

<sup>37</sup> 22 precincts where Kerry lost the official vote and 9 precincts where Bush won the official vote have the same vote share



The graph below shows these adjusted discrepancies plotted by exit poll share.



The effect of a calculated 1.12 overall exit poll response bias has been mathematically removed, yet

- the trend line has negative slope consistent with WPD produced by vote miscounts which take a proportion of votes from one candidate and add them to the other candidate's total,
- a majority of discrepancies occur where Kerry official vote is *more* than 50%,
- the overestimates of the Kerry vote increase as Kerry exit poll share increases to the right and overestimates of Bush vote increase as Kerry exit poll share decreases to the left, and

The Ohio exit poll discrepancy pattern remains consistent with a pattern produced by vote miscounts primarily, but not all, benefiting Bush, even if WPD produced by partisan exit poll completion rate differences is subtracted from the data.





### **ESI's Report is Logically and Empirically Invalid & its Data is Incomplete**

In a recent mathematical proof, the National Election Data Archive (NEDA) proved that the underlying analysis used by the Election Science Institute (ESI) is logically invalid and has no *analytical* value and no conclusions can be drawn from ESI's analysis.<sup>38</sup>

ESI compared 2004 election and exit poll results with 2000 election results in the forty-nine Ohio precincts.<sup>39</sup> ESI's claim is that if there is vote fraud, then WPD would be positively correlated with Bush vote share increases from 2000 to 2004. NEDA's math logic proof shows that exit poll discrepancies (WPD) caused by outcome-changing vote miscounts coexist with any relationship of the variables which ESI analyzed and thus nothing can be concluded from ESI's analysis. ESI's faulty June analysis was later repeated on the national exit poll data and presented by Warren Mitofsky at October 14, 2005 ASA conference. *No scientifically supportable* attempt was made by them to *explain* the historically large 2004 exit poll discrepancies themselves.

NEDA's papers which mathematically prove that ESI's June analysis and Mitofsky's October presentation to the American Statistical Association are mathematically incorrect, are contained in two papers:

- "Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud Is Logically Incorrect" <http://electionarchive.org/ucvAnalysis/US/exit-polls/ESI/ESI-hypothesis-illogical.pdf>
- "Response to Lindeman's Response to 'Mathematical Proof that Election Science Institute's Test to Rule Out Vote Fraud is Logically Invalid'" <http://electionarchive.org/ucvAnalysis/US/exit-polls/ESI/Mark-Lindeman-Response.pdf>

Moreover, an empirical analysis of the ESI report provided in Appendix D below shows that the data used are inadequate and inconclusive.

### ESI's Data is Incomplete

NEDA obtained precinct-level Ohio exit poll data for this analysis from the ESI June 6<sup>th</sup> report and by collating actual questionnaires available from the Roper institute. When ordered from low to high, Kerry exit poll shares tabulated from the Roper/UMich data are generally within  $\pm 3\%$  of the "original exit polls" reported by ESI. However for two precincts, ESI exit poll shares for Kerry are 9% and 6%, respectively, lower than their Roper/UMich values. The ESI exit poll values dramatically reduce the WPD odds for these precincts (in one case from less than 187 trillion to 18,603) – see Appendices B and

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<sup>38</sup> See NEDA report: *Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud is Logically Incorrect* which can be found at <http://electionarchive.org/ucvAnalysis/US/exit-polls/ESI/ESI-hypothesis-illogical.pdf>. In an October 31 paper, "Mathematical Proof that Election Sciences Institute's Test to Rule Out Vote Fraud is Logically Incorrect" NEDA proves that ESI's hypothesis is invalid. ESI claims that, "If systematic fraud or error in vote counting [favoring Bush] occurred in 2004 but not in 2000, [then] Bush would have done significantly better in those precincts in 2004 [than in 2000], and we would see larger differences between the reported vote and exit poll in those precincts [than in other 2004 exit-poll precincts]."

<sup>39</sup> We would welcome a thorough investigation of the 2000 Ohio results. However, we have not been able to obtain even "blurred" precinct-level election results for the 2004 exit polled precincts from ESI, or the underlying raw data from which the charts and tables in the ESI report were constructed. Without this data we cannot, for example, verify that the precincts in 2000 had the same geographical boundaries as these same precincts in 2004, or whether they adequately represented the state vote in 2000. We consider the withholding of the data from independent reviewers to be a violation of standard professional and scientific norms. This is especially problematic in this case because the ESI report is *not* an independent review since Warren Mitofsky is an author.



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C. Warren Mitofsky, in written correspondence to NEDA, has stated that the UMich/Roper surveys are a sample of about 50% of the complete set of exit poll responses used to derive the ESI exit poll values.

The data provided in the ESI report on Ohio's exit polls is inconsistent with the raw exit poll responses provided by Roper. There are only 47 precincts in ESI's Figure 2, but we know (from ESI Table 1) that there were 49 exit polled precincts in Ohio in 2004. Our requests to ESI for clarification regarding the two missing precincts have not, to date, received a response.<sup>40</sup> The missing or overlapping data underscores the need for ESI (and E/M) to release all of the relevant exit poll, and polling data.<sup>41</sup>

There are only 44 points in ESI's Graph 5. Data for *five* exit polled precincts are either overlapping or missing from this ESI graph. NEDA asked ESI for a clarification regarding the missing precincts in these Graphs but has, to date, not received an answer.

ESI and E/M have been withholding data from independent analysts, and producing reports based on partial and missing data. Moreover, data that has been released is inconsistent in ways that dramatically reduces pro-Kerry WPD. This is a violation of standard scientific norms. ESI's and E/M's non-response to inquiries on this matter further compounds the problem.<sup>42</sup>

NEDA concludes that the ESI June report and similar analyses presented separately by Mitofsky is another failed effort to show that there is no problem of "unexplained exit poll discrepancy" rather than a substantive statistical analysis that would explain the exit poll discrepancies in Ohio.<sup>43</sup> In the absence of a *substantive* statistical explanation for the 2004 Ohio and national exit poll discrepancies, the accuracy of the official 2004 presidential election result is in growing doubt.

