



1 that the use of extensive data sources and the best available statistical techniques is treated with  
2 such contempt.

3 5. Based upon my twenty years of analyzing political science data, I am willing to stake my  
4 reputation on the results reported in my declaration. Indeed, unlike many other social science  
5 results, those regarding punchcards are astonishingly clear, and they have been reproduced time  
6 and time again. Moreover, the criticisms of my declaration in the Amicus brief do not provide  
7 any contrary data on California. Rather, they consist of a set of standard concerns about social  
8 science research which I addressed in my initial declaration by using multiple methods and  
9 multiple data sources. In addition, the criticisms reflect some unfortunate misinterpretations of  
10 the existing literature and some failures to examine closely the data that was presented in my  
11 initial declaration.

### 12 **C. Voter Education is Not Enough**

13 6. Punchcard systems simply fail to record a statistically and substantively significant  
14 percentage of intentional votes that are recorded by other systems. There is no evidence that  
15 voter education remedies the poor performance of punchcards. Consequently, the only possible  
16 remedy is to not use punchcards in elections.

## 17 18 **DETAILED DISCUSSION OF ISSUES**

### 19 **A. Amicus Misunderstands its Own Expert Regarding Racial Bias in Punchcards**

20 7. Before turning to a more detailed discussion of the claims by Amicus and its experts, let me  
21 deal with a point that appears to be a serious and significant misunderstanding on the part of  
22 Amicus of the research of its own expert. Amicus claims “As studies have shown, punch-card  
23 voting does not have a disparate error impact on minority voters, who tend to undervote (and,  
24 less frequently, overvote) deliberately when a member of their group is not among the  
25 candidates.” In the last part of this sentence, Amicus is referring to the paper cited by its expert,  
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1 Michael Herron, which deals with deliberate under- or over-voting by minorities.<sup>1</sup> Dr. Herron  
2 (at paragraph 21) says “our research has shown that African American residual vote rates are  
3 lower where African American candidates are running for office,” but Dr. Herron says nothing in  
4 his declaration about whether or not punchcard voting has a disparate impact on minority voters.  
5 8. In the most current draft of Dr. Herron’s paper (written jointly with Jasjeet Sekhon of Harvard  
6 University) which deals with punchcard voting in Chicago, Dr. Herron and his coauthor state on  
7 page 4 that:

8 “Nothing in our argument should be taken to suggest that voting technology, voter  
9 experience, and socioeconomic variables are not important factors when accounting for  
10 the high residual vote rates of African-Americans. We usually find a significant black-  
11 white residual vote rate gap even when African Americans can vote for major-party black  
12 candidates.”

13 This statement absolutely contradicts Amicus’s statement that “punch-card voting does not have  
14 a disparate error impact on minority voters”.

15 9. Indeed, I have checked with Dr. Herron’s co-author who has told me that Amicus’s  
16 construction of their argument is “absurd”. In fact, the paper by Dr. Herron and Dr. Sekhon  
17 shows that even in the situation where the residual vote gap between minorities and others  
18 should be smallest because a minority is running for office, there is still a significant residual  
19 vote difference between minorities and non-minorities when punchcards are used. More  
20 generally, there is abundant evidence produced in my declaration and in other studies that  
21 residual vote rates are higher for minorities than non-minorities in punchcard counties.

22 **B. Criticisms of My Work**

23 10. The criticisms of my work fall into five categories:

24 (a) a claim that residual votes cannot be used as a measure of performance of voting  
25 technologies because some voters intentionally decide not to vote;

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27 <sup>1</sup> See Michael Herron and Jasjeet Sekhon, “Black Candidates and Black Voters: Assessing the Impact of Candidate  
28 Race on Uncounted Vote Rates,”  
<http://jsekhon.fas.harvard.edu/elections/election2000/HerronSekhon.candidates.pdf>

1 (b) a claim that my statistical procedures do not prove that punchcards perform poorly  
2 compared to other systems;

3 (c) a claim that we have learned from the Florida experience so that punchcards now  
4 perform better;

5 (d) a claim that there is no evidence of punchcards discriminating against minority voters;  
6 and

7 (e) a claim that other systems perform as badly as punchcards.

