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AFFIDAVIT OF PHILIP B. STARK

PHILIP B. STARK, being duly sworn, deposes and says the following under penalty of perjury:

I. QUALIFICATIONS AND BACKGROUND

1. I am Professor of Statistics, Associate Dean of Mathematical and Physical Sciences, and Director of the Statistical Computing Facility at the University of California, Berkeley, where I am also a faculty member in the Graduate Program in Computational Data Science and Engineering; a co-investigator at the Berkeley Institute for Data Science; principal investigator of the Consortium for Data Analytics in Risk; director of Berkeley Open Source Food; and affiliated faculty of the Simons Institute for the Theory of Computing, the Theoretical Astrophysics Center, and the Berkeley Food Institute. Previously, I was Chair of the Department of Statistics. I submit this Affidavit in support of Jill Stein's Petition for a hand recount of all ballots in Michigan.

2. I have published more than one hundred and fifty articles and books. I have served on the editorial boards of archival journals in Physical Science, Applied Mathematics, Computer Science, and Statistics. I currently serve on four editorial boards, including the board of the Journal of Election Technology and Systems (JETS), which focuses on election integrity. I have lectured at universities, professional societies, and government agencies in twenty-five countries. I was a Presidential Young Investigator and a Miller Research Professor. I received the U.C. Berkeley Chancellor's Award for Research in the Public Interest (for work on election integrity), the John Gideon Award for Election Integrity from the Election Verification Network, the Leamer-Rosenthal Prize for Open Social Science, and a Velux/Villum Foundation Professorship. I am a member of the Institute for Mathematical Statistics and the Bernoulli Society. I am a Fellow of the American Statistical Association, the Institute of Physics, and the Royal Astronomical Society. I am professionally accredited as a statistician by the American Statistical Association and as a physicist by the Institute of Physics.

3. I have consulted for many government agencies, including the U.S. Department of Justice, the U.S. Department of Agriculture, the U.S. Department of Commerce, the U.S.

Department of Housing and Urban Development, the U.S. Department of Veterans Affairs, the Federal Trade Commission, the California Secretary of State, the California Attorney General, the California Highway Patrol, the Colorado Secretary of State, and the Illinois State Attorney.

4. I have testified before the U.S. House of Representatives Subcommittee on the Census; the State of California Senate Committee on Elections, Reapportionment and Constitutional Amendments; the State of California Assembly Committee on Elections and Redistricting; and the State of California Senate Committee on Natural Resources.

5. I have been qualified as an expert on statistics in federal courts, including the Central District of California, the District of Maryland, the Southern District of New York, and the Eastern District of Pennsylvania.

6. I have also been qualified as an expert on statistics in state courts.

7. I have used statistics to address a wide range of questions in many fields.¹

8. Since 1988, I have taught statistics at the University of California, Berkeley, one of the top two statistics departments in the world (*see, e.g.*, QS World University Rankings, 2014) and the nation (US News and World Reports, 2014).

9. In 2007, I served on California Secretary of State Debra Bowen's Post-Election Audit Standards Working Group.

10. I developed statistical approaches to auditing elections ("risk-limiting audits") that have been incorporated into statutes in California (AB 2023, SB 360, AB 44) and Colorado (C.R.S. 1-7-515). Risk-limiting audits are widely considered the gold standard for post-election audits; they have been endorsed by the Presidential Commission on Election Administration, the American Statistical Association, the League of Women Voters, Verified Voting

¹ For example, I have used statistics to analyze the Big Bang, the interior structure of the Earth and Sun, the risk of large earthquakes, the reliability of clinical trials, the accuracy of election results, the accuracy of the U.S. Census, the risk of consumer credit default, the causes of geriatric hearing loss, the effectiveness of water treatment, the fragility of ecological food webs, risks to protected species, the effectiveness of Internet content filters, and the reliability models of climate, among other things.

Foundation, Common Cause, Citizens for Election Integrity Minnesota, and other groups concerned with election integrity.²

11. I currently serve on the Board of Advisors of the U.S. Election Assistance Commission.

12. I currently serve on the Board of Directors of Verified Voting Foundation, a 501(c)(3) nonpartisan nonprofit dedicated to election accuracy, transparency, and verifiability.

13. Since 2012, I have served on the Travis County, Texas, STAR-Vote team, which is developing a new voting system designed to be secure, transparent, auditable, and reliable, using cryptographic methods and a voter-verified paper trail audited using a risk-limiting audit to verify that election outcomes are correct.

14. I have published numerous peer-reviewed articles on election auditing and election integrity. I have also published open-source software to facilitate conducting risk-limiting post-election audits.

15. I have collaborated with state and local election officials in California and Colorado to pilot risk-limiting audits of roughly 25 contests in roughly 20 jurisdictions. Some of the pilots in both states were funded by grants from the U.S. Election Assistance Commission.

16. I have made invited presentations about election integrity to professional organizations of election officials, including the International Association of Clerks, Recorders, Election Officials, and Treasurers (IACREOT); and the California Association of Clerks and Election Officials (CACEO). I have also made invited presentations about election integrity and election auditing at many universities and to professional societies for statistics, political science, legal studies, computer science, and information security.

17. Appendix 1 is my current *curriculum vitae*.

² See, e.g., Presidential Commission on Election Administration, 2014. *The American Voting Experience: Report and Recommendations of the Presidential Commission on Election Administration*, <https://www.supportthevoter.gov/files/2014/01/Amer-Voting-Exper-final-draft-01-09-14-508.pdf>, American Statistical Association. 2010. Statement on risk-limiting post-election audits, http://www.amstat.org/outreach/pdfs/Risk-Limiting_Endorsement.pdf (both last visited 27 November 2016)

II. OPINIONS

18. No method for counting votes is perfect: Every method makes errors at some rate. If the error rate is comparable to or larger than the margin in the contest, errors can cause the wrong candidate or position to appear to win. This is true in particular for the method used in Michigan: optically scanned voter-marked ballots.
19. According to the certified results, the recorded margin between the president-elect and the second-place candidate in Michigan is 10,704 votes in 4,874,619 ballots cast.³ Hence, errors in the interpretation or tabulation of less than 0.11 percent of the ballots could have caused a tie to appear to be a win. To determine whether the reported winner actually won requires verifying the results as accurately as possible, which in turn requires manually examining the underlying paper records—not merely rescanning and retabulating the ballots.
20. Errors can enter in various parts of the election process, including the software in election management systems, voting machines and the computers used to aggregate votes; configuring, calibrating, deploying, and closing down voting equipment; voter error and vagaries of how voters mark ballots; limits on the ability of scanners and software to infer voter intent; and procedural lapses or errors.
21. Moreover, many components of the election process are vulnerable to malicious computer hacking, including voter registration databases, computers used to configure voting machines for each election, electronic pollbooks, individual voting machines, and the computers used to aggregate and report totals.
22. Votes cast on any computerized voting equipment that does not generate a paper trail can be altered, deleted, or created by software bugs, procedural errors, or deliberate hacking. Such errors may be completely undetectable. A skilled hacker could write malware that would cause a voting machine to alter votes, add votes, or delete votes, and then to erase

³ These numbers are derived from the final certified results in Michigan, per http://www.michigan.gov/sos/0,4670,7-127-1633_8722-397762--,00.html and http://miboecfr.nictusa.com/election/results/2016GEN_CENR_TURNOUT.html (both last visited 29 November 2016).

the instructions that made those changes. Viruses can be propagated from machine to machine through removable storage media.

23. If those votes were cast using a method that produces a paper record (i.e., either a paper ballot or a paper record that voters had the opportunity to verify before casting their votes), the only reliable way to determine in a particular election contest is to review those paper records. Depending on voting technology, those paper records might be voter-marked paper ballots, paper ballots marked using a computerized ballot-marking device, or a voter-verifiable paper audit trail printed by an electronic voting machine. If the paper records have been preserved intact, checking the electronic results against manual inspection of the underlying paper records can reveal tabulation and aggregation errors of all kinds, even if the software has bugs or has been hacked.
24. In contrast, the original result and the result obtained by rescanning and retabulation could both be wrong. Rescanning and retabulating without checking the electronic data against the original paper records cannot confirm that the reported result is correct.
25. Rescanning and retabulating might detect some kinds of errors, for instance, omitting an entire batch of ballots or scanning the same batch twice.
26. Other kinds of errors are likely to recur in rescanning and retabulation. For instance, if two ballot pages are stuck together, they might be “mispicked” during both scans. Scanner misfeeds and mispicks can be frequent, depending on the design and condition of the scanner, and the condition and weight of the ballots, humidity, and maintenance, and other procedures.⁴
27. Other kinds of errors cannot be detected in rescanning: Anything that affects the accuracy of the electronic data in both scans would not be detected without reviewing the underlying paper record. For instance, if the software had bugs or had been hacked, such errors likely would not be detected.
28. For optically scanned voter-marked ballots, software “interprets” voters’ marks to try to ascertain voter intent. There are many cases in which such systems perform poorly.