However, we have no choice but to work with the data that ESI and E/M have released, so NEDA's analysis proceeded as if ESI's Graph 5 (see appendix D) is an accurate rendition of the Ohio exit poll data.

### **Conclusion - Ohio's Exit Poll Pattern is Consistent with Outcome-Altering Vote Miscounts**

Ohio's exit poll discrepancy pattern is consistent with a hypothesis of outcome-altering vote miscounts primarily favoring Bush.<sup>44</sup> In other words, Ohio's exit poll discrepancies are consistent with the hypothesis that Kerry would have won Ohio's electoral votes if Ohio's official vote counts had accurately reflected voter intent. The patterns of Ohio's exit poll discrepancies are similar to the patterns in the national exit poll sample shown in the January 19, 2005 Edison/Mitofsky (E/M) report and discussed in earlier USCV reports.<sup>45</sup>

Ohio's exit poll discrepancies vary with official precinct vote share in ways that cannot be fully explained by any "reluctant Bush responder" or exit poll error hypothesis offered to date.

<sup>40</sup> There are fewer precincts in some of ESI's charts than in others.

<sup>41</sup> See footnote at the beginning of this report.

<sup>42</sup> Per discussion above, over a month ago Warren Mitofsky said that he would "look into" the discrepancies between ESI and UMich/Roper exit poll results, but has not gotten back to us.

<sup>43</sup> Better analysis is essential, based on "model" and not "data" variance – see comments and footnotes above.

<sup>44</sup> Furthermore, under the plausible assumption that the high-Kerry precincts are more urban and thus larger, significance levels for the high Kerry precincts will increase relative to significance levels in the high Bush precincts, which would exacerbate the irregular exit poll discrepancy pattern.

<sup>45</sup> See January 19, 2005, E/M report, p. 35-46, May 15 op. cit.; and 2005 (updated September 8, 2005) and March 31, 2005 scientific papers at: [www.uscountvotes.org](http://www.uscountvotes.org).



It is over one year after the 2004 presidential election and no valid explanation for the exit poll discrepancies has been offered. The detailed national exit poll data, including a complete data set with sample sizes, exit poll and vote count share, and data on the exit pollsters and precinct exit polling conditions, have not been publicly released by E/M or the NEP for independent analysis and investigation.<sup>46</sup>

### Did Vote Miscounts Alter Ohio's Presidential Election Outcome?

When considering whether or not vote miscounts could have changed Ohio's outcome, we note that the overall average Ohio exit poll discrepancy (WPD), when calculated from available precinct data, was a whopping 11.7%, and that the *number of exit poll respondents* is greater than average in precincts where Kerry official vote share overestimates occur and even greater in precincts where both Kerry won according to exit polls and Kerry vote overestimates occur.<sup>47</sup> If the number of exit poll respondents is related to precinct size and Ohio's exit poll disparities were largely due to vote miscounts, then Ohio's electoral votes may very well have been wrongly awarded to Bush rather than Kerry. Plus, the pattern of Ohio's discrepancies is consistent with outcome altering vote miscounts.

When the sign of the trend line becomes negative when the discrepancies are plotted against *exit poll share*, consistent with vote miscounts, and the significant discrepancies shift across the 50/50 line, candidates should *not concede* elections or be sworn into office until after further analysis of more detailed exit poll and vote count data, on-the-ground investigation, independent audits and recounts, and, if necessary,<sup>48</sup> re-elections.

The vote miscount explanation for the 2004 presidential exit poll discrepancies is supported by well-documented irregularities in the 2004 election in Ohio and other states.<sup>49</sup> Missing data and mathematically invalid analysis that has been released by E/M and ESI raises further concern over the accuracy of the 2004 election results. The possibility that vote miscounts caused the 2004 presidential election exit poll discrepancies has become increasingly credible.

### **Recommendations - Ways to Ensure that Vote Counts Accurately Reflect Voter Intent**

U.S. Election Systems are wide open to insider vote tampering and innocent errors. There is no such thing as a perfectly accurate, tamper-proof voting system. Yet, we can take commonly used measures to ensure integrity of our vote counts such as:

#### 1. Routine Independent Audits of Vote Counts

<sup>46</sup> Except for these precinct level data for Ohio (initially released exclusively to the, clearly *non-independent*, ESI team which included Warren Mitofsky) which still does not include information on pollsters and polling conditions. However, the fact that the Ohio data was released, belies E/M's claims that because of the need to preserve (exit poll) respondent confidentiality it *cannot* release *national* unadjusted precinct level data.

<sup>47</sup> This is estimated by pairing up exit poll data released to the University of Michigan with ESI report data.

<sup>48</sup> when voter verified paper ballots are unavailable

<sup>49</sup> A very large number of documented vote count impossibilities, illegalities, and extreme implausibility's were found in multiple precincts in Ohio in 2004 - see: *Did George W. Bush Steal America's 2004 Election? Ohio's Essential Documents*, by Bob Fittrakis, Harvey Wasserman, and Steve Rosenfeld. Steve Freeman provided additional evidence for this hypothesis in a debate with Warren Mitofsky at the October 14, 2005 Fall meetings of the American Statistical Association. Freeman showed correlations between states with Republican Governors, African American voters, and reported election administration problems, and unadjusted precinct level exit poll discrepancy based on E/M reported data. See Freeman presentation at: <http://www.appliedresearch.us/sf/epdiscrep.htm>



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Current U.S. election systems are vulnerable to tampering because vote counts are not routinely independently audited. To be effective, audits must be independent of any insiders within the system, including election officials, poll workers, and voting machine vendor staff. To be independent of voting machine programmers requires voter verified paper ballots that can be hand-counted using the same method that the voter used to verify the ballot.<sup>50</sup> To be scientifically valid, each precinct or machine count must have an equal probability of being randomly selected immediately after polls close.

