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Author: Henry E. Brady, Michael C. Herron, Walter R. Mebane, Jasjeet Singh Sekhon, Kenneth W. Shotts, Jonathan Wand
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Law and Data: The Butterfly Ballot Episode

On television's *Law and Order*, the police catch criminals and hand them over to the lawyers to get convictions. Part of the program's dramatic tension comes from the police operating under the scrutiny of a rigid and unforgiving legal system. The suspense increases as the lawyers try to do their job even though there is often a gap between justice and what the law requires.

In *Law and Data*, data analysts track down the facts and prove their theories, but often have trouble explaining them simply and clearly. Lawyers find it hard to obtain, or even define, justice. And the law sometimes goes in odd directions, missing the biggest facts and emphasizing seemingly trivial ones. Justice is not always done.

Our episode of *Law and Data* involves

by

Henry E. Brady,

University of California,
Berkeley

Michael C. Herron,

Harvard University

Walter R. Mebane Jr.,

Cornell University

Jasjeet Singh Sekhon,

Harvard University

Kenneth W. Shotts,

Northwestern University

Jonathan Wand,

Cornell University

political scientists from Cornell, Harvard, Northwestern, and the University of California, Berkeley, who came together through a series of accidents to become expert witnesses for the butterfly ballot cases in Palm Beach, Florida. A few of us had worked together as collaborators on scholarly articles, but our greatest common experience had been attending the annual summer

meetings of the Political Methodology Society of the American Political Science Association, where we pilgrimaged each year to hone our analytical skills. As members of that group, our Grail quest has been uncovering the truth through good data analysis no matter where it leads us. Serving as expert witnesses in court cases was far from our minds, because the logic of adversarial justice seemed uncongenial to

the logic of tough-minded data analysis. None of us had been involved as expert witnesses in court cases before November 2000, and we never envisioned ourselves becoming involved with the legal system. Like Sergeant Joe Friday, and unlike Assistant District Attorney Jack McCoy, we just wanted the unadorned facts, and some of us doubted that the legal system was the best forum for determining the whole truth and nothing but the truth.

Our individual decisions to become involved in the butterfly ballot cases after the 2000 elections flowed from our intellectual curiosity, the importance of the issue, and the availability of data on the Internet that makes quick data analysis possible. We were then propelled along by the clarity of the facts and the realization that we were well qualified to provide the public and the courts with clear and scientifically accurate analysis. Along the way, and after we had completed our initial analyses, phone and email messages from a lawyer in Florida got us involved in the Florida cases. Throughout the process, our admiration grew for the efforts of lawyers and judges to do their best, but our doubts have increased over whether the legal process can effectively digest information and make the best use of it. We saw, up close, a very significant problem--the failure of our voting system to convert people's vote intentions into counted votes--chopped into law-suit sized pieces that obliterated the larger picture and led to legalistic solutions that often seemed to miss the point.

The Palm Beach County Butterfly Ballot

Through news stories and email, each of us learned about the badly designed butterfly ballot the day after the election on Wednesday, November 8. We learned that some voters in Palm Beach, Florida, many of them Jews or African Americans, believed that they had mistakenly voted for Pat Buchanan instead of Al Gore because they misread or misinter-

preted the instructions on the ballot which had candidate names on both pages and punch-holes down the middle. One look at the ballot suggested that marking it correctly would be easy for Bush voters, who only had to match the first name on the ballot with the first punch-hole. But Gore voters, who had to match the second name on the left-hand side of the ballot with the third punch-hole in the center of the ballot, could easily mismatch their ballots. If Gore voters mistakenly punched the second hole, they cast their vote for Pat Buchanan whose name was listed on the right hand side of the ballot, somewhat higher on the page than Al Gore's name but somewhat lower than George Bush's name.¹ In addition, some Gore voters claimed that they had mistakenly punched two names for president because the ballot said "vote for group" and there were punch-holes next to both Gore and Lieberman's names.

The election results in Palm Beach County suggested that a sizeable number of people may have made these mistakes. Pat Buchanan received almost 20% of his total statewide support in Palm Beach, which houses only about 7% of the voters in Florida.² A simple calculation reveals that over 2,000 Gore supporters may have mistakenly voted for Buchanan. Furthermore, the number of multiply punched ballots, or "overvotes," was over 19,000. That seemed very high compared to other counties, leading to the possibility that thousands more Gore votes might have been lost because of the ballot form. With the presidential election result in Florida depending upon a difference of less than 1,000 votes, the butterfly ballot might have proved the difference.

Although this circumstantial evidence implicates the butterfly ballot, there is nothing definitive about it. Perhaps counties routinely have large "outliers" in votes for third-party candidates or in spoiled ballots. Perhaps there is a history of unusually strong Buchanan support in Palm Beach County, or perhaps there was some reason that he had strong support in 2000. Furthermore, perhaps Bush supporters were just as likely to make mistakes as Gore supporters, so that the net effect on the presidential race was zero. These are the kinds of questions that sprang into our minds when we first heard about the butterfly ballot, and each of us chose to address them in our own ways.³

How We Got Involved and What We Found

At Harvard University in Cambridge on Wednesday, November 8, Jasjeet Sekhon learned about the butterfly ballot and the large vote for Buchanan from Congressman Robert Wexler (D-FL) on CNN. Sekhon talked about it that day with Walter Mebane and Jonathan Wand of Cornell. Mebane was Sekhon's Ph.D. adviser and Wand was a graduate student at Cornell who was working with Sekhon on an Internet start-up company. Although they thought it plausible that the ballot might have caused Gore supporters to vote for Buchanan, they did not believe that the evidence presented to that time made the case.

The basic statistical evidence circulating on Wednesday via email and that was available on the web by Thursday November 9 had been compiled very quickly by Greg Adams and Chris Fastnow at Carnegie Mellon University.⁴ Their analysis was also widely reported in the news media. They had plotted the vote for Buchanan by total votes for Florida's 67 counties and had fitted a simple linear regression line to all counties but Palm Beach.⁵ The plot showed that Palm Beach County appeared to be an extreme outlier with many more votes for Buchanan than might be expected given the size and partisanship of the county, but the statistical method, simple ordinary least squares applied to votes instead of vote shares, was not well-suited to detecting an outlier, and their analysis only used Florida data. Perhaps every state in the country had such an outlier, and perhaps large counties such as Palm Beach tend to have substantial variability in their vote for third parties. After all, the total vote percentage for Buchanan in Palm Beach was less than one percent (0.78%).⁶

Mebane, Sekhon, and Wand decided that none of the existing analyses could establish that Palm Beach was an anomaly because of the butterfly ballot. The county might just be one of many in the United States that had somewhat deviant, but statistically understandable, values for the Buchanan vote. They decided that performing a convincing analysis would require compiling more data and using better statistical methods. Wand went to the Internet and began to build a data set of thousands of election reporting units. By late Wednesday night, Sekhon and Wand had already found some additional outliers, but none of them in counties as large as Palm Beach. Mebane worked with them by suggesting improvements to the statistical analysis.