⁴ I know this from my own personal experience watching ballots being processed during elections and audits, and from speaking with election officials and staff who have hands-on experience.

Repeating the scanning and tabulation process may simply repeat such errors, rather than reveal the errors.

29. For instance, the software may miss a light or incomplete mark, interpreting it as an undervote, whereas a human being inspecting the paper record would see the voter's intent clearly. I personally saw evidence of this during an audit in Yolo County, California, in 2008.
30. Similarly, the software may interpret a "hesitation mark" as an intended vote, resulting in interpreting a ballot as having an overvote where a human being would see a valid vote, or incorrectly recording a vote where the voter intended none. I personally saw evidence of this in audits in San Luis Obispo, California, and Ventura, California, in 2011. There are documented instances where scanners have high rates of erroneously inferring that valid votes are overvotes.⁵
31. I understand that the residual vote rate (undervotes, overvotes, and otherwise invalid votes) in the 2016 presidential contest in Michigan is substantially higher than in previous four presidential elections: the mean rate was 1.03% and the maximum was 1.09% (in 2000), while the rate this year was 1.55%, more than 41% higher than in 2000, the next highest year.⁶ If even a small fraction of these residual votes are actually valid votes, that could change the outcome of the presidential election in Michigan.

⁵ See, e.g., <http://www.nydailynews.com/opinion/voters-damned-article-1.1028275#ixzz1nb60Oaz2> (last visited 27 November 2016)

⁶ The Michigan Secretary of State's office shows turnout and total votes for president as follows for the last five elections:

2000: 4279299, 4232501

2004: 4875692, 4839252

2008: 5039080, 5001766

2012: 4780701, 4730961

2016: 4874619, 4799284

See http://miboecfr.nictusa.com/election/results/2000GEN_CENR_TURNOUT.html,

http://miboecfr.nictusa.com/election/results/2000GEN_CENR.html,

http://miboecfr.nictusa.com/election/results/2004GEN_CENR_TURNOUT.html,

http://miboecfr.nictusa.com/election/results/2004GEN_CENR.html,

http://miboecfr.nictusa.com/election/results/2008GEN_CENR_TURNOUT.html,

http://miboecfr.nictusa.com/election/results/2008GEN_CENR.html,

http://miboecfr.nictusa.com/election/results/2012GEN_CENR_TURNOUT.html,

http://miboecfr.nictusa.com/election/results/2012GEN_CENR.html,

32. Depending on the scanner technology and how the scanner is calibrated, it can fail to detect some kinds of ink or can be overly sensitive to others, interpreting a “speck” as a full mark.⁷ Re-scanning the ballots may simply repeat such problems, not reveal the problems.
33. Small variations in the length of a paper ballot can cause scanners not to count some ballots.⁸ Re-scanning the ballots would repeat such problems, not reveal the problems.
34. Optical-scan voting equipment can be unreliable. For instance, running the same ballots through the same scanner can produce widely varying results.⁹ Re-scanning the ballots may be likely to produce another inaccurate count rather than a corrected count.
35. Software problems in voting systems can cause entire batches of votes to be deleted;¹⁰ re-scanning the ballots might not reveal such problems.
36. When margins are small, as they are in the 2016 presidential election in many jurisdictions including Michigan, the amount of error required to alter the outcome can easily be less than the error that an optical scan system makes in accurately tabulating votes cast by voters. Some marks considered valid votes according to Michigan law may not be counted reliably.
37. Hence, a “recount” that simply rescans the ballots might confirm an erroneous electoral outcome that a manual recount of the paper would reveal. There is no practical way to tell whether a rescan and retabulation accurately reflects the results, other than by comparing *those* results to the underlying paper record. As mentioned above, because the margin in Michigan is so small, an error rate lower than 0.11 percent (just over one tenth of one percent) could have altered the apparent outcome.

http://miboecfr.nictusa.com/election/results/2016GEN_CENR_TURNOUT.html,

http://miboecfr.nictusa.com/election/results/2016GEN_CENR.html (all last visited 29 November 2016)

⁷ <http://www.phoenixnewtimes.com/news/ballot-box-breakdowns-6400239> (last visited 27 November 2016)

⁸ In Florida in 2008, this was a statewide problem. See, e.g., <http://www.votersunite.org/article.asp?id=8009> (last visited 27 November 2016)

⁹ See, e.g., <https://www.wired.com/2008/10/florida-countys> (last visited 27 November 2016)

¹⁰ See, e.g., <https://www.wired.com/2008/12/unique-election> (last visited 27 November 2016)

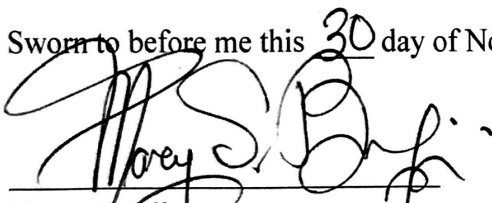
38. Therefore, someone entitled to persuasive evidence that the reported outcome of an election is the true outcome must be allowed to rely on a manual inspection of the underlying paper record rather than on rescanning and retabulating from the scan data.
39. For these reasons, and others, to determine the true electoral outcome it is essential to examine the underlying, voter-verifiable paper records manually, rather than to rely on the original scans or on rescanning the ballots.

This affidavit was executed on the 30 day of November, 2016 in Berkeley, CA.



PHILIP B. STARK

Sworn to before me this 30 day of November, 2016.



Notary Public

My Commission Expires: _____

SEE NOTARY'S CERTIFICATE.

CALIFORNIA ALL PURPOSE ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA }

COUNTY OF ALAMEDA

On Nov. 30, 2016 before me, MARY S. BAPI Notary Public,

Date

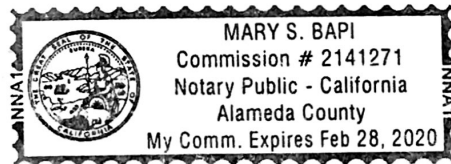
(here insert name and title of the officer)

personally appeared Philip B. Stark

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.



Signature: Mary S. Bapi (Seal)

OPTIONAL

Description of Attached Document

Title or Type of Document: AFFIDAVIT Number of Pages: _____

Document Date: _____ Other: _____

Exhibit A

Curriculum Vitae

Philip Bradford Stark

Biographical Information	1
Interests	1
Appointments	1
Awards and Fellowships	2
Affiliations and Professional Societies	3
Education	4
Mentors	4
Publications	5
Refereed Publications	5
Books and Edited Volumes	16
Book Chapters	16
Technical Reports, White Papers, and Unrefereed Publications	17
Editorials, Reviews, and Comments	23
Working Drafts	27
Software	27
Selected Presentations	28
Other Invited Seminars	57
Press	59
Teaching and Advising	81
Courses	81
Former Graduate Students and Postdocs	83
Graduate Committees	83
First-year PhD advising	89
Current PhD advisees	89
Undergraduate Research Advisees	89
Service	90
Professional Societies and Government Agencies	90
Foundations, Non-Profit Corporations, and Industry	96
Editorial and Referee Service	96
University and Higher Education	99
Contracts and Grants	104
Consulting and Expert Witness Experience	107
Recent Testimony	113

P.B. Stark: CV

November 18, 2016

1

Biographical Information

Born: 7 October 1960, Houston, Texas.

Citizenship: U.S.A.