As few as 2 to 5% of precinct or machine vote counts could be *independently* audited to ensure a high likelihood of detecting any vote miscounts that occur in at least 10% of precincts or voting machines. Many digital recording electronic (DRE) voting systems make it difficult to implement independent audits. Yet any electronic vote count is trivially easy for insiders to undetectably manipulate, while passing all “logic and accuracy” testing before and after elections. Experiments show that errors on DRE paper rolls are often missed by voters because only 30% of voters take the extra step to verify them. Furthermore, paper rolls are virtually impossible to hand recount accurately and, because they store ballots in the same order as voters vote, risk violating voter anonymity. Furthermore, the bar codes on paper rolls are not verifiable by the voter, and would normally contain the same errors as the electronic counts.

*Until all vote counting systems are routinely independently audited and more secure, another method to detect and correct vote miscounts is urgently needed.*

### 2. Detailed Public Election Data Reporting

Public release of detailed vote counts broken out by vote type (absentee, overseas, Election Day, provisional, and so on) would permit independent monitoring of vote count accuracy. Almost unbelievably, today every county in America now reports its election data in a way that hides evidence of vote miscounts. Yet, we could detect probable vote miscounts immediately after any election by analyzing detailed vote count and exit poll data. Here is how it would work:

- a. Volunteers in each state obtain the detailed election data that is available under every state’s open records laws from the over 3,300 county and township election offices (because not one state in America yet collects its own data!)<sup>51</sup> Unofficial and official vote counts are needed broken out by precinct *and* by vote type (absentee, early – provisional, election day – provisional, early, election day, overseas, military) and the vote counting method for each type.
- b. Volunteers or election officials from each state upload original election results documents in electronic format to ElectionArchive.org. These original documents are in a myriad of file types and formats, depending on voting machine vendor and local election officials.
- c. These documents are made publicly available by ElectionArchive.org and can be used by any independent analyst.
- d. Programs are written to electronically parse the original electronic documents and put the data into standardized tables which are publicly posted on the Internet.

<sup>50</sup> More information on independent audits of vote counts is available on ElectionArchive.org.

<sup>51</sup> Links to each state’s freedom of information act and sample letters requesting are available on ElectionArchive.org. It would help to have the assistance of a local attorney in each state to make the requests to each county or township in the case of non-cooperative election officials. Legal suits may have to be brought in order to obtain the data in original electronic formats in timely fashion.



## *The Gun is Smoking: 2004 Ohio Presidential Exit Poll Analysis*

- e. Statistical programming automates the analyses of this database and the results are publicly posted. The analyses are verifiable by any independent analysts by using the original official election documents in the archive.

This election data monitoring system could pinpoint precincts with probable vote count errors and its methods be refined and improved via independent recounts or audits, as they become available, to increase the accuracy of its predictions. NEDA's construction of a national election data archive so that vote count data can be analyzed before candidates concede elections, needs to be funded immediately if it is to be ready by November 2006.

### 3. Publicly Available Exit Poll Data

Precinct-level, unadjusted exit poll data including sample sizes, the data on exit pollsters and polling conditions, voting equipment, and county identifiers need be released to enable independent observers to test any hypothesized explanations of exit poll discrepancies.<sup>52</sup> If exit poll data were made publicly available, then independent analysts could effectively detect probable count errors which could be investigated before candidates are sworn into office.<sup>53</sup>

If exit poll data were routinely publicly available, including official vote counts, sample sizes, and exit poll results for each precinct, then scientific analyses of exit poll discrepancies could be performed. Where valid scientific analysis raises further questions about the validity of official vote counts, as it does in Ohio's 2004 presidential race, further detailed exit poll data, including voting equipment, precinct location, and information on exit pollsters can be analyzed. On-the-ground investigation might determine the cause of any discrepancy patterns indicating vote fraud.

*In the Future, Whenever Suspicious Exit Poll Patterns Occur, Candidates Should Not Concede or Be Sworn into Office Until After Further Analysis and Investigation.* Lives and economies depend deeply on the integrity of American democracy. Accurate vote counts are critical to healthy U.S. and world economies and to the environment upon which they depend. There is no reasonable excuse for not independently auditing and monitoring U.S. vote counts to ensure that they are counted accurately.

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<sup>52</sup> See Sept. 8 report op. cit., p. 4-5 for an explanation of the need for an explanation based on “model” and not “data” variance. Precinct level data on the pollsters and on polling conditions that is necessary for a substantive statistical analysis has not been provided, even for Ohio.

<sup>53</sup> Probabilities for obtaining *at least* one corrupted precinct from a random pick of 49 out of 11,360 with different proportions of corrupted precincts among the 11,360 are calculated in Appendix A.





**Appendix A: Chance of Finding Corrupted Precincts with Ohio's Exit Poll “Audit”**

The table below shows probabilities for finding at least one corrupted precinct when selecting 49 out of 11,360 based on a hypothetical number of corrupted precincts” ranging from 50% to 0.1%. The probability estimates are based on a “hyper geometric” distribution for determining the probability of finding:

- a)  $x$  (corrupted precincts),
- b) in an overall sample of  $n$  (Number of Audited Precincts)
- c) when there are  $X$  (Hypothetical Number of Corrupted Precincts)
- d) out of  $N$  (Total Number of Precincts).

This distribution is calculated using the Excel function HYPGEOMDIST( $x, n, X, N$ ). The hyper geometric assumes all individual “picks” are random but adjusts this random probability for each pick. The first row in Table 2 for example, assumes a 50% probability that the first of 49 picks will be corrupted, a 5,679/11,359 probability that the second will be corrupted if the first one is and a 5,680/11,359 probability that the second will be corrupted if the first one isn’t, and so on for all 49 picks. It then uses these individual pick probability estimates to calculate the probability that none of the 49 picks will be a corrupted precinct ( $x=0$ ), exactly one of the 49 will be a corrupted precinct ( $x=1$ ), and so on.