In Chicago, at Northwestern University, Ken Shotts sent an email to colleagues and friends the day after the election in which he described some very simple data analyses regarding the Buchanan vote in Palm Beach County and concluded: "The basic argument made by Democrats is that thousands of voters who intended to vote for Gore were confused by the ballot and accidentally wound up voting for Buchanan, and this may have been pivotal in determining the election outcome. Bottom line: I think the Democrats may be right on this one. But I'm not sure."

Shotts also phoned his colleague Michael Herron, who was visiting Harvard for the year, to discuss the issue. Herron agreed with Shotts that it seemed surprising to find so many Buchanan votes in a county with large Jewish and African-American populations, but he wondered whether there was some plausible explanation other than the ballot form. Perhaps there was some hidden source of Buchanan support in Palm Beach. That evening, Shotts' father responded to his email by saying that his analysis did not identify the source of the extra votes for Buchanan. Perhaps they were Bush voters who mistakenly voted for Buchanan. While thinking about his father's comments, Shotts realized that precinct-level data might be used to figure out where the votes came from, and he left a message on

Michael Herron's office answering machine late Wednesday evening saying that maybe they should work on this.

At the University of California, Berkeley, Brady heard about the butterfly ballot on Wednesday through an email, and he discussed the issue with his graduate students. The researchers who had posted their findings on the web up until that time had only used county-level data to establish that the Buchanan vote seemed anomalous, but Brady and his students agreed that precinct-level data were needed to determine whether the extra votes for Buchanan came from Bush or Gore supporters. One of Brady's graduate students, Laurel Elms, found Palm Beach County precinct-level data on the Internet and suggested that it looked like Buchanan votes were concentrated in liberal precincts. Conducting a convincing analysis, however, would require formulating and statistically estimating a model containing a behavioral parameter--the fraction of Gore voters who mistakenly voted for Buchanan. Moreover, the model would be even more convincing if it also permitted estimation of the proportion of Bush supporters who had mistakenly voted for Buchanan.

Brady went home that night and started to think about the problem. On Thursday morning, he got up at 5 am to work on some ideas that had occurred to him. By shortly after noon, he had completed a paper that developed a statistical ("mixture") model to test whether Bush or Gore voters were responsible for the unusually high Buchanan vote. He concluded that "Using data from the 67 Florida counties along with data from precincts in Palm Beach County, I find that there is a strong likelihood that over 2000 of the Buchanan votes in Palm Beach County were cast by Gore supporters who mistakenly punched Buchanan's name." Moreover, he found no evidence that Bush supporters had made the same mistake. In spare moments throughout the rest of the day, Brady sent out "What Happened in Palm Beach?" via email and posted it to his web site (<http://ucdata.berkeley.edu>). Friday morning, he left Berkeley for a conference at the University of California, Santa Barbara.

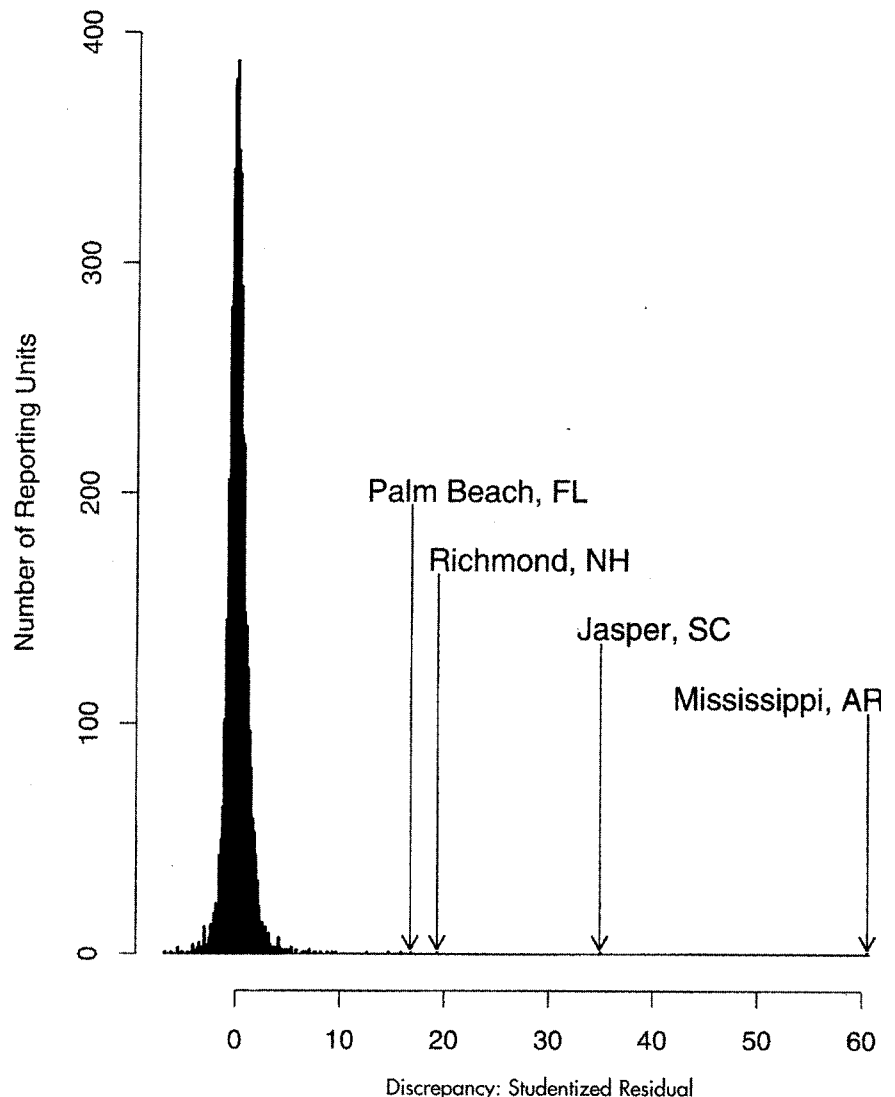
At the same time, on Thursday, November 9, Wand was visiting Sekhon on the Harvard campus, and they ran into Michael Herron as they were going to lunch. Herron mentioned that he and Shotts were

working on the Palm Beach County butterfly ballot. They decided that the five of them (Wand, Sekhon, Mebane, Herron, and Shotts) should work together. They would focus on three questions:

- Was Buchanan's vote in Palm Beach County really an outlier?
- Were the extra Buchanan votes from Gore supporters?
- Were the overvotes cast by Gore supporters?