Interests

Theory: Inference, inverse problems, multiplicity, nonparametrics, optimization, restricted parameters, sampling

Applications: Astrophysics, ecology, educational technology, elections, geophysics, hearing, legislation, litigation, marketing, physics, public policy, risk assessment and control, uncertainty quantification

Appointments

10/2015–present Associate Dean, Division of Mathematical and Physical Sciences, University of California, Berkeley

6/2016–8/2016 Visiting Professor of Theoretical Computer Science, IT University of Copenhagen

7/2012–6/2015 Chair, Department of Statistics, and Director, Statistical Computing Facility, University of California, Berkeley

7/2011–6/2012 Vice Chair, Department of Statistics, University of California, Berkeley

7/2011–8/2011 Acting Chair, Department of Statistics, University of California, Berkeley

7/2008–present Faculty, Designated Emphasis in Computational and Data Science and Engineering, University of California, Berkeley

7/1998–present Professor, Department of Statistics, University of California, Berkeley

*P.B. Stark: CV**November 18, 2016*

2

7/2001–6/2003 Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education), University of California, Berkeley

6/1996 Visiting Associate Professor, School of Mathematical Sciences, Tel Aviv University, Tel Aviv, Israel

7/1994–6/1998 Associate Professor, Department of Statistics, University of California, Berkeley

7/1988–6/1994 Assistant Professor, Department of Statistics, University of California, Berkeley

7/1987–6/1990 National Science Foundation Postdoctoral Fellow in Mathematical Sciences

1/1987–6/1987 Postgraduate Research, Department of Statistics, University of California, Berkeley

8/1986–12/1986 Postgraduate Research, Institute for Geophysics and Planetary Physics, UC San Diego

Awards and Fellowships

Velux/Villum Foundation Visiting Professor Programme (2015–2016)

Leamer-Rosenthal Prize for Transparency in Social Science (2015)

Chancellor's Award for Public Service, Research in the Public Interest, University of California, Berkeley (2011)

John Gideon Award for Election Integrity, Election Verification Network (2011)

Mellon Library/Faculty Fellow for Undergraduate Research (2006–2007)

Presidential Chair Fellow, University of California, Berkeley (2003–2004)

Fellow, American Statistical Association (selected 2014)

P.B. Stark: CV

November 18, 2016

3

Fellow, Institute of Physics (elected 1999)

Miller Research Professor, Miller Institute for Basic Research in Science (1999)

Dobson Fellow, University of California at Berkeley (1998, 1999)

Presidential Young Investigator (1989–1995)

National Science Foundation Postdoctoral Fellowship in Mathematical Sciences (1987–1989)

University Fellowship, University of Texas at Austin (1982–1983)

Affiliations

Association of Foragers

Berkeley Institute for Data Science (BIDS), University of California, Berkeley

Berkeley Food Institute, University of California, Berkeley

Berkeley Open Source Food, University of California, Berkeley

Center for Astrostatistics, Pennsylvania State University

Global Oscillation Network Group (GONG)

National Partnership for Advanced Computational Infrastructure (NPACI)

Simons Institute for the Theory of Computing, University of California, Berkeley

Solar and Heliospheric Observatory Solar Oscillations Investigation (SOHO-SOI)

Space Sciences Laboratory, University of California, Berkeley

Theoretical Astrophysics Center, University of California, Berkeley

P.B. Stark: CV

November 18, 2016

4

Professional Societies

American Statistical Association: Fellow and Accredited Professional Statistician

Bernoulli Society for Mathematical Statistics and Probability

Institute of Mathematical Statistics

Institute of Physics: Fellow and Chartered Physicist

International Statistical Institute

Royal Astronomical Society: Fellow

Society for Empirical Legal Studies

Education

A.B. 1980, Princeton University, Princeton, New Jersey

Ph.D. 1986, University of California, San Diego, La Jolla, California

Mentors

Robert L. Parker, Institute for Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego (PhD dissertation advisor)

George E. Backus, Institute for Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego (postdoctoral advisor)

David L. Donoho, Department of Statistics, Stanford University (post-doctoral advisor)

P.B. Stark: CV

November 18, 2016

5

Publications

Refereed Publications

1. Stark, P.B. and C. Frohlich, 1985. The depths of the deepest deep Earthquakes, *Journal of Geophysical Research*, *90*, 1859–1869.
2. Stark, P.B., R.L. Parker, G. Masters, and J.A. Orcutt, 1986. Strict bounds on seismic velocity in the spherical Earth, *Journal of Geophysical Research*, *91*, 13,892–13,902.
3. Stark, P.B., 1986. *Travel-Time Inversion: Regularization and Inference*, Ph.D. Thesis, Scripps Institution of Oceanography, University of California, San Diego, 106pp.
4. Stark, P.B., and R.L. Parker, 1987. Smooth profiles from tau(p) and X(p) data, *Geophysical Journal of the Royal Astronomical Society*, *89*, 2713–2719.
5. Stark, P.B., and R.L. Parker, 1987. Velocity bounds from statistical estimates of tau(p) and X(p), *Journal of Geophysical Research*, *92*, 2713–2719.
6. Stark, P.B., 1987. Rigorous velocity bounds from soft tau(p) and X(p) data, *Geophysical Journal of the Royal Astronomical Society*, *89*, 987–996.
7. Orcutt, J.A., R.L. Parker, P.B. Stark, and J.D. Garmany, 1988. Comment concerning “A method of obtaining a velocity-depth envelope from wide-angle seismic data” by R. Mithal and J.B. Diebold. *Geophysical Journal*, *95*, 209–212.
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9. Donoho, D.L. and P.B. Stark, 1989. Uncertainty principles and signal recovery. *SIAM Journal of Applied Mathematics*, *49*, 906–931.
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P.B. Stark: CV

November 18, 2016

6

11. Stark, P.B., 1992. Minimax confidence intervals in geomagnetism, *Geophysical Journal International*, 108, 329–338.
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17. Stark, P.B. and D.I. Nikolayev, 1993. Toward tubular tomography, *Journal of Geophysical Research*, 98, 8095–8106.
18. Constable, C.G., R.L. Parker, and P.B. Stark, 1993. Geomagnetic field models incorporating frozen-flux constraints, *Geophysical Journal International*, 113, 419–433.
19. Gough, D.O. and P.B. Stark, 1993. Are the 1986–1988 changes in solar free-oscillation frequency splitting significant?, *Astrophysical Journal*, 415, 376–382.
20. Stark, P.B., M.M. Herron, and A. Matteson, 1993. Empirically minimax affine mineralogy estimates from Fourier-transform infrared spectroscopy data using a decimated wavelet basis, *Applied Spectroscopy*, 47, 1820–1829.
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P.B. Stark: CV

November 18, 2016

7

22. Genovese, C.R., P.B. Stark, and M.J. Thompson, 1995. Uncertainties for Two-Dimensional Models of Solar Rotation from Helioseismic Eigenfrequency Splitting, *Astrophysical Journal*, 443, 843–854.
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28. Hill, F., P.B. Stark, R.T. Stebbins, E.R. Anderson, H.M. Antia, T.M. Brown, T.L. Duvall, Jr., D.A. Haber, J.W. Harvey, D.H. Hathaway, R. Howe, R. Hubbard, H.P. Jones, J.R. Kennedy, S.G. Korzenik, A.G. Kosovichev, J.W. Leibacher, K.G. Libbrecht, J.A. Pinar, E.J. Rhodes, Jr., J. Schou, M.J. Thompson, S. Tomczyk, C.G. Toner, R. Toussaint, and W.E. Williams, 1996. The solar acoustic spectrum and eigenmode parameters, *Science*, 272, 1292–1295.
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P.B. Stark: CV

November 18, 2016

8

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34. Benjamini, Y., Y. Hochberg, and P.B. Stark, 1998. Confidence Intervals with more Power to determine the Sign: Two Ends constrain the Means, *Journal of the American Statistical Association*, *93*, 309–317.
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P.B. Stark: CV

November 18, 2016

22

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November 18, 2016

23

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November 18, 2016

24

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25

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26

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165. Stark, P.B., 2016. Eat your Weedies!, *The Urbanist*, Issue 549, February 2016, Invited. <http://www.spur.org/publications/urbanist-article/2016-03-09/walking-oakland>
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27

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<http://lib.stat.cmu.edu/general/bvls>
2. Java Applets for Statistics
<http://www.stat.berkeley.edu/~stark/Java/Html/index.htm>
3. Millman, K., K. Ottoboni, P.B. Stark, and S. van der Walt, 2015. permute — a Python package for permutation tests
<https://github.com/statlab/permute>
4. Tools for election audits
<http://www.stat.berkeley.edu/~stark/Vote/auditTools.htm>
<http://www.stat.berkeley.edu/~stark/Vote/ballotPollTools.htm>
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5. Tools to assess suspected lottery fraud
<https://github.com/pbstark/Lotto>

P.B. Stark: CV

November 18, 2016

28

6. Miscellaneous software and teaching materials:
<http://www.stat.berkeley.edu/~stark/Code>
<https://github.com/pbstark>

Selected Presentations

208. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Distinguished Lecture Series, Department of Computer Science and Engineering, University of California, San Diego, San Diego, CA, 14 November 2016.
207. Simple Random Sampling is not that Simple, *Random Processes And Time Series: Theory And Applications, A Conference In Honor Of Murray Rosenblatt*, UC San Diego, San Diego, CA, 21–23 October 2016.
206. Invited panelist, “Productive Ecologies in the Anthropocene: Foraging Systems,” *Sixth International Conference on Food Studies*, Berkeley, CA, 12–13 October 2016.
205. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Ethics Colloquium Series, Colorado State University, Fort Collins, CO, 3 October 2016.
204. Simple Random Sampling is not that Simple, Neyman Seminar, Department of Statistics, University of California, Berkeley, Berkeley, CA 21 September 2016.
203. The Aliens Have Landed ... and They Are Delicious, *Visions of the Wild*, Vallejo, CA, 15 September 2016.