8 **C. Residual Vote Rate is a Widely Used and Satisfactory Measure of Performance**

9 11. It is wrong to conclude that the residual vote rate is flawed because some voters choose  
10 intentionally not to vote. Using the best survey evidence, Stephen Knack and Martha Kropf  
11 (2001)<sup>2</sup> find that only about 0.75% of the voters who go to the polls intentionally decide not to  
12 vote in presidential elections. Thus, residual vote rates greater than this must be the result of  
13 unintentional under- or over-voting. Consequently, the residual vote has been widely used as a  
14 measure of the performance of voting systems. Residual vote rates in presidential elections have  
15 been used as a measure of performance by the Cal-Tech/MIT report that is Exhibit F of Amicus's  
16 submission and by the National Commission on Federal Election Reform (the Carter-Ford  
17 Commission) that is Exhibit I of Amicus' submission.

18 12. The National Commission said (at page 54):

19 "We encourage states (and their citizens) to judge performance at four levels. Residual  
20 vote rates at or below 1% should be considered good. Residual vote rates between 1 and  
21 2% can be viewed as adequate, but citizens should consider local circumstances and  
22 decide what is possible. Rates between 2 and 3% should be viewed as worrying. Rates  
23 higher than 3% should be considered unacceptable."

24 The National Commission allowed for residual votes at or below 1% because they believed that  
25 there might be some intentional undervoting (and even overvoting) in a presidential race, but  
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27 <sup>2</sup> Stephen Knack and Martha Kropf, 2001, "Roll Off at the Top of the Ballot: Intentional Undervoting in American  
28 Presidential Elections," Working Paper. This paper is cited in the report of the National Commission on Federal  
Election Reform (The Carter-Ford Commission), *To Assure Pride and Confidence in the Electoral Process*, August,  
2001, page 53 (Exhibit I of Amicus Brief).

1 they did not believe that it would exceed one percent. By the National Commission’s standards  
2 (see Figure 1 in my initial declaration) the residual vote rate for punchcards in California is  
3 “worrying” and the residual vote rate for all other systems is “good”.

4 **D. My Methods Complement One Another by Controlling for Differences Across Areas**  
5 **and Across Elections**

6 13. Dr. Katz criticizes my statistical analysis (at Katz, paragraph 16) after noting that “There are  
7 two standard approaches, cross-sectional and panel (or dynamic) comparisons. Dr. Brady uses  
8 both and there are problems with each.” Dr. Katz’s discussion is a reasonable summary of the  
9 problems with these two types of studies when taken separately, but he fails to mention that the  
10 approaches complement one another so that evidence from both types of studies provides a much  
11 stronger case than either method taken alone. I used both methods in my declaration.

12 14. In addition, in a statistical analysis underlying my original declaration, I used a “difference-  
13 in-differences”<sup>3</sup> method which involves a simultaneous cross-sectional and panel-study using all  
14 of the approximately 3500 Census tracts using punchcards in California in 1996, some of which  
15 changed to new systems in 2000. This approach takes the difference in residual votes between  
16 2000 and 1996 in all tracts changing from punchcards to another system and it compares this  
17 with the difference in residual votes between 2000 and 1996 in all tracts which used punchcards  
18 in both years. The difference of these differences is an estimate of the net residual votes for  
19 punchcards after controlling for both sets of factors which concern Dr. Katz. The net result is  
20 that those areas using punchcards instead of other systems have a residual vote rate that is greater  
21 by at least one percentage point (with a t-statistic of 9.6 indicating statistical significance at the  
22 .000001 level, far beyond the standard .05 level). I also find that residual vote rates increase  
23 about 0.9% from zero percent minority tracts to 100 percent minority tracts – thus indicating that  
24 punchcards discriminate against minorities. (This result has a t-statistic of 4.4 indicating  
25 statistical significant at the .0001 level.)