By 3 am on Friday, November 10, Sekhon had created a web page for the preliminary report "Voting Irregularities in Palm Beach County" (<http://elections.fas.harvard.edu/wssmh/>). Throughout Friday Herron, Sekhon, and Wand worked together in Cambridge and made frequent phone calls to Shotts in

FIGURE 1
Histogram of Discrepancies
From Expected Vote for Buchanan
4481 Reporting Units in 46 States



Source: Wand et al. (2000)

Chicago. Mebane started off working in Ithaca, but late in the afternoon he left to drive to Cambridge, intending to attend a conference at MIT on Saturday. Brady had emailed his paper to Shotts on Friday, but neither Shotts nor any of his colleagues had a chance to read it until Saturday. Learning of Brady's paper, however, increased the five's already strong commitment to get their own paper done as soon as possible. All five worked into the early hours of Saturday morning, and three of them continued until all the pieces of the paper had been compiled. At 11:40 am on Saturday morning, the paper was linked to the web site and announcements of it were emailed. In the paper, Wand, Shotts, Sekhon, Mebane, and Herron⁷ concluded that:

We find that Buchanan's Palm Beach County vote total is not merely large but that in statistical terms it is extraordinary. Furthermore, we examined voting patterns within Palm Beach County and find strong statistical evidence that Buchanan voters are concentrated in the most liberal precincts of Palm Beach County. We also find that invalid, double-punched ballots--presumably double-punched for Gore and Buchanan--tend to come from relatively liberal precincts. These two findings are evidence for the claim that the ballot format in Palm Beach County led some Gore supporters mistakenly to vote for Buchanan and, in some cases, to vote for multiple presidential candidates.⁸

Three reporting units were identified in a figure in the paper (see Figure 1) as having more irregular vote counts than Palm Beach County. Although we did not know it at the time, one of them (Mississippi, Arkansas) was irregular only because its returns were incorrectly reported on the CNN web site. A second was a small New Hampshire township, Richmond, where over 10% of the presidential votes were for Buchanan (55 of the 533 votes). The Republican voters in Richmond are very conservative judging by their votes in the 2000 presidential primary, but the total still appears high. A third anomaly was Jasper County, South Carolina, where one precinct, Tillman, accounted for 239 of Buchanan's 245 votes in the county, and in this precinct, there was only one vote for Gore, one for Bush, 111 for Nader (the next highest precinct had three votes for Nader), and five votes for the remaining candidates.⁹ Local officials initially argued that there was no problem because 'voter error led to the odd results' ("Voters Say" 2000), but affidavits collected from registered voters in Tillman revealed that many more registered voters actually voted for Bush and Gore. On December 13th, a new election was ordered for county offices in Jasper, County. These results confirm that the method used in the November 11 paper was finding true outliers.

By Saturday at noon, then, we had all chimed in with our analysis, and we had come to a common conclusion. For all of us, the data told a very clear story. Palm Beach County was an extraordinary outlier even when compared to the entire nation. Gore supporters and not Bush supporters had mistakenly voted for Buchanan in Palm Beach County. Spoiled ballots came disproportionately from liberal precincts. Almost all of the other analyses posted to the web came to the same conclu-

sions (e.g., Adams and Fastnow 2000), and the dissenters based their complaints on work that had not taken the precautions that we had (e.g., Shimer 2000).

Unlike most social science data, these told a very clear and consistent tale. Every analysis indicated that something very odd had happened in Palm Beach. All of us felt good about our work, and we were pleased to get our analysis out on the web. Perhaps now we could get some rest and go on to other business.

Going to Florida

On Saturday morning, Greg Adams of Carnegie Mellon University received an email from Fort Lauderdale attorney David Krathen, who had filed a lawsuit in the Fifteenth Judicial Circuit on November 9 contesting the legality of the butterfly ballot on behalf of two Palm Beach County voters, Beverly Rogers and Ray Kaplan.¹ Krathen asked Adams if he were interested in acting as an expert witness on the case. Citing other commitments, Adams demurred and referred Krathen to Brady and the Cornell/Harvard/Northwestern team. In a routine check of his email on Saturday morning while attending the Santa Barbara conference, Brady found a message Krathen had sent a few hours before asking Brady to contact him immediately.

Brady called Krathen and asked him about the case. Krathen said that all the legal work was being done *pro bono* and that there was no money to pay airfares or expenses, much less any fees, for expert witnesses. But Krathen needed help and would welcome our involvement. Brady asked whether Krathen was representing the voters or the Democratic Party. As the coauthor of a book on political participation entitled *Voice and Equality* (Verba, Schlozman, and Brady 1995), Brady knew some of the ways that democratic institutions fail to make sure that people's voices are heard. Palm Beach County's voting problems appeared to be a case where voters' voices were silenced by inexcusable and preventable errors in ballot design and administration. Although Brady had no illusions about which party's voters were supporting the Palm Beach lawsuits, he felt much more comfortable representing voters than the Democratic Party. After a moment's thought, he said he would go. Perhaps the case would direct attention to America's antiquated voting and vote-counting methods. After spending Sunday working with his research assistant, Laurel Elms, doing additional analyses and obtaining data from more counties,¹¹ Brady flew to Fort Lauderdale.

Shortly after noon on Saturday, Herron, Mebane, Sekhon, Shotts, and Wand also received emails asking them to call Krathen. By Sunday afternoon, all five had decided to go. All but Mebane flew to Fort Lauderdale Sunday evening. Mebane drove back to Ithaca Sunday night and flew down Monday morning. Each of us was paying his own way.

Our intellectual curiosity, the availability of the data over the Internet, the clarity of our results, the desire to see votes fairly represented, and our professional

commitment to high quality data analysis had propelled us all into an extraordinary situation. We would get very little sleep for the next five days.