P.B. Stark: CV

November 18, 2016

29

202. Simple Random Sampling: Not So Simple, Section of Theoretical Computer Science, IT University of Copenhagen, Copenhagen, Denmark, 27 June 2016.

201. Simple Random Sampling: Not So Simple, Section of Mathematics, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, 24 June 2016.

200. Invited panelist, “Carrot vs. Stick: approaches to encouraging reproducibility,” Moore-Sloan Data Science Environment Reproducibility Conference, New York University, New York, 3 May 2016.

199. Guest lecturer, MCB 15 (Public understanding of science), University of California, Berkeley, 12 April 2016.

198. Teaching Evaluations: Biased Beyond Measure, Center for Studies in Higher Education, and The Social Science Matrix, University of California, Berkeley, CA 11 April 2016. <http://www.stat.berkeley.edu/~stark/Seminars/setCSHE16.htm> Video: <https://www.youtube.com/watch?v=yhxUxBk-6GE>, <http://uctv.tv/shows/Teaching-Evaluations-Biased-Beyond-Measure-30870>

197. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Wharton Statistics Department, University of Pennsylvania, Philadelphia, PA, 17 March 2016. <http://www.stat.berkeley.edu/~stark/Seminars/setPenn16.htm>

196. Invited Panelist, “The potentials and pitfalls of electronic auditing,” Election Verification Network Conference: Securing Elections in the 21st Century, George Washington University, Washington, DC, 10–11 March 2016.

*P.B. Stark: CV**November 18, 2016*

30

195. Invited Panelist, “Interoperability standards, proprietary codes, and verification/testing,” III Arnold Workshop: Reproducibility in Modeling and Code, American Association for the Advancement of Science, Washington, DC, 16–17 January 2016. <http://www.aaas.org/event/iii-arnold-workshop-modeling-and-code>

194. Teaching Evaluations (Mostly) Do Not Measure Teaching Effectiveness, Department of Applied Mathematics and Statistics, University of California, Santa Cruz, 1 February 2016. <http://www.stat.berkeley.edu/~stark/Seminars/setUCSC16.htm>

193. A Noob’s Guide to Reproducibility and Open Science, Department of Nuclear Engineering, Berkeley Institute for Data Science, and Berkeley Initiative for Transparency in Social Science, University of California, Berkeley, 25 January 2016. <http://www.stat.berkeley.edu/~stark/Seminars/reproNE16.htm> Video: <http://www.ustream.tv/recorded/81987743>

192. Chair, Wild Edibles Taste Workshop, 2015 Indigenous Terra Madre Conference, Shillong, Meghalaya, India, 3–7 November, 2015.

191. Invited Panelist, “From Field to Fork, the Stories of Chefs, Communities, and Writers,” 2015 Indigenous Terra Madre Conference, Shillong, Meghalaya, India, 3–7 November, 2015. <http://www.stat.berkeley.edu/~stark/Seminars/forageITM15.htm>

190. Guest lecturer, ESPM 117 (Urban Garden Ecosystems), University of California, Berkeley, 20 October 2015. <http://www.stat.berkeley.edu/~stark/Seminars/forageAgroEcol15.htm>

189. Invited Panelist, “Statistical Implications of Big Data Applied to Risk Modeling,” Consortium for Data Analytics in Risk (CDAR) Symposium, University of California, Berkeley, 16 October 2015. <http://www.stat.berkeley.edu/~stark/Seminars/CDAR15.htm>

P.B. Stark: CV

November 18, 2016

31

[p://cdar.berkeley.edu/events/2015cdarsymposium/](http://cdar.berkeley.edu/events/2015cdarsymposium/)

188. Guest lecturer, Statistics 210A (Theoretical Statistics), University of California, Berkeley, 13–15 October 2015. <https://github.com/pbstark/Nonpar>

187. Risk-Limiting Audits and the Colorado Uniform Voting System Pilot, Colorado Pilot Election Review Committee Meeting, Office of the Colorado Secretary of State, Denver, CO, 9 October 2015. <http://www.stat.berkeley.edu/~stark/Seminars/auditC015.pdf>

186. Wild and Feral Food in EBRPD, East Bay Regional Park District Volunteer Meeting, Oakland, CA, 15 September 2015. <http://www.stat.berkeley.edu/~stark/Seminars/forageEBRPD15.htm>

185. Probability and Statistics for Physical Science and Engineering PhD Students (a 15-hour course), University of Tokyo, 23–26 August 2015. Materials: <http://www.github.com/pbstark/PhysEng>

184. Statistics for Engineering PhD students (a 30-hour course), University of Padova, Padova, Italy, 29 June–7 July 2015. Materials: <http://www.github.com/pbstark/Padova15>

183. Pay no attention to the model behind the curtain, Significant Digits: Responsible Use of Quantitative Information, European Commission Joint Research Centre, Brussels, Belgium, 9–10 June 2015. <http://www.stat.berkeley.edu/~stark/Seminars/rabbitsBrux15.htm>

182. Reaping without Sowing: Wild Food and Urban Foraging, Berkeley Food Institute Seed Grant Forum, Berkeley, CA, 6 May 2015. <http://www.stat.berkeley.edu/~stark/Seminars/bfi-15-5-6.htm>
Video: <http://food.berkeley.edu/seed-grant-forum/>

P.B. Stark: CV

November 18, 2016

32

181. Invited panelist, Data Science: Supporting new Modes of Research, Annual Meeting of the Association of Research Libraries, Berkeley, CA, 28–30 April, 2015.
180. Teaching evaluations: class act or class action?, National Center for the Study of Collective Bargaining in Higher Education and the Professions, Annual Conference, Hunter College, New York, NY, 19–21 April 2015. <http://www.stat.berkeley.edu/~stark/Seminars/setNCSCB15.htm>
179. Where the Wild Things Grow, Berkeley Path Wanderers Association, Berkeley, CA, 4 April 2015. <http://berkeleypaths.org/events/event/where-the-wild-things-grow/>
178. Invited panelist, Brave New Audits: How We Can Implement Risk-Limiting Audits with Today's Machines, Off-the-Shelf Hardware, and Open Source Software, 2015 Election Verification Network Annual meeting, New Orleans, LA, 4–6 March 2015. <http://www.stat.berkeley.edu/~stark/Seminars/evn15.htm>
177. Co-chair, Election Auditing, NIST / U.S. Election Administration Commission Future of Voting Systems Symposium II, Washington, DC, 9–10 February 2015.
176. Teaching evaluations: truthful or truthy?, European Commission Joint Research Centre *Third Lisbon Research Workshop on Economics, Statistics and Econometrics of Education*, Lisbon, Portugal, 23–24 January 2015. <http://cemapre.iseg.ulisboa.pt/educonf/3e3/> <http://www.stat.berkeley.edu/~stark/Seminars/setLisbon15.htm>
175. Bad Numbers, Bad Policy, 5th Impact Assessment Course by the Joint Research Centre and the Secretariat General of the European Commission, Brussels, Belgium, 20–21 January 2015. <https://ec.europa.eu/jrc/en/event/training-course/5th-impact-assessment>

P.B. Stark: CV

November 18, 2016

33

-course <http://www.stat.berkeley.edu/~stark/Seminars/fauxBrux15.htm>

174. Quantifauxcation, European Commission Joint Research Centre, Ispra, Italy, 19 January 2015. <http://www.stat.berkeley.edu/~stark/Seminars/fauxIspra15.htm>

173. Preproducibility for Research, Teaching, Collaboration, and Publishing, Replicability and Reproducibility of Discoveries in Animal Phenotyping, Tel Aviv University, Tel Aviv, Israel, 5–7 January 2015. <http://www.stat.berkeley.edu/~stark/Seminars/reproTAU15.htm>
 Video: http://video.tau.ac.il/events/index.php?option=com_k2&view=item&id=5563:preproducibility-for-research-teaching-collaboration-and-publishing&Itemid=552

172. Urban Foraging—Real Street Food, Discover Cal: A Menu for Change, Los Angeles, CA, 18 November 2014. <http://www.stat.berkeley.edu/~stark/Seminars/discoverCalLA14.htm>

171. Guest lecturer, 6.S897/17.S952: Elections and Voting Technology, MIT, 13 November 2014.

170. Open Geospatial Data Down in the Weeds: Urban Foraging, Food Deserts, Citizen Science, Sustainability, and Reproducibility, Assessing the Socioeconomic Impacts and Value of ‘Open’ Geospatial Information, The George Washington University, Washington DC, 28–29 October 2014. <http://www.stat.berkeley.edu/~stark/Seminars/openGeospatial14.htm>