In Table 1 below the probability that *at least one* of the 49 is corrupted is estimated. For the first row, for example, this equals:  $1 - \text{HYPGEOMDIST}(0, 49, 5680, 11,360)$

The table below shows that if 5% of precincts are corrupted, there is a 91.94% probability that any sample of 49 precincts will have one or more corrupted precinct, with an expected value of 2.45 corrupted precincts in the sample of 49. Ohio’s sample had three precincts that were virtually impossible strongly suggesting that *at least* 5% of Ohio precincts were corrupted.

Total Number of Precincts	Hypothetical Number of Corrupted Precincts	Percent Corrupted Precincts	Number of Audited Precincts	Expected Value	Standard Deviation	Chance of Finding one or more Corrupted Precincts
11360	5680	50.0%	49	24.50	3.50	100.00%
11360	5112	45.0%	49	22.05	3.48	100.00%
11360	4544	40.0%	49	19.60	3.43	100.00%
11360	3976	35.0%	49	17.15	3.34	100.00%
11360	3408	30.0%	49	14.70	3.21	100.00%
11360	2840	25.0%	49	12.25	3.03	100.00%
11360	2272	20.0%	49	9.80	2.80	100.00%
11360	1704	15.0%	49	7.35	2.50	99.97%
11360	1136	10.0%	49	4.90	2.10	99.43%
11360	568	5.0%	49	2.45	1.53	91.94%
11360	454	4.0%	49	1.96	1.37	86.50%
11360	341	3.0%	49	1.47	1.19	77.61%
11360	114	1.0%	49	0.49	0.70	39.06%
11360	57	0.5%	49	0.25	0.49	21.89%





Appendix B: Tables & Details of Statistical Analysis

NEDA's calculations use the following match of UMich/Roper sample size information to ESI exit poll and "blurred" Ohio official precinct election result data.

2	3	4	5	6	7
Mitofsky Precinct Number	Official Vote	ESI Table 1: "Exit Poll Original"	WPD Official Vote minus Exit Poll margins	Standard Deviation for Kerry Exit Poll Discrepancy	Number of Respondents = 2 times # Roper Data Surveys
	-0.1		$2*((3)-(4))$	$\text{sqrt}((3) \times (1-(3)) / (7))$	
48	0.22	0.380	-0.32	0.04	100
14	0.24	0.280	-0.08	0.04	104
7	0.25	0.340	-0.18	0.05	68
26	0.28	0.260	0.04	0.05	90
23	0.28	0.310	-0.06	0.05	94
37	0.30	0.320	-0.04	0.06	56
2	0.30	0.410	-0.22	0.08	30
3	0.30	0.410	-0.22	0.06	64
29	0.32	0.300	0.04	0.05	92
47	0.32	0.430	-0.22	0.03	184
28	0.34	0.430	-0.18	0.05	104
21	0.34	0.440	-0.20	0.05	108
6	0.36	0.530	-0.34	0.05	96
15	0.37	0.390	-0.04	0.05	98
43	0.37	0.490	-0.24	0.05	96
19	0.38	0.450	-0.14	0.06	58
17	0.38	0.480	-0.20	0.07	50
27	0.38	0.670	-0.58	0.05	100
30	0.39	0.500	-0.22	0.07	54
25	0.40	0.680	-0.56	0.06	62
18	0.42	0.460	-0.08	0.08	40
40	0.43	0.390	0.08	0.07	58
1	0.43	0.500	-0.14	0.07	54
11	0.45	0.410	0.08	0.05	88
46	0.45	0.470	-0.04	0.07	46
39	0.46	0.540	-0.16	0.05	106
22	0.47	0.410	0.12	0.07	58
13	0.47	0.470	0.00	0.05	100
5	0.48	0.410	0.14	0.05	86
34	0.48	0.540	-0.12	0.07	46
16	0.51	0.570	-0.12	0.05	104
50	0.52	0.580	-0.12	0.06	62
36	0.52	0.660	-0.28	0.05	102
49	0.54	0.580	-0.08	0.06	74
42	0.54	0.660	-0.24	0.05	94
20	0.54	0.690	-0.30	0.06	64
44	0.55	0.550	0.00	0.06	64
4	0.55	0.700	-0.30	0.04	140
38	0.57	0.410	0.32	0.07	56
31	0.57	0.680	-0.22	0.05	100
35	0.62	0.750	-0.26	0.05	86
9	0.64	0.670	-0.06	0.05	104
41	0.66	0.570	0.18	0.07	44
12	0.70	0.680	0.04	0.05	88
32	0.71	0.820	-0.22	0.04	134
8	0.80	0.900	-0.20	0.04	102
33	0.81	0.680	0.26	0.05	70
24	0.85	0.870	-0.04	0.04	104
10	0.96	0.960	0.00	0.03	58
			-0.1167		



NEDA’s calculations use the following match of UMich/Roper sample size information to ESI exit poll and “blurred” Ohio official precinct election result data. Matches were derived by ordering both the ESI and UMich/Roper exit poll results for Kerry exit poll share from low to high. Duplicates of either ESI, or UMich/Roper, exit poll values were matched so as to *minimize* the discrepancy between the UMich/Roper exit poll values and blurred official results (which are linked to the ESI exit poll data). For the two precincts were both ESI and UMich/Roper report identical (50%) Kerry exit poll shares, the sample size was estimated as an average of the UMich/Roper number of responses for these two precincts (27). UMich/Roper “number of responses per precinct” were then doubled as Warren Mitofsky has reported that the UMich/Roper data set is a random sample of about 50% of the total number of exit poll responses used to calculate ESI exit poll values. See Appendix C for descriptions and comparison of the UMich/Roper and ESI data.