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28 <sup>3</sup> Difference-in-Differences estimators are relatively new but they have already entered standard introductory  
econometrics textbooks. See James H. Stock and Mark W. Watson, 2003, *Introduction to Econometrics*, Addison-  
Wesley, pages 385-338 and Jeffrey M. Wooldridge, 2000, *Introductory Econometrics*, South-Western College  
Publishing, page 415.

1 15. This analysis answers both of Dr. Katz’s criticisms. He worries that with cross-sectional  
2 studies the counties (or tracts in my analysis) that are compared might have different  
3 characteristics, but he notes (at paragraph 23) that with panel studies, “Since the underlying  
4 characteristics of [a] county, such as its demographic make-up, are not likely to have changed  
5 much in a short enough period of time, one potential source of confounding effects is  
6 eliminated.” The first set of differences (one for those tracts that changed from punchcards to  
7 other systems and the other for those counties that used punchcards in both years) in my analysis  
8 solves this problem because each difference is like a panel analysis in which residual votes in  
9 one year are compared with residual votes in another year in the same tract. Thus, the method  
10 controls for the underlying characteristics of a tract. But Dr. Katz goes on to say (at paragraph  
11 23) that with a panel analysis, “we now have to worry that the two elections used to compare the  
12 same county do not systematically vary.” My second difference takes care of this because it  
13 compares the change in punchcard residual vote rates between 1996 and 2000 with the change in  
14 non-punchcard residual vote rates between 1996 and 2000. If the 2000 election is different from  
15 the 1996 election, then it will affect both of these differences equally – any remaining difference  
16 must be due to the use of punchcards. Thus, the best available techniques lead to the same  
17 conclusion that punchcards lead to significantly higher residual vote rates, and they discriminate  
18 against minorities.

19 **E. Punchcard Performance in the 2002 Gubernatorial Race Did Not Improve After 2000,**  
20 **Even Though the 2002 Race was Much Closer than the 1998 Contest**

21 16. Both Dr. Katz and Mr. Hawkins criticize my evidence that punchcard performance did not  
22 improve after the 2000 Presidential election problems in Florida. I am, frankly, mystified by  
23 their comments.

24 17. First, Dr. Katz might have noted that Table I presented in my initial declaration and my  
25 discussion of it amount to a difference-in-differences analysis which strongly supports my claim.

26 18. Second, even more mystifying is Mr. Hawkins’ claim (at paragraph 9):

27 “As a (former) California voting official, I am deeply skeptical of Professor Brady’s  
28 evidence that we have not learned from the Florida fiasco. He contrasts the ‘residual’

1 rates for the 1998 and 2002 gubernatorial races and shows a higher ‘residual’ rate after  
2 the Florida balloting than before. In my opinion that comparison is apples and oranges:  
3 the California 1998 gubernatorial was hotly contested while the 2002 pitted an incumbent  
4 against an apparently weak challenger. Not surprisingly, many more voters chose to  
5 abstain in that contest than did in 1998.”

6 Dr. Katz makes the same claim (at paragraph 26) “That some more voters in Los Angeles  
7 county, for example, decided to abstain on the 2002 race is hardly surprising.” The Amicus brief  
8 picks up these claims (footnote 11).

9 19. Yet by the standard measure of “closeness of the election” the 2002 race was much more  
10 hotly contested than the 1998 race. In the 1998 race there was a difference of almost twenty  
11 percentage points between Mr. Davis (57.97%) and Mr. Lungren (38.38%) while in the 2002  
12 race the vote difference was less than five percentage points between Mr. Davis (47.3%) and Mr.  
13 Simon (42.4%). Therefore, I cannot understand why both Dr. Katz and Mr. Hawkins believe that  
14 there should have been more abstention (by which they mean intentional undervoting) in 2002.  
15 If anything, 2002 was much more hotly contested than 1998, and we should expect less  
16 “abstention” in 2002. The failure of any of these experts to remember (or to look-up) these facts  
17 is somewhat surprising to me.<sup>4</sup>

18 **F. High Residual Vote Rates in 100% Minority Tracts Prove that Punchcards**  
19 **Discriminate Against Minority Voters**