169. Student Evaluations of Teaching, University of San Francisco, 23 October 2014. <http://www.stat.berkeley.edu/~stark/Seminars/setUSF14.htm>

P.B. Stark: CV

November 18, 2016

34

168. Guest lecturer, CS 76N: Elections and Technology, Stanford University, 14 October 2014.
167. Statistical Evidence and Election Integrity, XXIX International Forum on Statistics, UPAEP, Puebla, Mexico, 29 September–3 October 2014. <http://www.stat.berkeley.edu/~stark/Seminars/foro14.pdf>
166. Nonparametric Inference, Auditing, and Litigation, Short course at XXIX International Forum on Statistics, UPAEP, Puebla, Mexico, 29 September–3 October 2014. <https://github.com/pbstark/MX14>
165. Invited participant, Pew Charitable Trusts roundtable: Challenges Related to the Voting Systems Marketplace, Chicago, IL, 8 September 2014.
164. Invited panelist, U.S. Election Assistance Commission roundtable: Expanding the Body of Knowledge of Election Administration—Reflections and Future Direction, 3 September 2014. http://www.eac.gov/eac_grants_expanding_the_body_of_knowledge_of_election_administration_%E2%80%93reflections_and_future_direction/ Video: <http://mediasite.yorkcast.com/webcast/Play/a90f223fa61940cd893b70fab55fe1b51d>
163. Reproducibility, Evidence, and the Scientific Method, Late-breaking session on Reproducibility, Joint Statistical Meetings, Boston, MA, 2–7 August 2014. <http://www.stat.berkeley.edu/~stark/Seminars/reproJSM14.htm>
162. Invited panelist, Big Data & Academic Libraries, International Alliance of Research Universities, 3rd Librarians' Meeting, University of California, Berkeley, CA, 23–24 June 2014.

*P.B. Stark: CV**November 18, 2016*

35

161. Mini-Minimax Uncertainty Quantification for Emulators, 2nd Conference of the International Society for Nonparametric Statistics, Cadiz, Spain, 11–16 June 2014. <http://www.stat.berkeley.edu/~stark/Seminars/emulatorISNPS14.pdf>

160. Reproducible and Collaborative Statistical Data Science, Transparency Practices for Empirical Social Science Research, 2014 Summer Institute, University of California, Berkeley, CA, 2–6 June 2014. <http://www.stat.berkeley.edu/~stark/Seminars/bitss14.pdf>

159. Risk-Limiting Audits for Denmark and Mongolia, Third DemTech Workshop on Danish Elections, Trust, and Technology for the Mongolian General Election Commission, IT University of Copenhagen, Copenhagen, Denmark, 24 May 2014. <http://www.stat.berkeley.edu/~stark/Seminars/itu14.pdf>

158. How to Lie With Big Data (and/or Big Computations), Panel on Data Deluge or Drought (Quality and Quantity), MPE13+ Workshop on Global Change, DIMACS Special Program: Mathematics of Planet Earth 2013+, University of California, Berkeley, CA, 19–21 May 2014. <http://www.stat.berkeley.edu/~stark/Seminars/mpe14.pdf>

157. Invited panelist, Relying on Data Science: Reproducible Research and the Role of Policy, DataEDGE conference, UC Berkeley School of Information, Berkeley, CA, 8–9 May 2014.

156. Invited panelist, Some Tools and Solutions, University of Washington / Moore–Sloan First Reproducibility Workshop, eScience Institute, University of Washington, Seattle, WA, 8 May 2014 <http://www.stat.berkeley.edu/~stark/Seminars/reproUW14.pdf>

155. Some people have all the luck, public lecture, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA, 28 April 2014. (with Skip Garibaldi and Lawrence Mower) <http://www.ipam.ucla.edu/p>

P.B. Stark: CV

November 18, 2016

36

rograms/PUBLEC2014/ Video: <https://www.youtube.com/watch?v=s8cHHWNb1A4>

154. Invited panelist, Ask a Statistician, SIAM/ASA/GAMM/AGU Conference on Uncertainty Quantification, Savannah, GA, 29 March – 3 April 2014.
153. Invited panelist, The Reliability of Computational Research Findings: Reproducible Research, Uncertainty Quantification, and Verification & Validation, SIAM/ASA/GAMM/AGU Conference on Uncertainty Quantification, Savannah, GA, 29 March – 3 April 2014. <http://www.stat.berkeley.edu/~stark/Seminars/reproUQ14.pdf> Video: http://client.blueskybroadcast.com/SIAM14/UQ/siam_uq14_MS42_3
152. Invited panelist, New Paradigms for Voting Systems, 2014 Election Verification Network Annual meeting, San Diego, CA, 5–7 March 2014. <http://www.stat.berkeley.edu/~stark/Seminars/evn14NewParadigms.pdf> Video: <https://www.youtube.com/watch?v=bTlHYkiYBZI>
151. Invited panelist, End-to-End Verifiable Voting Roundtable, 2014 Election Verification Network Annual meeting, San Diego, CA, 5–7 March 2014. Video: https://www.youtube.com/watch?v=jsGSQV_rFzA
150. Invited panelist, Improving Teaching through uncharted Waters: Peer Observation and other Approaches, Dialogues, a Colloquium Series on Teaching, Center for Teaching and Learning, University of California, Berkeley, 26 February 2014. <http://teaching.berkeley.edu/dialogues-colloquium-series-teaching>
149. Invited panelist, Unpacking the Voting Technology Debate, 2014 Voting and Elections Annual Summit, Overseas Vote Foundation and U.S. Vote Foundation, George Washington University, Washington,

P.B. Stark: CV

November 18, 2016

37

D.C., 30 January 2014. <https://www.overseasvotefoundation.org/initiatives-UOCAVASummit-summit2014-agenda> Video: <http://www.youtube.com/watch?v=UXqqnOWhsmA&list=PLtRB8fQ0zBR8Nza-G-RGln-HTrkp4UM6F&feature=share&index=1#t=23m30s>

148. Risk-Limiting Audits for Party-List Elections. IT University of Copenhagen, Copenhagen, Denmark, 21 November 2013. <http://www.stat.berkeley.edu/~stark/Seminars/itu13.pdf>

147. Selective Inference and Conditional Tests. Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel, 28 October 2013.

146. Ontology of Earthquake Probability: Metaphor. Dynamics of Seismicity, Earthquake Clustering and Patterns in Fault Networks, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, 9–11 October 2013. <http://www.stat.berkeley.edu/~stark/Seminars/samsiSeis13.pdf>

145. Invited panelist, Innovations in On-line Learning, Designing a World University, World Academy Forum on Global Higher Education, Berkeley, California, 2–3 October 2013.

144. E2E to Hand-to-Eye: Verifiability, Trust, Audits, Vote ID 2013: The 4th International Conference on e-Voting and Identity, University of Surrey, Guildford, UK 17–19 July 2013. <http://www.stat.berkeley.edu/~stark/Seminars/voteID13.pdf>

143. Mini-Minimax Uncertainty of Emulators, Center for Security, Reliability, and Trust, University of Luxembourg, Luxembourg, 9 July 2013. <http://www.stat.berkeley.edu/~starkstark/Seminars/emulatorLux13.pdf>

*P.B. Stark: CV**November 18, 2016*

38

142. Invited panelist, Extracting Actionable Insight From Dirty Time-Series Data, Berkeley Research Data Science Lectures, University of California, Berkeley, 21 June 2013. Video: <http://vcresearch.berkeley.edu/datascience/webcast-data-science-lecture-series-june-21>

141. Uncertainty quantification for emulators, Dipartimento di Fisica e Astronomia, Università di Bologna, Bologna, Italy, 5 June 2013. <http://www.stat.berkeley.edu/~stark/Seminars/emulatorUniBo13.pdf>

140. Leveraging Paper Ballots, Running Elections Efficiently, A Best Practices Convening, Common Cause – Common Cause / NY – Columbia University School of International and Public Affairs, Columbia University, New York, NY, 20 May 2013. <http://www.stat.berkeley.edu/~stark/Seminars/ccNY13.pdf>

139. Uncertainty quantification for emulators, University of California, Los Angeles, 11 April 2013. <http://www.stat.berkeley.edu/~stark/Seminars/emulatorUCLA13.pdf>

138. Brittle and Resilient Verifiable Voting Systems, Verifiable Voting Schemes Workshop: from Theory to Practice, Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg, Luxembourg 21–22 March 2013. <http://www.stat.berkeley.edu/~stark/Seminars/vv13.pdf>

137. Now What?, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate Election, Atlanta, Georgia 14–15 March 2013. <http://www.stat.berkeley.edu/~stark/Seminars/evn13nowWhat.pdf>

136. Machine-Assisted Transitive Audits, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate

P.B. Stark: CV

November 18, 2016

39

Election, Atlanta, Georgia 14–15 March 2013.