Palm Beach and Fort Lauderdale: Monday, November 13

In Florida, we faced the difficult task of translating our data analyses into terms that made sense to journalists and to the legal system. Our paramount concern was to ensure the integrity of our analyses. Our professional reputations as trustworthy and competent researchers mattered much more to us than anything else. At the same time, as teachers, we recognized the need to explain our results in ways that were comprehensible to those who lacked our background and training. We were not surprised by vacant looks when we pulled out a scatter-plot or mentioned statistical significance, and we were more than willing to try to explain our results in simple terms. What we did not fully expect or immediately know how to deal with were the frenetic pace of activity and the extraordinary emotions on display in Palm Beach.

After meeting with Krathen on Monday morning, November 13, at his Fort Lauderdale offices on fashionable Las Olas Boulevard, all of us, except Mebane who would not arrive until the afternoon, got into several cars and went north to a television studio at a Christian academy, where we prepared to be interviewed on CNN's *Burden of Proof*. While making us presentable for television, our make-up artist was clearly upset about what she perceived to be unwarranted challenges to Governor Bush's victory in Florida. After waiting in the studio for 15 minutes, we were bumped by a breaking news story that a federal judge in Miami would not be issuing a preliminary injunction to enjoin the local canvassing boards from continuing a manual count.

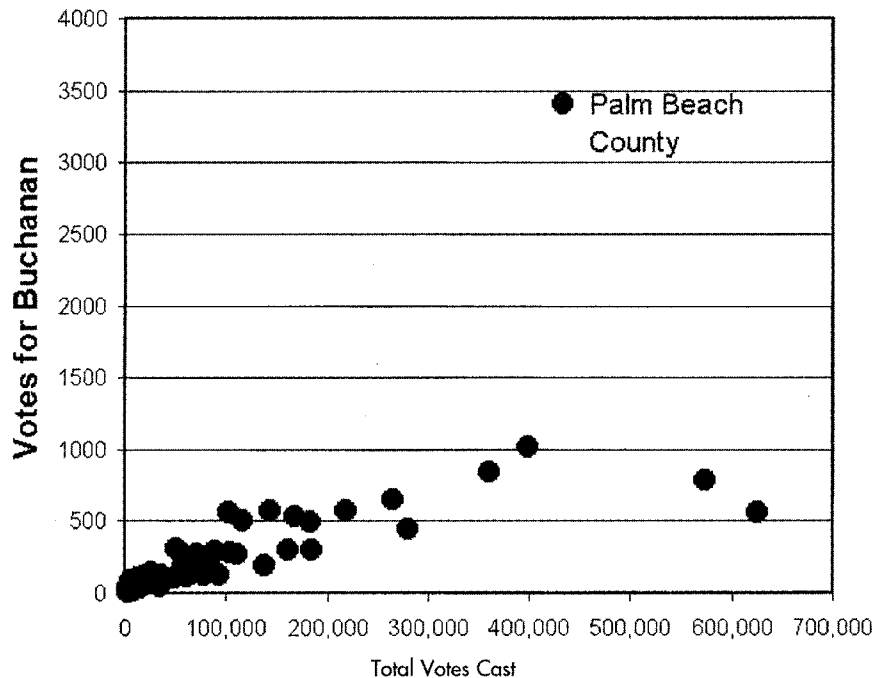
Later that afternoon, we went to the Palm Beach County Courthouse, which was about 40 miles north of Fort Lauderdale. After getting off the freeway, we encountered blocked roads, people holding protest signs, and police everywhere near the courthouse. At least half a dozen helicopters were circling around. We later learned that the demonstrators were going to a march led by Jesse Jackson, and that he had been ushered away by police as Bush supporters came at his entourage chanting "Jesse, go home!" (Markey 2000).

Upon entering the courthouse one of our team members explained our purpose to an African-American security guard and asked for directions. The guard courteously complied and volunteered the opinion that the butterfly ballot had been intentionally designed to

harm blacks in particular. All the evidence, including the fact that the ballot was approved by a Democratic commissioner of elections, suggests that this is not true, but the security guard's comments and the demonstration outside suggested the depth of feeling around the issue.

We arrived at the courtroom too late to get in; we found our way blocked by a crush of reporters, security personnel, and other people. Along with the press, we watched the hearing on court television and saw the assigned judge recuse himself and set the next day for a preliminary hearing. We used the opportunity to talk at length with reporters from local and national media and to refine the presentation of our analysis.

FIGURE 2
Presidential Election Results for Florida, by County



Source: Adams and Fastnow (2000).

After the hearing, we walked out into a sea of cameras and a press conference. One of the attorneys associated with the case, although not Krathen or Gary Farmer, with whom we worked closely during the next few days, started the press conference with a fiery partisan attack on the Republicans. We felt uncomfortable with this and said that we would prefer to emphasize the voting issues that were central to the case. Krathen and Farmer agreed.

We chose Walter Mebane as our spokesperson, and he coped as best he could with questions about our role and the impact of the butterfly ballot. At this time, we began to realize that the press craved precise numbers and expressions of certainty that we were only partly prepared to provide. We felt confident that at least 2,000 Gore supporters had mistakenly voted for

Buchanan, but we did not know what to say about the spoiled ballots because we had very limited data.

During our first day in Florida, then, we had almost been on CNN, seen parts of a highly charged demonstration, talked with numerous reporters, been crowded out from a hearing regarding our case, and participated in a press conference with 30 reporters and a half dozen cameras.

Palm Beach and Fort Lauderdale: Tuesday, November 14

Tuesday morning we had to prepare for a possible hearing. George Badey, the Philadelphia lawyer who would conduct our direct examination in the courtroom, had joined us the night before, and Keith Altman, an expert on legal presentations, joined us in morning. They worked with us on our presentation. We realized we would need pictures that told the story simply and clearly. But the simplest figures, such as those done by Greg Adams (see Figure 2), were not as technically acceptable as the figures in our papers. And the technically superior figures, such as the "Histogram of Discrepancies from Expected Vote for Buchanan--4481 Reporting Units in 46 States" from the Wand et al. paper suffered from using concepts such as "studentized residual" and having three reporting units that were even more extreme than Palm Beach County (see Figure 1). All of this could be explained, of course, but the Adams picture was appealing because it had direct impact. Any child could plot Buchanan votes versus total votes, and in this picture, Palm Beach stood far apart from other Florida counties.