The table below shows the three Ohio precincts with "virtually impossible" results.

1	2	3	4	5	6	7	8	9	10
Almost Impossible Outcome	Mitofsky Precinct Number	Official Vote	ESI Table 1: "Exit Poll Original"	WPD Official Vote minus Exit Poll margins	Standard Deviation for Kerry Exit Poll Discrepancy	Number of Respondents = 2 times # Roper Data Surveys	Probability of Official Kerry Vote Given Exit Poll	Less than 5% Probability that Kerry Official Vote could be this low	Odds of Kerry Official Vote Being this Low
				(2)-(4)	$\text{sqrt}((4) \times (1-(4)) / (7))$		$\text{norm dist}((3), (4), (6))$	(8) < 0.05	1/(8)
x	27	0.38	0.67	-0.58	0.05	100	0.000000	1	867,205,553
x	25	0.40	0.68	-0.56	0.06	62	0.000003	1	294,832
x	4	0.55	0.70	-0.30	0.04	140	0.000180	1	5,550

Estimates of the probability of obtaining the Kerry exit poll share for precincts #27, #25 and #4, given their official vote share, is almost zero. These odds are far smaller than the odds for other pro-Kerry or pro-Bush exit poll discrepancies.

Columns 13 through 19 in the table below normalize WPD for possible pervasive pro-Kerry exit poll response bias using the bias equation:<sup>54</sup>

$$(1) \quad \text{WPD} = \frac{2bk(1 - \alpha)}{k\alpha + b}$$

Calculations used in the next table (below) show that, as NEDA has shown for the national data<sup>55</sup>, the E/M hypothetical exit poll response bias of 1.12 (56% of approached Kerry voters but only 50% of Bush voters complete exit polls, so that K/B = 0.56/0.50 = 1.12), is *not* sufficient to produce the average Ohio WPD of -0.058.

The table shows that a bias (or  $\alpha$ ) value of 1.299 (response rates of about 65% of Kerry voters but only 50% of Bush voters) is necessary to generate the overall average WPD of -11.7% the E/M reports for Ohio exit polls.

Column 13 applies equation (1) to estimate WPD for each precinct assuming a pro-Kerry exit poll response bias of 1.299 because this amount of response bias produces the same overall -11.7% WPD. However, when the WPD produced by this exit poll response bias is subtracted from the original WPD,

<sup>54</sup> Sept. 8, 2005 USCV paper, op. cit., see Appendix C, Equation 7. This estimate of expected WPD from a given level of exit poll response bias is equivalent to Liddle’s and Mitofsky’s “WPE Index” before taking a natural log – see discussion in USCV “History of the Debate” paper, op. cit.

<sup>55</sup> See USCV Sept. 8 paper, op. cit., Appendix F, Table 6.



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resulting in an overall average WPD of almost zero, the resulting number of significantly discrepant precincts is still 35% of precincts, reducing the overall number of significant discrepancies from 45% by only 22.7%. Moreover, while assuming this level of response bias (necessary to reduce overall WPD to zero) reduces the number of precincts with significant pro-Kerry WPD from 22 to 2, it increases the number of precincts with pro-Bush WPD from 2 to 15. It is thus clear that the “pervasive Kerry voter response bias hypothetical” cannot (even in any kind of approximate way) explain the overwhelming and highly significant pro-Kerry WPD revealed by the Ohio exit poll data.



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3	4	13	14	15	16	17	18	19	20
Official Vote	ESI Exit Poll Shares	Estimated Precinct WPD with Bias of 1.303	Kerry Exit Poll Adjusted for Bias of 1.303	WPD Normalized for Exit Poll Response Bias of 1.303	Probability of Official Kerry Vote Given Adjusted Exit Poll	Less than 5% Adjusted Probability that Official Kerry Vote	Odds of Official Kerry Vote With Adjusted Exit Poll	Less than 5% Adjusted Probability that Official Bush Vote could be	Odds of Official Bush Vote With Adjusted Exit Poll
			(4)+(14)	(2)-(15)	dist((3), (14), (16) < 0.05	(16) < 0.05	1/(16)	1-(16) < 0.05	1/(1-(16))
0.22	0.38	-0.096	0.28	-0.22	0.07				
0.24	0.28	-0.102	0.18	0.02	0.92				
0.25	0.34	-0.104	0.24	-0.08	0.58				
0.28	0.26	-0.111	0.15	0.15	1.00			1	332
0.28	0.31	-0.111	0.20	0.05	0.96			1	24
0.30	0.32	-0.115	0.20	0.08	0.95				
0.30	0.41	-0.115	0.29	-0.10	0.55				
0.30	0.41	-0.115	0.29	-0.10	0.57				
0.32	0.30	-0.119	0.18	0.16	1.00			1	501
0.32	0.43	-0.119	0.31	-0.10	0.61				
0.34	0.43	-0.122	0.31	-0.06	0.74				
0.34	0.44	-0.122	0.32	-0.08	0.67				
0.36	0.53	-0.124	0.41	-0.22	0.15				
0.37	0.39	-0.126	0.26	0.09	0.99			1	83
0.37	0.49	-0.126	0.36	-0.11	0.58				
0.38	0.45	-0.127	0.32	-0.01	0.83				
0.38	0.48	-0.127	0.35	-0.07	0.67				
0.38	0.67	-0.127	0.54	-0.45	0.00	1	2,042		
0.39	0.50	-0.127	0.37	-0.09	0.62				
0.40	0.68	-0.128	0.55	-0.43	0.01	1	126		
0.42	0.46	-0.129	0.33	0.05	0.88				
0.43	0.39	-0.130	0.26	0.21	1.00			1	224
0.43	0.50	-0.130	0.37	-0.01	0.81				
0.45	0.41	-0.130	0.28	0.21	1.00			1	1,484
0.45	0.47	-0.130	0.34	0.09	0.93				
0.46	0.54	-0.131	0.41	-0.03	0.85				
0.47	0.41	-0.131	0.28	0.25	1.00			1	535
0.47	0.47	-0.131	0.34	0.13	1.00			1	217
0.48	0.41	-0.131	0.28	0.27	1.00			1	9,742
0.48	0.54	-0.131	0.41	0.01	0.83				
0.51	0.57	-0.130	0.44	0.01	0.92				
0.52	0.58	-0.129	0.45	0.01	0.87				
0.52	0.66	-0.129	0.53	-0.15	0.42				
0.54	0.58	-0.128	0.45	0.05	0.94				
0.54	0.66	-0.128	0.53	-0.11	0.58				
0.54	0.69	-0.128	0.56	-0.17	0.37				
0.55	0.55	-0.127	0.42	0.13	0.98			1	55
0.55	0.70	-0.127	0.57	-0.17	0.32				
0.57	0.41	-0.125	0.28	0.45	1.00			1	171,246
0.57	0.68	-0.125	0.55	-0.09	0.66				
0.62	0.75	-0.119	0.63	-0.14	0.42				
0.64	0.67	-0.116	0.55	0.06	0.97			1	36
0.66	0.57	-0.112	0.46	0.29	1.00			1	392
0.79	0.68	-0.104	0.58	0.14	0.99			1	143
0.70	0.82	-0.102	0.72	-0.12	0.40				
0.80	0.90	-0.077	0.82	-0.12	0.31				
0.81	0.68	-0.074	0.61	0.33	1.00			1	100,228
0.85	0.87	-0.061	0.81	0.02	0.87				
0.96	0.96	-0.018	0.94	0.02	0.78				
		-0.117				4%		31%	