135. Risk-limiting Audits and Evidence-Based Elections in a Nutshell, Election Verification Network Annual Conference, The Right to a Secure, Transparent and Accurate Election, Atlanta, Georgia 14–15 March 2013. <http://www.stat.berkeley.edu/~stark/Seminars/evn13nutshell.pdf>

134. Reproducibility in Computational and Experimental Mathematics, ICERM, Brown University, Providence, RI, 10–14 December 2012. <http://icerm.brown.edu/tw12-5-rcem>

133. Whaddya know? Bayesian and Frequentist approaches to inverse problems, Inverse Problems: Practical Applications and Advanced Analysis, Schlumberger WesternGeco, Houston, TX, 12–15 November 2012. <http://www.stat.berkeley.edu/~stark/Seminars/swg12.pdf>

132. Evidence-Based Elections, E-Voting: Risk and Opportunity Conference, Center for Information Technology Policy, Princeton University, Princeton, NJ, 1 November 2012. <http://www.stat.berkeley.edu/~stark/Seminars/princeton12.pdf> Video: http://youtu.be/1Z6JW1t_sFI

131. Evidence-Based Elections, Berkeley/Stanford Data, Society and Inference Seminar, Stanford University, Stanford, CA 8 October 2012. <http://www.stat.berkeley.edu/~stark/Seminars/dataSocietyInference12.pdf>

130. Voting Technology Exploratory Meeting, The Pew Charitable Trusts Center on the States, Santa Monica, CA 23–24 August 2012.

P.B. Stark: CV

November 18, 2016

40

129. Lightning Debates, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '12), USENIX, Bellevue, WA, 6–7 August 2012. Video: <https://www.usenix.org/conference/evtwote12/panel-2-title-tbd>
128. BRAVO: Ballot-polling Risk-limiting Audits to Verify Outcomes, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '12), USENIX, Bellevue, WA, 6–7 August 2012. <http://www.stat.berkeley.edu/~stark/Seminars/evt12.pdf> Video: <https://www.usenix.org/conference/evtwote12/s6-paper-title-tbd>
127. The Will of the People and the Luck of the Draw: Using Statistics to Limit the Risk of Wrong Electoral Outcomes, Joint Statistical Meetings, San Diego, CA, 29 July 2012. <http://www.stat.berkeley.edu/~stark/Seminars/jsm12.pdf>
126. Evidence-Based Elections, Risk-Limiting Audits, and Resilient Canvass Frameworks, SecVote 2012 Summer School on Secure Voting, Leibniz-Zentrum für Informatik, Schloss Dagstuhl, Germany, 16 July 2012. <http://www.stat.berkeley.edu/~stark/Seminars/dagstuhl12.pdf>
125. The Effectiveness of Internet Content Filters, Distinguished Lecture (http://www.en.uni.lu/snt/distinguished_lectures), Center for Security, Reliability, and Trust, University of Luxembourg, Luxembourg, 13 July 2012. <http://www.stat.berkeley.edu/~stark/Seminars/luxembourg12.pdf>
124. Evidence-Based Elections, International Association of Clerks, Recorders, Election Officials & Treasurers (IACREOT) annual conference, Albuquerque, NM, 30 June 2012. <http://www.stat.berkeley.edu/~stark/Seminars/iacreot12.pdf>

P.B. Stark: CV

November 18, 2016

41

123. Confidence Limits, Progress on Statistical Issues in Searches, SLAC National Accelerator Laboratory, Stanford, CA, 4–6 June 2012. <http://www.stat.berkeley.edu/~stark/Seminars/slac12.pdf>

122. UQQ, UQ: Transition Workshop, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC, 21–23 May 2012. <http://www.stat.berkeley.edu/~stark/Seminars/samsi12.pdf>

121. Testing for Poisson Behavior, Seismological Society of America Annual Meeting, San Diego, CA, 17–19 April 2012. <http://www.stat.berkeley.edu/~stark/Seminars/ssa12.pdf>

120. Get Out The Audit (GOTA), Election Verification Network Annual Conference, Santa Fe, NM, 29–30 March 2012. <http://www.stat.berkeley.edu/~stark/Seminars/evnGOTA12.pdf>

119. The Long View: Evidence-Based Elections, Election Verification Network Annual Conference, Santa Fe, NM, 29–30 March 2012. <http://www.stat.berkeley.edu/~stark/Seminars/evnLongView12.pdf>

118. The Will of the People and the Luck of the Draw: Risk-Limiting Audits and Resilient Canvass Frameworks, San Francisco Chapter of the American Statistical Association, Berkeley, CA, 16 February 2012. <http://www.stat.berkeley.edu/~stark/Seminars/asa12.pdf>

117. Evidence-Based Elections: Colorado's Future?, Colorado Elections Best Practices & Vision Commission, Denver, CO, 14 December 2011. <http://www.stat.berkeley.edu/~stark/Seminars/co-11-12-14.pdf> Audio: <mms://pub.sos.state.co.us/20111214130705B>

116. From the Virtual Trenches, *Letters and Sciences Colloquium on Undergraduate Education: The Virtual University—Challenges and*

P.B. Stark: CV

November 18, 2016

42

Opportunities, University of California, Berkeley, CA, 16 November 2011. <http://ls.berkeley.edu/stories/archive/fall-2011-collquium-undergraduate-education-0> <http://www.stat.berkeley.edu/~stark/Seminars/onlineEd11.pdf> Video: <http://www.youtube.com/watch?v=40vGDuPSJso>

115. Earthquake Clustering and Declustering, Institute de Physique du Globe de Paris, Paris, France, 4 October 2011. <http://www.stat.berkeley.edu/~stark/Seminars/ipg11.pdf>

114. Fears, Predictions, Hopes & Plans, *Panel on the Future*, Election Integrity: Past, Present, and Future, Caltech/MIT Voting Technology Project, Cambridge, MA, 1 October 2011. <http://www.stat.berkeley.edu/~stark/Seminars/mit11.pdf> Video: <http://techtv.mit.edu/collections/vtp/videos/14802-eippf-2011-3-the-future>

113. Risk-limiting Audits: Soup to Nuts, and Beyond, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '11), USENIX, San Francisco, CA, 9 August 2011. <http://www.stat.berkeley.edu/~stark/Seminars/evtRLA11.pdf>

112. SOBA: Secrecy-preserving Observable Ballot-level Audit, Workshop on Electronic Voting Technology / Workshop on Transparent Elections, (EVT/WOTE '11), USENIX, San Francisco, CA, 9 August 2011. <http://www.stat.berkeley.edu/~stark/Seminars/evtSoba11.pdf>

111. The Effectiveness of Internet Content Filtering, Workshop on Free and Open Communication on the Internet (FOCI '11), USENIX, San Francisco, CA, 8 August 2011. <http://www.stat.berkeley.edu/~stark/Seminars/foci11.pdf>

110. SticiGui, Onsophic, and Statistics W21, Panel on online instruction, Joint Statistical Meetings, Miami Beach, FL, 31 August 2011. <http://>

P.B. Stark: CV

November 18, 2016

43

[/www.stat.berkeley.edu/~stark/Seminars/jsm11.pdf](http://www.stat.berkeley.edu/~stark/Seminars/jsm11.pdf)

109. Risk Limiting Audits, Colorado Secretary of State, Colorado Risk Limiting Audit (CORLA) Kick-off Meeting, Denver, CO, 16 June 2011. <http://www.stat.berkeley.edu/~stark/Seminars/co-11-6-16.pdf>

108. Simultaneous Confidence Intervals with more Power to Determine Signs, Conference in honor of Erich Lehmann, Rice University, Houston, TX, 12 May 2011. <http://www.stat.berkeley.edu/~stark/Seminars/lehmann11.pdf>

107. Close enough for government [to] work, Verified Voting Foundation, Palo Alto, CA, 27 April 2011. <http://www.stat.berkeley.edu/~stark/Seminars/vv-11-4-27.pdf>

106. Close enough for government [to] work: Risk-limiting post-election audits, Berkeley-Stanford Joint Statistics Colloquium, Stanford University, Stanford, CA, 12 April 2011. <http://www.stat.berkeley.edu/~stark/Seminars/stanford11.pdf>

105. Audits: The After-Math of Elections, Verify early, verify often: creating secure, transparent and accurate elections, Election Verification Network, Chicago, IL, 25–26 March 2011. <http://www.stat.berkeley.edu/~stark/Seminars/reed11.pdf>