20 20. In paragraph 4 above I showed that Amicus’ own expert argues that when punchcards are  
21 used there is a higher residual vote rate among minorities than among other groups, even when a  
22 minority candidate is on the ballot. But despite this strong evidence which was available to Dr.  
23 Katz (who cites Dr. Herron’s study at paragraph 14 in his declaration), Dr. Katz criticizes my  
24 results on the grounds that I have committed an “ecological fallacy.” He argues (at paragraph  
25 30) as follows:

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27 <sup>4</sup> Turnout was lower in 2002 than in 1998 (50.57% versus 57.59%) but this would lead to lower residual vote rates  
28 in 2002 based upon the common wisdom that there are fewer voting problems when turnout is lighter. Turnout in  
1998 might have been higher in 1998 because there was a Senate race, but this would also increase residual votes in  
1998 because some people might turn out to vote in one “top-of-the-ticket” race (the gubernatorial) while others  
turned out to vote in the other “top-of-the-ticket” race (the Senate race).

1 “For example, suppose that white voters in predominantly non-white communities  
2 (precincts) cast invalid votes at higher rates – perhaps because they feel politically  
3 disenfranchised or have lower average education levels – than whites in predominantly  
4 white communities (precincts) and that non-white voters’ rate of casting invalid votes is  
5 lower than both groups of whites.”

6 Dr. Katz’s argument is based upon the idea that the high residual vote rates are really due to non-  
7 minorities who happen to be in largely minority areas, but once again, I am mystified by Dr.  
8 Katz’s comment.

9 21. I included Figure 3 in my initial declaration precisely so that statistically-trained researchers  
10 like Dr. Katz could plainly see that in 100% minority Census tracts (at the right-hand side of the  
11 figure), the residual vote rate is clearly higher than the overall average and higher than the almost  
12 entirely non-minority Census tracts at the left of the Figure. Thus, in Census tracts which are  
13 entirely minority, the residual vote rate is 4.6% in 2000 (versus the average of about 2.7%) and it  
14 is even higher in entirely minority tracts in 1996. Since these tracts are entirely composed of  
15 minorities, it cannot be the case that the high residual vote rates are the result of non-minorities.  
16 (It is also wrong to suggest, as in paragraph 31, that I should have used newly developed  
17 statistical methods to solve this problem. As Dr. Katz knows very well, the method of  
18 homogenous tracts or precincts has always been considered the strongest method for dealing  
19 with this problem. A glance at Figure 3 would have shown that there is exceptionally strong  
20 evidence that there are high residual vote rates among minorities.)

21 **G. In California, All Non-Punchcard Systems Perform Substantially Better than**  
22 **Punchcards**

23 22. The final criticism of my work is that there is evidence that non-punchcard systems perform  
24 worse than punchcards. The study cited by Amicus experts that purportedly shows that  
25 electronic systems perform badly combines data from 1988 (when electronic systems were in  
26 their infancy) to 2000. When I analyzed data for just 2000 for the entire United States in my  
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1 2001 report,<sup>5</sup> I concluded that “Optical scan and DREs appear to dominate all other systems in  
2 terms of overall performance across all counties and especially in large counties.” (page 2). In  
3 fact, whereas the nationwide average residual vote rate for punchcards was 2.64 percent, the  
4 average for DREs was 1.68 percent and for optical scan was 1.37 percent. (page 29).

5 23. It is also surprising to me that Amicus does not cite any evidence regarding the performance  
6 of non-punchcard systems in California, even though Amicus emphasizes that California is  
7 different and that (at page 3) “We are not in Florida. California election administrators...have  
8 successfully and reliably deployed punch-card systems for over forty years.” Yet, Amicus’  
9 expert cites 2000 Florida data as the leading evidence that central-count optical scan systems  
10 perform poorly (Dr. Herron at paragraph 15). I agree with Amicus on this one point: based upon  
11 the historical performance of their election systems, California election administrators are better  
12 than Florida election administrators. We should, therefore, be wary of assuming that Florida  
13 data reflects the performance that would be obtained from voting systems in California.