We also faced the problem of demonstrating why Buchanan's vote came from Gore supporters and not Bush supporters. Brady's mathematical argument, as satisfying as it was to us, would not do. The solution was to develop a hypothetical example that eventually found its way into Brady's affidavit "Report on Voting and Ballot Form in Palm Beach County" (<http://ucdata.berkeley.edu>). In this example, we start from the empirically true fact that in Florida and in Broward and Miami-Dade Counties the fraction of Buchanan voters increased with the fraction of Bush voters in a precinct. Not surprisingly, Buchanan's support is usually greatest where there is strong Republican support. Then we show that the positive relationship between Buchanan's vote share and Bush's vote share becomes even stronger if Bush voters are mistakenly voting for Buchanan but becomes weaker if Gore voters are mistakenly voting for Buchanan. In fact, if enough Gore voters are mistakenly voting for Buchanan, then the percent Buchanan voters in a precinct decreases with the fraction of Bush voters in a precinct; the relationship between Buchanan votes and Bush votes becomes negative! Put another way, the fraction of Buchanan voters increases with the fraction of Gore voters. And that is exactly what we found in Palm Beach County, but not in nearby Broward or Miami-Dade.

Finally, we faced the problem of explaining what happened with the overvotes. Because there were over

19,000 of them, the overvote story appealed to the attorneys who wanted to focus attention on the biggest number of affected votes.¹² But it was the hardest story to tell. We knew that the fraction of spoiled ballots increased with Gore support in a precinct, but there are many reasons why ballots can be spoiled. While we were in Palm Beach County we found some data reported on the web by Peter Orszag and Jonathan Orszag (at www.sbgo.com/election.htm) that described the overvotes in the one-percent sample of ballots that the Palm Beach County Elections Canvassing Commission had hand counted on November 11. Based on that sample, the commission had decided to do a complete manual recount of all the Palm Beach County ballots.

Of the 144 multiply punched ballots in the Palm Beach County sample, 132 had double punches and 114 (79%) had adjacent double punches. Among the adjacent double punches 80 were for Buchanan and Gore and 21 were for Gore and McReynolds. Eleven were for Bush and Buchanan, and one was for "blank two" (the box above the box for Bush) and Bush. A simple projection might suggest that 70% (101/144) of all the overvotes in Palm Beach County were intended to be votes for Gore, while 8% (12/144) were intended to be votes for Bush, but it seemed dubious to allocate all the votes away from Buchanan, not to allow that some proportion of the four key patterns of double punches were meaningless errors, and to extrapolate to all of Palm Beach County from a one-percent sample comprising four nonrandomly selected precincts.¹³ We felt confident that Gore had lost votes from double-punching caused by the poor ballot design, but found it difficult to come up with a definitive minimum number for those votes. Eventually, in his affidavit completed very early Thursday morning, November 16, Mebane chose 3,400 as the minimum net number of votes that Gore certainly lost, although he strongly believed the actual number to be much higher than that (see <http://elections.fas.harvard.edu/wmebane>). It seems likely, in fact, that Gore lost slightly more than 10,000 net votes because of double-punched, spoiled ballots.

We faced still another problem on Tuesday morning, which George Badey began to address. We knew that the Democratic Party and the AFL-CIO had collected a large number of affidavits from voters in Palm Beach County who believed they had miscast their vote. We could make a much better case if we had access to these affidavits. But, strangely, Democratic Party officials were reluctant to let us have them. After making some phone calls, one of which provoked an angry comment from a labor official who said he didn't care what the Democratic party wanted to do, he thought the affidavits should be used, we finally got permission to use them, and they were faxed to Krathen's office.¹⁴

As we went running out the door to get to another court appearance, we were handed pages of affidavits. We read them as we drove north, and we found confirmation for our theories about what was happening. One woman wrote:

I had reviewed the sample ballot before going to the polling place, and had even gone through training to serve as a poll worker. Even though I was familiar with the sample ballot and had voted many times before, I found the ballot I received on November 7 very confusing. It did not correspond to the sample ballot I had received. . . . Because I was so confused, though, I asked a poll worker for assistance lining up the holes on the ballot properly, and informed her that I was having trouble lining up the holes to see which hole I should punch to vote for Vice President Al Gore to be the next president. She did not provide me with the assistance I requested in lining up the ballot in the voting machine, and just told me I should “punch the hole” near Vice President Gore’s name in order to vote for him. This was not at all helpful to me, since my problem was that I could not tell which was the hole nearest to Vice President Gore’s name. . . . I punched the second hole on the ballot, believing that to be the correct hole to punch in order to vote for the Democratic candidate for president since they were listed second on the ballot. I was not certain that I had voted correctly, but I was ashamed to ask for help again, especially since the poll worker had refused to help when I first asked for assistance. My husband, who was at the polls voting with me and had started filling out his ballot shortly after I did, noticed my confusion and told me that a poll worker had informed him that the proper way to vote for the Democratic candidates was to punch both the second and third holes on the ballot in order to vote for both Vice President Gore and Senator Lieberman. This seemed very unusual and surprising to me, but I believed it since I understood it was what the poll worker had instructed us to do.

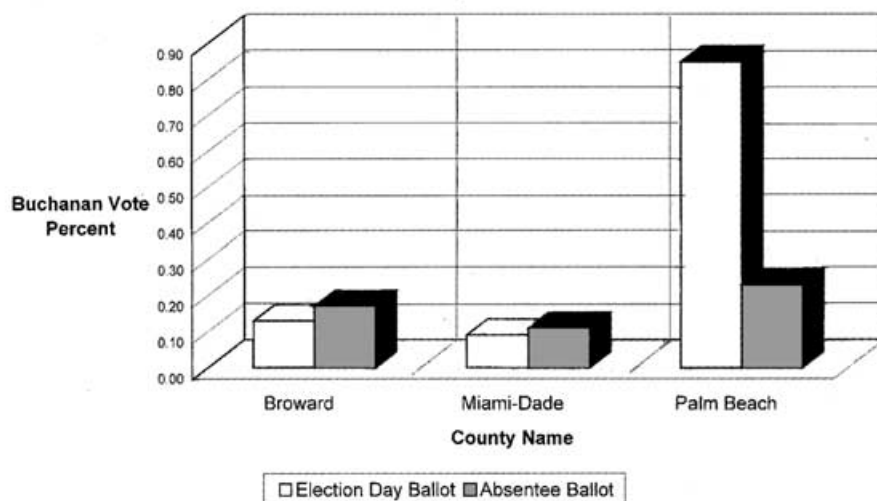
This one affidavit, one of thousands, shows how some voters mistakenly voted for Buchanan when they meant to vote for Gore and how other voters spoiled their ballot by punching two names because of the mysterious instruction to “Vote for Group” and the confusion of holes. Although only about one percent of the Gore supporters mistakenly voted for Buchanan and about 5% spoiled their ballots by double punching for Gore and some other candidate, these numbers are very high for machine failures. Banking machines, cash registers, or telephones that failed in 6% of the total transactions would certainly be sent to the junkyard.