104. Simultaneous Confidence Intervals with more Power to Determine Signs, Department of Mathematics, Reed College, Portland, OR, 10 March 2011. <http://www.stat.berkeley.edu/~stark/Seminars/reed11.pdf>

103. Close enough for government work: Risk-Limiting Post-Election Audits, Wharton Statistics Department, University of Pennsylvania,

P.B. Stark: CV

November 18, 2016

44

Philadelphia, PA, 26 January 2011. <http://www.stat.berkeley.edu/~stark/Seminars/penn11.pdf>

102. Audits: The After-Math of Election Reform, Conference on Innovative Electoral Reforms and Strategies, Washington, DC, 10–11 December 2010. <http://www.stat.berkeley.edu/~stark/Seminars/innovative10.pdf>
101. Risk-Limiting Post-Election Audits: Statistics, Policy, and Politics, Department of Statistics, Rice University, Houston, TX, 1 November 2010. <http://www.stat.berkeley.edu/~stark/Seminars/rice10.pdf>
100. Are Declustered Earthquake Catalogs Poisson?, Department of Statistics, Pennsylvania State University, State College, PA, 14 October 2010. <http://www.stat.berkeley.edu/~stark/Seminars/psu10.pdf>
99. Super-simple simultaneous single-ballot risk-limiting audits, 2010 Electronic Voting Technology Workshop / Workshop on Trustworthy Elections (EVT/WOTE '10), Washington, DC, 9–10 August 2010. <http://www.stat.berkeley.edu/~stark/Seminars/evtwote10.pdf>
98. AB 2023 and Risk-Limiting Audits, California Association of Clerks and Election Officials Legislative Committee Meeting, 14 May 2010. <http://www.stat.berkeley.edu/~stark/Seminars/caceo-legis10.pdf>
97. Justice and inequalities, Department of Statistics and Operations Research, Tel Aviv University, Tel Aviv, Israel, 13 April 2010. <http://www.stat.berkeley.edu/~stark/Seminars/tau10.pdf>

*P.B. Stark: CV**November 18, 2016*

45

96. Size Matters: Smaller Batches Yield More Efficient Risk-Limiting Audits, Small-Batch Audit Meeting, Washington, DC, 27–28 March 2010. <http://www.stat.berkeley.edu/~stark/Seminars/smallBatch10.pdf>

95. Sexy Audits and the Single Ballot, Election Verification Network (EVN) annual conference, Washington, DC, 25–27 March 2010. <http://www.stat.berkeley.edu/~stark/Seminars/evn10.pdf>

94. Simple, Affordable, Post-Election Audits, Institute for Mathematical Behavioral Sciences, University of California, Irvine, CA, 7 January 2010. <http://www.stat.berkeley.edu/~stark/Seminars/uci10.pdf>

93. Efficient Post-Election Audits of Multiple Contests: 2009 California Tests, Conference on Empirical Legal Studies, University of Southern California Gould School of Law, Los Angeles, CA, 20–21 November 2009. <http://www.stat.berkeley.edu/~stark/Seminars/cels09.pdf>

92. Risk-Limiting Audits, Audit Working Meeting, American Statistical Association, Arlington, VA, 23–24 October 2009. <http://www.stat.berkeley.edu/~stark/Seminars/asa09.pdf>

91. Invited panelist, Uncertainty Quantification and Error Analysis, Scientific Grand Challenges in National Security: the Role of Computing at the Extreme Scale, Washington, DC, 6–8 October 2009.

90. Some Ado about (mostly) Nothing: zero-dominated data, Alameda County Workshop on Avian Mortality at Altamont, Emeryville, CA, 22 September 2009. <http://www.stat.berkeley.edu/~stark/Seminars/altamont09.pdf>

P.B. Stark: CV

November 18, 2016

46

89. Freedman's Dialogue with the Social Sciences, 2009 Joint Statistical Meetings, Washington, DC, 5 August 2009.
88. Invited panelist, David A. Freedman's Dialogue with the Social Sciences, The Society for Political Methodology 26th Annual Summer Meeting, Institution for Social and Policy Studies, Yale University, New Haven, CT, 23 July 2009.
87. Election Auditing: How Much is Enough?, The Society for Political Methodology 26th Annual Summer Meeting, Institution for Social and Policy Studies, Yale University, 23 July 2009. (Keynote lecture) <http://www.stat.berkeley.edu/~stark/Seminars/polMeth09.pdf>
86. Risk-Limiting Post-Election Audits, Department of Statistics, University of California, Berkeley, CA, 31 March 2009. <http://www.stat.berkeley.edu/~stark/Seminars/ucb09.pdf>
85. Uncertainty Quantification Qualification, Lawrence Livermore National Laboratory, Livermore, CA, 26 March 2009. <http://www.stat.berkeley.edu/~stark/Seminars/llnl09.pdf>
84. 2008 Risk-limiting Audits in California, The Pew Charitable Trusts Audit Workshop, Salt Lake City, UT, 23–24 February 2009. <http://www.stat.berkeley.edu/~stark/Seminars/pew09.pdf>
83. Election Auditing and Nonparametric Confidence Bounds, Department of Mathematics, Reed College, Portland, OR, 20 November 2008. <http://www.stat.berkeley.edu/~stark/Seminars/reed08.pdf>
82. Risk-Limiting Post-Election Audits, Department of Statistics, Kansas State University, Manhattan, KS, 2 October 2008. <http://www.stat.berkeley.edu/~stark/Seminars/ksu08.pdf>

P.B. Stark: CV

November 18, 2016

47

81. CAST: Canvass Audits by Sampling and Testing, 2008 American Political Science Association Annual Meeting, Panel 2008MP04292: Catch Me If You Can: Techniques to Detect Electoral Fraud, Boston, MA, 28–31 August 2008. <http://www.stat.berkeley.edu/~stark/Seminars/apsa08.pdf>

80. Invited panelist, Joint Statistical Meetings session, Statistical Measures Can Help Restore Confidence in U.S. Elections, Denver, CO, 3–7 August 2008.

79. Invited Panel on Post-Election Auditing: The Academic & Advocacy Perspective, California Association of Clerks and Election Officials (CACEO) 100th Anniversary Celebration Conference, Long Beach, CA, 8–11 July 2008.

78. Statistical Audits: Why and How Much?, Invited Panel on Post-Election Auditing: Practical Experience and Best Practices, California Association of Clerks and Election Officials (CACEO) 100th Anniversary Celebration Conference, Long Beach, CA, 8–11 July 2008. <http://www.stat.berkeley.edu/~stark/Seminars/caceo08.pdf>

77. Invited Panel on Online Learning, UC21st Century, Teaching, Learning and Technology: Past, present and future, University of California, Davis, 20–21 June 2008.

76. SticiGui—What is it?, Department of Statistics, University of California, Los Angeles, CA, 29 May 2008. <http://www.stat.berkeley.edu/~stark/Seminars/ucla08.pdf>

75. Election Auditing: How Much Is Enough?, Mathematical Sciences Research Institute, Annual Meeting of Academic Sponsors and Steering Committee, Berkeley, CA, 7 March 2008. <http://www.stat.berkeley.edu/~stark/Seminars/msri08.pdf>

*P.B. Stark: CV**November 18, 2016*

48

74. Invited panelist, 2007 Post Election Audit Summit, Minneapolis, MN, 25–27 October 2007. <http://www.stat.berkeley.edu/~stark/Seminars/peaSummit07.pdf>
73. Urning Voter Confidence, Department of Mathematics, Reed College, Portland, OR, 11 October 2007. <http://www.stat.berkeley.edu/~stark/Seminars/reed07.pdf>
72. Frequentist Methods in Inverse Problems, Sandia CSRI Workshop on Large-Scale Inverse Problems and Quantification of Uncertainty, Santa Fe, NM, 10–12 September 2007. <http://www.stat.berkeley.edu/~stark/Seminars/sandia07.odp>
71. How Statistics Helps, 9th US Congress on Computational Mechanics, San Francisco, CA, 22–26 July 2007. <http://www.stat.berkeley.edu/~stark/Seminars/compMech07.odp>
70. Nonparametrics: nonpareil?, Veterans Administration Hospital, Neuropsychology Brown Bag Lunch, Martinez, CA, 15 May 2007. <http://www.stat.berkeley.edu/~stark/Seminars/ebire-5-15-07.pdf>
69. The Null Hypothesis Are Earthquakes Predictable?, Assessment schemes for earthquake prediction, Royal Astronomical Society/Joint Association for Geophysics Discussion Meeting 7–8 November 1996, the Geological Society, London
68. Shaking Down Earthquake Predictions, Department of Statistics, University of California, Davis, 25 May 2006 <http://www.stat.berkeley.edu/~stark/Seminars/ucd-5-25-06.pdf>
67. Measuring Resolution in Nonlinear and Constrained Inverse Problems, Workshop on Statistical Inverse Problems, Institute for Mathematical Stochastics, Göttingen, Germany, 23–25 March 2006. http://www.num.math.uni-goettingen.de/gk/?Workshops:Workshop_on_Statist