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Note that the estimated WPD values in column 13 follow the asymmetric “U” pattern.<sup>56</sup> However, as has been extensively pointed out by USCV in earlier reports<sup>57</sup>, the table shows that this pattern cannot explain the observed exit poll discrepancies.

In Column 14, Kerry exit poll results are adjusted by these WPD values. Column 15 then estimates the probability of the officially reported Kerry vote share given this adjusted exit poll result. *Columns 16-18 show that exit poll bias adequate to explain the overall Ohio average WPD cannot explain either the extreme WPD in precincts #27, #25, and #4, or the overall pattern of WPD.*

Rather, as has been noted, the table shows that this is an *over adjustment* as it eliminates all pro-Kerry WPD (except for Precincts #27 and #4) but adds 13 more precincts with pro-Bush WPD.

The analysis shows that even if exit poll response bias is assumed to have occurred:

- WPD significance levels for precinct #27 and #4 remain statistically impossible; and
- an unexplained WPD pattern, going from significant pro-Kerry discrepancy in Bush partisan precincts to significant pro-Bush discrepancy in Kerry partisan precincts, remains; and
- at least 24%, of Ohio exit-pollled precincts still have significant unexplained exit poll discrepancy.

### **Appendix C: Where Does the Data Come From? Roper/UMich & Election Science Institute**

Both sets of Ohio exit poll data included 49 precincts. The differences between the two available data sets include:

UMich/Roper data:

- contains complete individual surveys for each precinct
- does not include official vote counts
- includes roughly half of the surveys that the ESI data does, according to Warren Mitofsky's email correspondence with US Count Votes

ESI report data:

- does not include sample sizes
- includes "blurred" official vote counts
- includes twice the number of respondents deposited in the Roper/UMich data set

The publicly released “raw data” is thus only about 50% of the actual data. Moreover, one of two precincts (Mitofsky #4) with a large (greater than  $\pm 3\%$ ) discrepancy between ESI reported and UMich/Roper reported “exit poll” results would have *had by far the largest and most implausible official Kerry result* (odds of less than 187 trillion rather than 18,603!) if the UMich/Roper Kerry exit poll value of 79%, rather than the ESI “original exit poll” value of 70%, is used for this precinct. The other of these two precincts (Mitofsky #35) would have much more highly significant odds (of less than 526,000 rather than 373) that the Kerry official result actually occurred if the UMich/Roper Kerry exit poll value of 81%, rather than the ESI value of 75%, is used. Though specifically asked about this in November 2005, Mitofsky has, to date, not offered any explanation for these large reductions in the ESI

<sup>56</sup> See USCV Sept. 8 paper, op. cit., Appendix B; and USCV “History of the Debate” paper, op. cit.

<sup>57</sup> See USCV Sept. 8 paper, op. cit.



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Kerry exit poll values relative to the UMich/Roper results. These large and suggestive data inconsistencies underscore the need for a full release of *all* the relevant data.

In any case, because valid analysis of Ohio's exit poll results requires both sample sizes and official vote counts, US Count Votes did its best to conservatively estimate the sample sizes for analyzing the ESI report data, and to pair up UMich/Roper data precincts based on exit poll share with the ESI reported data to obtain the most conservative vote count estimates to analyze the UMich/Roper data.

In other words, US Count Votes estimated the missing information from the given data in a way that was *least likely* to produce data that favored the vote miscount hypothesis.

It is truly unconscionable that, given the serious questions surrounding the validity of the 2004 presidential election results that the data for independent scientific analysis of exit poll disparities has yet to be fully released for investigation.

USCV's method for estimating official vote count share is described in Appendix B.