At the courthouse, we walked through a scrum of reporters and cameras to get to our courtroom. Once there, we listened to Chief Judge Walter Colbath enumerate the four other judges who had recused themselves after Judge Stephen Rapp first took himself off the case the previous afternoon. Judge Colbath explained how he was only temporarily presiding, because he did not believe he was supposed to be in the rotation for the case. He said he would remain only until his staff could find the next judge in the rotation. A surprised Judge Jorge Labarga took over our case as soon as he returned from lunch. He was well-spoken with a good sense of humor. Before considering our

case, he considered a number of substantial and procedural questions regarding motions for changing the venue, striking the case altogether, and continuance. After dealing with these in oral rulings, he concluded that the case would remain in Palm Beach County and that the Canvassing Board should continue counting and supplement as necessary the results that were to be submitted to the secretary of state at 5 pm. As for matters directly concerning us, he set the next day for a preliminary hearing.

Once again, we had prepared but it had come to naught. The only redeeming moment came when Brady, reading an affidavit, found a copy of the absentee ballot and realized that it did not have the same defects as the butterfly ballot. In effect, Palm Beach County had run a quasi-experiment. Over 45,000 people received an absentee ballot without the same problems as the butterfly ballot, and almost 400,000 people voted in Palm Beach on Election Day with the butterfly ballot. We knew that absentees tended to be

FIGURE 3
Buchanan Vote by Ballot Type and County



somewhat different from resident voters, but they were still a pretty good “control” group for the butterfly ballot “treatment” because they were not that different. In fact, absentee voters tend to be more conservative than election-day voters, so that if we found a lower rate of voting for Buchanan among the absentees than among the resident voters in Palm Beach County, we would have very strong evidence for the butterfly ballot’s effects.

When we got back to Fort Lauderdale, we compared the vote for Buchanan among those who voted absentee with the Buchanan vote among those who voted at county polling places on Election Day. We also looked at the same information for nearby Broward and Miami-Dade Counties. The results were striking, and they are summarized in Figure 3. In Broward and Miami-Dade counties, the absentee voters were slightly more likely to vote for Buchanan, but in Palm Beach County, the people who cast their votes on Election Day

were almost four times more likely to vote for Buchanan. This was the smoking gun we had been looking for. All of our evidence made it very hard to believe that most of the votes Buchanan received in Palm Beach County were his. Moreover, the figure of 0.23% of absentee voters who voted for Buchanan provided a highly defensible upper-bound for the “true” Buchanan vote percentage throughout the county, and led us to conclude that approximately 2,400 people cast their vote for Buchanan in error. Once again, the data were converging on the same answer.

Tuesday night we prepared late into the night for a possible court appearance. By this time, a number of lawyers, led by George Badey, had appeared from the Philadelphia law firm that was connected to the case through one of the plaintiffs. The lawyers were smart and tough-minded, and the legal issues became clear



The cast of *Law and Data*, (from left) Walter Mebane, Jonathan Wand, Jasjeet Sekhon, Henry Brady, Ken Shotts, and Michael Herron.

and vexing. We had excellent evidence to show that the butterfly ballot had wreaked havoc with people’s votes. But legally, the case had to revolve on a clear point of law that was violated, and it had to seek a remedy that was legal and politically feasible as well.

The original brief filed by our lawyers noted that Florida law requires that the candidates for any office be listed on the ballot so that the candidate of the party that received the highest number of votes for governor in the last gubernatorial election goes first, and the candidate of the party that received the second highest number of votes goes second. Jeb Bush, of course, won the last Florida gubernatorial election, so the presidential candidate of his party, George W. Bush, came first, and the Democratic candidate, Al Gore, should have come second. But did he? Al Gore was listed second in the left-hand column, but he was third on the ballot. In terms of vertical placement, Patrick Buchanan’s name was clearly above Gore’s. Voting for Gore, then,

required punching the third, and not the second, punch-hole. The ballot assigned the number “3” to George W. Bush, “4” to Patrick Buchanan, and “5” to Al Gore. By this reckoning, Gore was second on the ballot only if people in Palm Beach County counted “3, 5, 7, 9, 11, 13, 4, 6, 8, 10.” Considering this, Mebane wondered aloud if people in Florida also taught their children the “A-C-E’s” instead of the “A-B-C’s.” Other features of the ballot arguably violated Florida law, but it was by no means clear that calling attention to these features would be enough to convince a judge that the ballot was defective.

Even if it was, no one had great hope that the remedy sought would, or even could be granted. All five of the voters’ suits, including our own, sought a revote in Palm Beach County. A revote had never occurred in a presidential election, and holding a new election posed serious equity problems.

Obviously, only those people who had voted on Election Day should be allowed to vote in the new election; that could be controlled by voting lists. But what would prevent third-party voters from changing their votes now that they knew that their votes could decide the election? In Palm Beach County, about 10,200 people had ostensibly voted for third-party candidates. If one takes these votes at face value, then the third-party candidates of the right obtained 4,481 votes and the third-party candidates of the left, obtained 5,969 votes, most of them for Ralph Nader. If all right-leaning voters went for Bush and all left-leaning voters went for Gore, then Gore would surely be advantaged in a revote. But this analysis is too simple because Nader supporters in Florida were, according to exit polls and our own analyses of voting data, more centrist than elsewhere, and a significant minority of them would vote for Bush if they switched from Nader. Maybe

Bush would have the advantage if a revote were called. Whatever the truth, third-party voters posed a real challenge to conducting a fair revote.

The facts of the butterfly ballot case proclaimed a significant injustice, but the law appeared blind to the problem and unable to deal with it. After spending hours refining our statistical arguments and becoming sobered by the legal complexities, we went to bed around 3:30 am feeling ready to testify. The jousting with the lawyers had been exhilarating, but it also showed how far we had to go.