14 24. My Figure 1 in the initial declaration displays California data that clearly show the  
15 substantially better performance (about 1.3 percentage points better) of each non-punchcard  
16 system (including central count optical scan, Datavote, precinct count optical scan, and  
17 electronic systems) compared to punchcards. Thus, highly competent and professional  
18 California election administrators have done well with Datavote, electronic, and optical scan  
19 systems of both types, but they have not done well with punchcards in California.

#### 20 21 **H. Should Voting Systems Tell People How They Voted?**

22 23. One of the most astounding (I can think of no other word) claims in the Amicus brief is that  
23 voters should not be given a summary of how they voted including an indication of overvotes  
24 and undervotes:

25 “Not surprisingly, punchcards do worse. But as Professor Herron explains, that is not  
26 necessarily because punch-cards fail to accurately register voter intent. Rather, optical  
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28 <sup>5</sup> Henry E. Brady, Justin Buchler, Matt Jarvis, and John McNulty, *Counting All the Votes: The Performance of Voting Technology in the United States*, 2001, Survey Research Center and the Institute for Governmental Studies.

1 scanning system and DREs are biased against overvotes and undervotes; they are  
2 designed to generate warnings that effectively force voters to cast a vote in each contest  
3 and not more than one, even if that is how the voter would otherwise prefer to vote. (page  
4 18)”

5 Putting aside the hyperbole that has Amicus claiming that a summary of how a voter has voted  
6 amounts to “effectively force[ing]” someone to “cast a vote in each contest,” it is worth  
7 considering the following statement by “The Election Center,” an organization of election-  
8 administration professionals cited favorably by Amicus in footnote 8. This group says that  
9 “Voting systems must, and with more or less ease do, enable voters to review their ballots prior  
10 to casting them.” (page 45 in Amicus Exhibit L) Furthermore, it must be recognized that no  
11 system forces a person to vote – every system allows undervotes so that a voter can decide not to  
12 vote in a race.

13 24. Simple good sense tells us that a complex system that summarizes peoples’ actions for them  
14 is better than one which is hard to fathom and opaque. It is amazing to me that Amicus would  
15 argue that a transparent and clear system is “biased,” and that Amicus prefers an opaque and  
16 hard to understand system.

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18 **CONCLUSIONS: VOTER EDUCATION IS NOT ENOUGH**

19 25. The declarations by Dr. Herron and Dr. Katz demonstrate the ability of talented social  
20 scientists to point out the difficulties of doing good social science research, but they do not  
21 provide any contrary data concerning my major points and their criticisms have been answered  
22 by my research. Indeed, in every case I have anticipated their concerns and found no evidence  
23 for their speculations. What remains is the fact that punchcards perform poorly.

24 26. My statement has dealt mostly with the Amicus brief because, unlike the state’s reply, it  
25 contests the well-known findings regarding punch-cards. As I have shown, there is no reason to  
26 doubt these findings – punchcards throw away votes, especially minority votes, and they  
27 punchcard systems have not improved.

1 27. Although the state does not contest these findings, it does claim that any problems with  
2 punchcards can be dealt with through voter education. This “solution” is based upon an untested  
3 theory that the problem with punchcards is uneducated voters. Yet, it is just as likely that the  
4 problem is the systems themselves. Unfortunately, I do not believe that we know exactly why  
5 punchcards perform so badly so we cannot remedy the problem except by getting rid of  
6 punchcard systems. Moreover, it is very disconcerting to think that the state is just now deciding  
7 to engage in voter education. Why did they not do so in all elections from 2001 to the present?  
8 And if they did, why are punchcard systems still performing so badly? In short, voter education  
9 is not the solution. The solution is to get rid of punchcards.

10 28. I have been also asked to indicate that on Thursday, August 14<sup>th</sup> I was informed that I would  
11 have a new title at the University of California as the Class of 1941, Morton Deutsch Professor  
12 of Political Science and Public Policy. Needless to say, I am very pleased at receiving this  
13 prestigious chair at the nation’s premier public university.

14  
15 I declare under penalty of perjury under the laws of California that the foregoing is true and  
16 correct, and if called upon to do so, I could and would so testify. Executed this \_\_\_ day of  
17 August, 2003, at \_\_\_\_\_, California.

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20 Henry E. Brady  
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