### **Appendix D: ESI Ohio Analysis is Empirically Invalid**

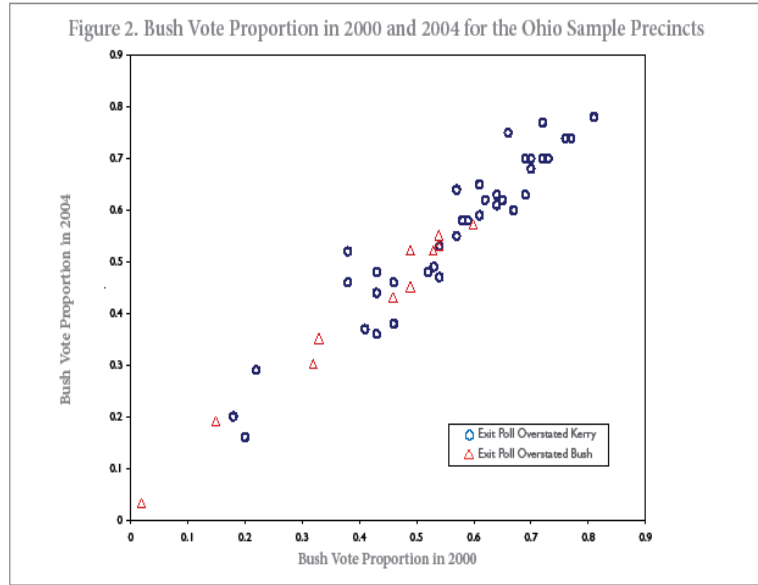
In this Appendix we explain what the Figures in the ESI report show, and why the ESI analysis is empirically inadequate, inconclusive, and possibly contrary to report's stated "no smoking gun for fraud in Ohio" conclusion.

There are fewer precincts in some of ESI's charts than in others. It is not possible to determine whether this is a result of missing data or overlapping values as ESI has not released the underlying data from which its Graphs are produced in spite of repeated requests – see below.





Graph 4 – ESI Figure 2

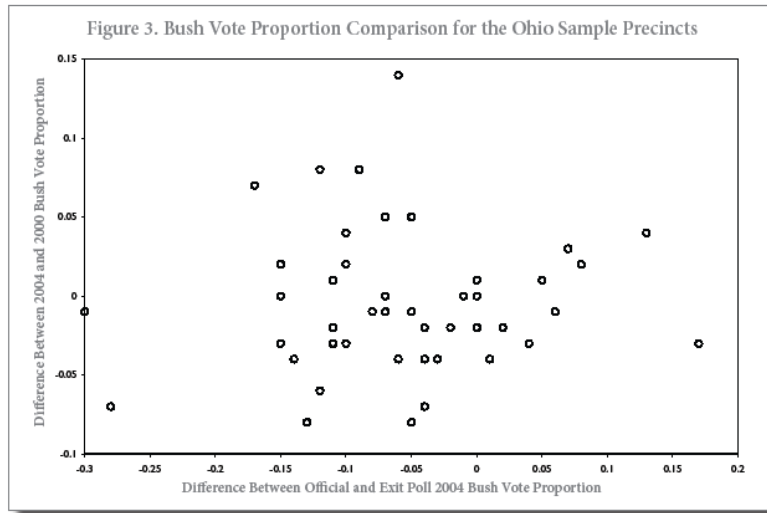


The chart above plots the proportion of the vote Bush received in each of the sample precincts in 2004 (vertical axis) and the proportion he received in the same precincts in 2000 (horizontal axis). The different symbols indicate whether the 2004 exit poll result for the precinct overestimated the proportion for Bush ( $\Delta$ ) or for Kerry ( $\circ$ ). What is evident from the plot is that all the precincts voted very similarly in 2000 and 2004, and the direction of error in the exit poll estimates does not appear to be strongly related to how large a proportion of the vote Bush received in the precinct.

ESI For further information contact [info@electionscience.org](mailto:info@electionscience.org).



Graph 5 – ESI Figure 3



The vertical axis of the above chart represents the proportions of the vote Bush received in these precincts in 2000 and 2004 (vertical axis). The horizontal axis represents the difference between the official and exit poll results for these precincts (horizontal axis.) If systematic irregularities in vote counting in some precincts occurred in 2004 but not in 2000, we would expect that Bush would do significantly better in those precincts in 2004, and that larger exit poll errors would also tend to occur in those precincts. However, these two sets of differences are not associated.

ESI For further information contact [info@electionscience.org](mailto:info@electionscience.org).

Let us clear up the ambiguously labeled axes of ESI Figure 3. We know (and Table 1 from the ESI report confirms) that the Ohio exit polls overall under-estimated the reported Bush vote. This implies that the horizontal axis of Graph 5 must be interpreted as:

$$B_{ep} - B_{ov}$$

where  $B_{ep}$  is the Bush exit poll percentage and  $B_{ov}$  is the Bush official vote percentage, because there are many more circles on the left side (less than 0) of the axis than on the right side.

It can be seen from Graph 4, ESI's Figure 2, that the number of precincts below a diagonal line drawn from the lower left corner to the upper right corner of the graph is greater than the number of precincts above this diagonal. This shows us that the number of exit polled precincts where Bush vote share improved in 2004 over 2000 was *less* than the number of precincts where Bush share decreased.

From Graph 4 (ESI Figure 2), we know that a larger number of these precincts received higher Bush shares in 2000 than in 2004. Hence, because most of the points in Graph 5 (ESI Figure 3) are in the lower left hand quadrant (in terms of 0 horizontal and vertical values), we know that the label for the vertical axis of Figure 4 is:

$$B_{2004} - B_{2000}$$

That is, the vertical axis of ESI figure 3 is Bush reported vote percentage in 2004 minus that for 2000.

In figure 3 counting the number of precincts with higher 2004 Bush vote shares we see that Bush's vote share increased from 2000 to 2004 in 15 precincts and declined in 25 Ohio exit polled precincts appear about equal in four precincts. Thus, even if the five *missing* precincts had higher 2004 Bush vote shares,



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the overall number of precincts with higher 2004 Bush vote shares would be smaller than the number with higher 2000 Bush vote shares.