Palm Beach and Fort Lauderdale: Wednesday, November 15

At 7 am we left our hotel for the Palm Beach County Courthouse. We had now been in Florida for several days, and we were getting anxious to either testify or

go home. Judge Labarga began the day's proceedings by disclosing his political background. In light of the numerous recusals that preceded his selection as judge for this case, he felt that it would be proper for him to outline his past and present political affiliations and he apologized for not doing so the previous day. He noted that he was a Cuban American and had formerly been active in Republican politics. He had been appointed by Democratic Governor Lawton Chiles and, after being appointed to the bench, he had changed his party affiliation to independent. Labarga then took up motions from the Florida Democratic Party's attorney, Ben Kuehne, who was asking the Palm Beach County Canvassing Board to use a "totality of the circumstances standard" rather than a "detached chad" standard for judging the intent of the voter in the Palm Beach County manual recount. Despite the oral ruling the previous day for the canvassing board to proceed with the recount, election officials were waiting for a further, immediate ruling directing them on the guidelines to be used in their work. During a recess, one of us talked with Kuehne and asked him why the Democratic Party was staying away from the butterfly ballot case. Kuehne said that the decision was being made at the highest level, but he was not sure what the reasoning was. He said that he had wanted to get involved.

Now it was our turn. Our lawyer, Gary Farmer, made us feel good by telling Judge Labarga that he had expert witnesses who were ready to go, right away. Barry Richard, Bush's lawyer, who was participating via a phone link to Tallahassee, objected vigorously and called the request "outrageous" and beyond anything he had experienced in his years of practice. His list of outrages was long and partly justified, although we suspected that his indignation was also part of the Republican strategy of stalling as much as possible. Richard complained that he had not had a chance for discovery. He had not had a chance to depose the experts. He had not had time to get his own experts. He was, after all, just one lawyer working for George Bush. The judge noted wryly that he was sorry that George W. Bush only had one lawyer, but Gary Farmer wisely retreated. Could the witnesses give a live proffer of testimony? That too was unacceptable to Richard, who claimed that Farmer was merely seeking publicity.

Judge Labarga ended the discussion by saying that he was not sure that he had the power, constitutionally, to order a revote in a presidential election. The facts might not matter because the law might not be able to solve the problem even if it existed. He told the lawyers, "Here is your homework. Find me a case anywhere in American history where such a revote has been ordered in a presidential election." He wanted briefs by 5 pm Thursday. We adjourned. Our lawyers conducted a press conference in front of the courthouse, but, sensitive to the point Richard had raised about publicity seeking, our counsel kept us away from it.

This Wednesday hearing was the bittersweet high point of our trip. The case was going forward, and

there might be a chance of success if the lawyers could find some way to argue for a revote. But we would not be testifying anytime soon, and the legal hurdle was very high.

We gathered back at Krathen's office in Fort Lauderdale, and we worked together until early Thursday morning to develop two affidavits, one about the Gore supporters who mistakenly voted for Buchanan and the other about the overvotes that were cast disproportionately by Gore supporters. Brady took the lead on the first and easier task, and Mebane tackled the second, more difficult one. Mebane put himself in the position of ~~inviting the students he had so lovingly helped train~~ (Sekhon and Wand) and the other methodologists (Brady, Herron, and Shotts)¹⁵ to listen to his presentation and to rip it to pieces. The experience was singularly unpleasant for him, but it was necessary. The standard for statements in our affidavits was that we were confident "to a reasonable degree of scientific certainty." Taking peer review and the highly intense Political Methodology Society summer meetings as our models, we knew that having each other criticize our analysis strengthened our arguments and prevented sloppy thinking. It allowed us to assert a reasonable degree of scientific certainty with great confidence.

The main points of contention regarding the overvotes were how to extrapolate from the one-percent sample and how much of the overvote in Palm Beach County to attribute to the butterfly ballot's design. High proportions of overvotes occurred in other elections that did not employ the butterfly ballot. For the purpose of calculating the number of votes that were changed in Palm Beach County due to ballot design, it was important to think carefully about how to define the baseline level of error.¹⁶ The heated discussion strained already exhausted emotional and physical reserves, but the combative moments improved the clarity of our thoughts and arguments. We made progress toward a better understanding of overvotes and, eventually, reached a consensus. We felt confident about the facts.

Resolution

The facts did not matter. On Friday, November 17, Judge Labarga considered whether there was any legal basis for a revote. "I think," he said at the hearing, "I have as deep an appreciation of the right to vote as anyone else in this county. My parents brought me here so I'd have that right. If I rule the Constitution does not allow for a reelection, it will be the hardest decision I ever make." ("GOP Holdups" 2000).

On Monday, November 20, Labarga issued his opinion. A revote could not be held because "our forefathers included clear and unambiguous language in the Constitution of the United States which requires that presidential 'electors' be elected on the same day throughout the United States." Moreover, the constitutional prohibition was sensible because "the danger of one candidate benefitting from an undue advantage in a

revote or a new election is always a strong possibility. If anything, for this reason alone, presidential elections must be held on the same day throughout the United States.”¹⁷ The plaintiffs’ request for a revote was denied without any witnesses ever being presented.

This ruling was immediately appealed and eventually found its way to the Florida Supreme Court. In the appeal, the lawyers for one of the cases that had been consolidated with ours proposed another remedy: statistical readjustment of the vote totals. If accepted, this would mean that the presidency would be determined by statistical imputation, an approach that the Republicans strongly opposed when it was suggested for adjusting the results of the U.S. Census. It seemed unlikely Republicans would find it anymore palatable for “adjusting” the presidential vote.

The Florida Supreme Court took a different tack than the Circuit Court judge, but they came to the same decision on Friday, December 1. The judges unanimously concluded that “even accepting appellants’ allegations, we conclude as a matter of law that the Palm Beach County ballot does not constitute substantial noncompliance with the statutory requirements mandating the voiding of the election.”¹⁸ The Court’s contorted double negative suggests the judges recognized that the ballot had some defects but did not consider them severe enough to trigger a legal challenge. Because the ballot was legal, Judge Labarga’s ruling on the remedy was not necessary and it was vacated. In the end, the Palm Beach County butterfly ballot case foundered on the unwillingness of the Florida Supreme Court to find the ballot defective, as a matter of law, and not on their likely reluctance to recommend a revote.

Did we accomplish anything? Legally, no. But practically, our efforts, along with those of others, were

the first step in a national civics lesson about the inadequacies of our voting and vote-counting systems. We made our case through the Internet to academics around the country and our results were reported widely in the news media. And the butterfly ballot itself provided one of the phrases that will surely endure from this election. It will always be a catchphrase for bad design.

What We Learned

The Palm Beach butterfly ballot story reads like a classic case of conservative jurisprudence recoiling from trying to right wrongs that vex the human condition. Anyone can see that the standard for calling a ballot defective must be very high and that revotes should rarely be called, especially in presidential elections where the Humpty Dumpty of third-party preferences cannot be put back together again after the initial vote.

All this would seem more palatable to us if the ultimate outcome of the Florida election follies had not been a 5-4 decision of the U.S. Supreme Court that used the Constitution’s equal protection clause and arcane aspects of electoral college procedures to justify the abandonment of a statewide recount. If equal protection mattered so much for the statewide recount, why did it not matter for the citizens of Palm Beach County?

Perhaps these questions can be answered by reviewing the legal arguments and judicial opinions in the torrent of election law cases that spouted forth from Florida. But the answers seem a bit hollow to us. They would resonate better if a statewide recount, with suitable standards, had been undertaken to decide the election.

Notes

1. Making matters worse, the only office for which the ballot listed candidates on both sides of the booklet, thus creating the “butterfly,” was for the presidency.

2. There are two other stories regarding this ballot. David McReynolds, a Socialist Party candidate for president was listed just below Buchanan on the right-hand side of the ballot with some overlap with Al Gore on the left-hand side. McReynolds received 302 votes in the initial Palm Beach County count, almost 50% of the 618 votes he received statewide, and 268 more than he received in any other county. Howard Phillips of the conservative Constitution Party was listed below McReynolds with some overlap with Ralph Nader. Phillips’ 188 votes in Palm Beach County were 78 more than he received in any other Florida county, and these votes were 14% of his statewide total. If the Buchanan, Phillips, and McReynolds votes are taken seriously, then Palm Beach County has the remarkable distinction of being the stronghold among Florida counties for right-wingers Buchanan and Phillips and left-winger McReynolds.

3. We were not the only ones to produce analyses regarding the butterfly ballot. Within four days of the election, the following people had posted analyses: Greg Adams and Chris Fastnow, Carnegie Mellon University; Layth Alwan, University of Wisconsin, Milwaukee; Christopher Carroll, Johns Hopkins University; Burt Monroe, Indiana University; Craig Fox, Duke University; Bruce Hansen, University of Wisconsin, Madison; John Irons, Amherst College; Robert Max Jackson, New York University; Jonathan O’Keefe, Peter Orszag, and Jonathan Orszag, Sebago Associates; Till Rosenband, MIT; Matthew

Ruben, University of California, San Diego; Robert Shimer, Princeton University; and Chris Volinsky, AT&T Labs. We apologize to anyone we have missed, and we note that many others added work later.

4. Considering the limits of the time available, Adams and Fastnow’s (2000) initial analysis proved very useful and informative, but methodologists are picky people, and it was clear that their work was only a starting point. Adams and Fastnow improved their work in the subsequent days.

5. They also plotted Buchanan vote versus Bush vote and Buchanan vote versus Gore vote.

6. Indeed, skeptics such as Robert Shimer and Bo Honore of Princeton University and Patrick Anderson of Anderson Consulting soon jumped in to make exactly these points. Shimer (2000) argued that “the evidence that Palm Beach voted too much for Buchanan is based on a spurious correlation driven to a large extent by the size of Palm Beach County. The oft-quoted significance of this result is based on an erroneous assumption of normal residuals, which is inapplicable given the low average vote share for Buchanan.” Our methods avoid these pitfalls.

7. The authors were listed in reverse alphabetical order.

8. Wand et al. also completed their overvote analysis by using the total number of votes in the Senate election for each precinct as a proxy measure for the total number of ballots. Subsequent analysis using the actual number of overvotes has led to the same conclusion.

9. In the 1996 presidential election, Tillman voters cast 288 votes for Clinton, 102 for Dole, 19 for Perot, and 2 for the remaining candidates.

10. *Beverly Rogers and Ray Kaplan v The Elections Canvassing Commission of the State of Florida; Governor Jeb Bush; Secretary of State Katherine Harris; Clay Roberts, Director of the Division of Elections for the State of Florida; Theresa LePore, Supervisor of Elections for Palm Beach County; The Palm Beach County Elections Canvassing Commission; Al Gore; and George W. Bush*. 15th Cir Ct Fla. CL0010992AF:. The state-level defendants were subsequently dropped and, on November 13, the case was consolidated with other similar citizen's actions by Administrative Order No. 2.061-11/00.

11. Among other things, Brady checked to see if Reform Party support was especially strong in Palm Beach County. He convinced himself that Reform Party registration was low, that across precincts it had no relationship to the Buchanan vote, and that votes for other Reform Party candidates had no relationship to Buchanan's support.

12. The machine recount completed in Palm Beach County on November 11 recorded 19,147 overvotes, while the complete manual count completed on November 26 recorded 19,213 overvotes. The Palm Beach County Supervisor of Elections reported these counts on a file server at <http://pbcelections.org/electionresults/2000/GEN/>.

13. The Gore campaign selected three of the precincts (162E, 193 and 193E) contributing 4,346 of the 4,694 ballots in the sample. The Elections Commission selected the fourth precinct (6B) to get as near as possible to one percent of all the ballots cast in the county.

14. This story is consistent with later reviews of Gore's decision-

making. "Regarding the butterfly ballots, Democratic field workers were collecting some 8,000 affidavits from confused voters, and Mr. Gore's lawyers were eager to litigate. But some in Mr. Gore's dining room that first Saturday night [November 11] worried that the proposed remedy--presumably a new vote of some kind--would make him seem unreasonable and extreme, testing the patience of both his partisans and the public" (Sack 2000). The Gore campaign never directly associated itself with the butterfly ballot case.

15. Herron heard only part of the argument because he returned to Boston on Wednesday evening.

16. We were at that time unaware of the stories that had broken about the large number of spoiled ballots in Duval County, where the presidential ballot spanned two pages but lacked the two key features of the butterfly ballot. After leaving Florida we were able to isolate key differences between the ballots in Duval and Palm Beach Counties, but it would have been very difficult for us to complete such analyses Wednesday night in the course of preparing our affidavits.

17. Fifteenth Judicial Circuit, Palm Beach Florida, "Order on Plaintiff's Complaint for Declaratory, Injunctive, and Other Relief Arising from Plaintiffs' Claims of Massive Voter Confusion Resulting from the Use of a 'Butterfly' Type Ballot During the Election Held on November 7, 2000"

18. *Fladell, et al. v Palm Beach County Canvassing Board, etc. et al.* Sup Ct Fla. 00-2373.

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