The ESI graphs and data thus provide the following information:

- a) More of the exit polled precincts had higher Bush vote shares in 2000 than in 2004.
- b) The official Bush overall Ohio vote share in 2004 is larger than the Bush vote share in 2000.
- c) The difference between Bush's official proportion in 2004 and 2000 is less than 1%.<sup>58</sup>

The text below graph 4, figure 2, of the ESI report<sup>59</sup> wrongly states:

“...the direction of error in the exit poll estimates does not appear to be strongly related to how large a proportion of the vote Bush received in the precinct.”

NEDA's mathematical proof showed that ESI's analysis is irrelevant for drawing any conclusions about the presence or absence of vote fraud. To compare the proportion of circles and triangles above and below the diagonal shows nothing because nothing can be concluded about the possibility of vote fraud from such a comparison. Second, Graph 4 shows that Ohio exit polled precincts with approximately 60% or greater Bush vote in 2004 and 2000, there are *exclusively* Kerry vote count overestimates because only circles appear in the upper right hand corner of the figure. This corroborates the analysis of the correlation between exit poll discrepancy and precinct partisanship in 2004, and, contrary to what ESI states, is very consistent with a WPD pattern that would be produced by vote fraud/miscount. I.e. there is a clear pattern of no triangles (no Bush vote overestimates) in precincts in which Bush's official vote count share was over 60% in either 2000 or 2004. This pattern is consistent with the pattern that would be produced by vote miscounts primarily favoring Bush.

ESI's comparison assumes without evidence that:

- a) the 2000 Bush vote is a *meaningful* “bench mark” for the 2004 Bush vote in precincts for which exit polls were conducted in 2004, and that
- b) the 2000 vote in these precincts is a *precise* bench mark so that small percentage changes from 2000 to 2004 are significant.

Given demographic, precinct geography, third party influence, turnout, other political factors influencing voter intended vote count shares, and the less than 1% difference between the 2004 and 2000 Bush official vote share, it is *surprising that ESI would assume* that the precinct-level direction of change (increase or decrease) in Bush official vote count share in the two elections for these precincts would *have a particular relationship* with 2004 exit poll discrepancies.<sup>60</sup>

ESI's text at the bottom of Graph 5 (Figure 3) states that:

“If systemic irregularities in vote counting occurred in some precincts in 2004 but not in 2000, we would expect that Bush would do significantly better in those precincts in 2004 [than in 2000], and that larger exit poll errors would also tend to occur in those precincts.”

Since Bush received a larger overall Ohio vote share in 2004 than in 2000, the points in the upper half of graph 5 represent a slightly larger number of Bush votes than those in the lower left half of the Graph,

<sup>58</sup> In 2004 the officially reported Bush vote in Ohio was 50.81% to 48.71% for Kerry: in 2000 it was 49.97% for Bush to 46.46% for Gore - see <http://uselectionatlas.org/USPRESIDENT/index.html>.

<sup>59</sup> See Election Science Institute report on the Ohio exit polls, by Kyle et. al., op. cit.

<sup>60</sup> If the 2000 precincts had weights similar to as the 2004 precincts, then the relatively smaller number of precincts where the Bush share increased in 2004 must have higher weights in 2000 and 2004.



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and since there are more than double (10) the number of precincts in the *upper left* as compared to the upper right (4) quadrant, Kerry exit poll overstatements (which are on-average larger in the upper left quadrant) appear to be correlated with precincts that delivered higher 2004 Bush shares, and account for much if not all of the Bush victory in 2004.<sup>61</sup> Even if all five missing precincts were in the upper right quadrant, this apparent relationship would still hold, though not as strongly.

Thus, the ESI report is either irrelevant, or appears to prove the opposite of what ESI claims.

### Appendix E: 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<sub>b</sub>* precinct vote miscount share for votes shifting to Bush from Kerry
- s<sub>k</sub>* 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)
- α* is defined as K/B and referred to as "response bias" ratio
- e<sub>s</sub>* 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  $K=29/54=0.537$ ,  $B=21/46=0.4565$ ,  $k=0.54$ , 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.

$WPD = \text{Official Vote Margin} - \text{Exit Poll Margin}$

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

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

<sup>61</sup> Note that these points would have to offset the considerably larger number of exit polled precincts in which the Bush 2004 vote share was significantly less than his 2000 vote share.



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Vote miscounts affect only the official vote count margin and do not affect the exit poll margin. This formulation for vote miscounts is consistent with most, but not all possible patterns of vote miscounts. Vote miscounts that benefit one candidate can be taken from 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, because vote counts are added together before publicly reporting them<sup>62</sup>, votes can be 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 and added to the other. The assumption, that the total votes cast equals the total votes counted, causes absolute value of WPD due to vote miscounts benefiting one candidate to increase as vote share for the benefiting candidate decreases - giving a distinctive pattern when WPD is plotted by exit poll share. If votes are subtracted from one candidate, but not added to the other candidate's total or added to one candidate's total without being subtracted from the other's, the above WPD equation can be simply modified to handle that situation. The resulting formula for WPD is still proportional to candidate's actual vote share.

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

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

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

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.

Setting vote miscounts and sampling error equal to zero gives us WPD caused by exit poll response bias

gives 
$$WPD = 2k - 1 - \frac{kK - B + Bk}{kK + B - Bk}$$
, with no random sampling error or vote miscounts. To fill in a

small missing step in the above derivation, sampling error originally is incorporated into the exit poll margin as:  $((kK + 0.5e) - (bB - 0.5e)) / (kK + 0.5e + bB - 0.5e)$ .

WPD patterns produced by vote miscounts, random sampling error, and partisan exit poll response rate differences are described in NEDA's paper, "Vote Miscount or Exit Poll Error? New Mathematical Function for Analyzing Exit Poll Discrepancy", which is publicly available at <http://electionarchive.org/ucvAnalysis/US/Exit-Poll-Analysis.pdf>

<sup>62</sup> 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.