*P.B. Stark: CV**November 18, 2016*

49

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66. Resolution in Nonlinear and Constrained Inverse Problems, Workshop on Computational and Mathematical Geoscience, Colorado School of Mines, Golden CO, 15–17 June 2005.
65. Quantifying uncertainty in inverse problems, Summer school: Mathematical Geophysics and Uncertainty in Earth Models, Colorado School of Mines, Golden CO, 14–25 June 2004. <http://www.stat.berkeley.edu/~stark/Seminars/mines04.pdf>
64. Estimating power spectra of galaxy structure: can Statistics help?, Penetrating bars through masks of cosmic dust: the Hubble tuning fork strikes a new note, Pilanesberg National Park, South Africa, 7–12 June 2004. <http://www.stat.berkeley.edu/~stark/Seminars/bars04.ppt>
63. Quantifying uncertainty in inverse problems, Institute for Pure and Applied Mathematics (IPAM) Conference on Statistical Methods for Inverse Problems, IPAM, Los Angeles, CA, 5–6 November 2003. <http://www.stat.berkeley.edu/~stark/Seminars/ipam03.ppt>
62. Using what we know: inference with physical constraints, PhyStat 2003: Statistical Problems in Particle Physics, Astrophysics and Cosmology, Stanford Linear Accelerator Center, Stanford, CA, 8–10 September 2003. <http://www.stat.berkeley.edu/~stark/Seminars/phyStat03.pdf>
61. Statistical Approaches to Inverse Problems. Danish Interdisciplinary Inversion Group Seminars on Inverse Problems: Insight and Algorithms. Niels Bohr Institute, Copenhagen University, Copenhagen, Denmark, 27–29 May 2002. <http://www.stat.berkeley.edu/~stark/Seminars/bohr02.ppt>

P.B. Stark: CV

November 18, 2016

50

60. Statistical Measures of Uncertainty in Inverse Problems. Institute for Mathematics and its Applications Tutorial on Inverse Problems and the Quantification of Uncertainty, Annual Program Mathematics in the Geosciences, Minneapolis, MN, 19 March 2002. <http://www.stat.berkeley.edu/~stark/Seminars/ima02.ppt>

59. Data Errors, Model Errors, and Estimation Errors, Frontiers of Geophysical Inversion Workshop, Waterways Experiment Station, U.S. Army Corps of Engineers Engineer Research and Development Center, Vicksburg, MS, 17–19 February 2002. <http://www.stat.berkeley.edu/~stark/Seminars/wes02.ppt>

58. Strategic Planning and Implementation I: The Challenge of Adapting Organizations and Creating Partnerships to Target New Markets, University Teaching as E-business?, Center for Studies in Higher Education, Berkeley, CA, 26–27 October 2001.

57. Inverse Problems and Data Errors, New Developments in Astrophysical Fluid Dynamics, Chateau de Mons, Caussens, France, 25–29 June 2001.

56. Data Reduction and Inverse Problems in Helioseismology, Workshop Statistics of inverse problems, Institut Henri Poincaré, Paris, France, 28–29 May 2001.

55. Why Statistics is worth the Stigma, Letters and Sciences Faculty Forum, University of California, Berkeley, CA, 23 April 2001. <http://www.stat.berkeley.edu/~stark/Seminars/stigma01.ppt>

54. Inverse Problems in Helioseismology, Second MaPhySto Workshop on Inverse Problems: Inverse problems from a Statistical Perspective, Aalborg, Denmark, 28–31 March 2001.

*P.B. Stark: CV**November 18, 2016*

51

53. What are the Chances?, NATO Advanced Research Workshop: State of scientific knowledge regarding earthquake occurrence and implications for public policy, Le Dune, Piscinas — Arbus, Sardinia, Italy, 15–19 October 2000.
52. Why Unadjusted Census Results should be Used for Reapportionment and Funding within the State of California, 13th Annual Demographic Workshop, U.S. Bureau of the Census, California State Census Data Center, and the Population Research Laboratory of the University of Southern California, Los Angeles, CA, 15 May 2000.
51. Invited discussant, Workshop of the National Academy of Sciences Panel to Review the 2000 Census, Washington, D.C., 2–3 February 2000.
50. Invited discussant, Panel discussion on the role of sampling in the US Census, San Francisco Bay Area Chapter of the American Statistical Association, 20 December 1999.
49. Lecturer, Mathematical Geophysics Summer School, Stanford University, Stanford, CA, 2–20 August 1999.
48. Less Asymptotic Tomography. 9th SOHO Workshop: Helioseismic Diagnostics of Solar Convection and Activity, Stanford University, Stanford, CA, 12–15 July 1999.
47. Invited panelist, Reinventing Undergraduate Education: Technology Enhanced Learning in the Sciences, Math, and Engineering, University of California, Berkeley, CA, 23 April 1999.
46. Error in Numerical Models Fitted to Data. DSRC/DARPA Study on Numerical Simulation of Physical Systems: The State of the Art, and Opportunities for Further Advances, Kick-Off Meeting, Arlington, VA,

*P.B. Stark: CV**November 18, 2016*

52

19–20 January 1999. <http://www.stat.berkeley.edu/~stark/Seminars/dsrc99.htm>

45. Sampling to Adjust the U.S. Census. Miller Institute for Basic Research in Science, University of California, Berkeley, CA, 12 January 1999. <http://www.stat.berkeley.edu/~stark/Seminars/mibrs99.htm>
44. A Statistician's Perspective on Census Adjustment, Berkeley Breakfast Club, Berkeley, CA, 5 December 1998. <http://www.stat.berkeley.edu/~stark/Seminars/bbc98.htm>
43. SticiGui: Melts in your Browser, not in your Brain, Joint Berkeley-Stanford Statistics Colloquium, Department of Statistics, Stanford University, Stanford, CA, 27 October 1998. <http://www.stat.berkeley.edu/~stark/Seminars/bsc98.htm>
42. SticiGui: Statistics Tools for Internet and Classroom Instruction with a Graphical User Interface, 1998 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 12 August 1998.
41. Presidential Panel on Statistics in Public Policy, 1998 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 10 August 1998.
40. Misfit Measures and Statistical Inconsistency in Linear Inverse Problems. AMS/IMS/SIAM Joint Summer Research Conferences in the Mathematical Sciences, Mathematical Methods in Inverse Problems for Partial Differential Equations, Mt. Holyoke, MA, 4–9 July 1998. <http://www.stat.berkeley.edu/~stark/Seminars/ams-ims-siam-98.pdf>

*P.B. Stark: CV**November 18, 2016*

53

39. Uncertainties for functions from incomplete, erroneous data. NSF/DOE Workshop on Uncertainty in Modeling, National Science Foundation, Arlington, VA, 11–12 June 1998. <http://www.stat.berkeley.edu/~stark/Seminars/nsf-doe-98.htm>
38. Sampling to adjust the 1990 Census for Undercount. U.S. House of Representatives Subcommittee on the Census, May 1998. <http://www.stat.berkeley.edu/~stark/Census/house-5-5-98-pbs.pdf>
37. Sounding the Sun: Helioseismology. 1998 American Association for the Advancement of Science (AAAS) Annual Meeting and Science Innovation Exposition, Philadelphia, PA., February 1998. <http://www.stat.berkeley.edu/~stark/Seminars/Aaas/helio.htm>
36. Data Sampling Rate Reduction for the OERSTED geomagnetic Satellite, Department of Geological Sciences, Stanford University, Stanford, CA, 28 July 1997. <http://www.stat.berkeley.edu/~stark/Preprints/Oersted/writeup.htm>
35. Does God play dice with the Earth, and if so, are they loaded? Fourth SIAM Conference on Mathematical and Computational Methods in the Geosciences, Albuquerque, NM, 16 June 1997. <http://www.stat.berkeley.edu/~stark/Seminars/doesgod.htm>
34. Solving Problems for a Large Statistics Lecture Course using a Website UC Berkeley Academic Senate Workshop on Classroom Technology, Berkeley, CA, 11 April 1997. <http://www.stat.berkeley.edu/~stark/Seminars/itpTalk.htm>
33. Deficiencies of the simple theories, Local Helioseismology Workshop, University of Cambridge, Cambridge, England, 1997.

P.B. Stark: CV

November 18, 2016

54

32. CMB's, Royal Astronomical Society Ordinary Meeting, London, England, 1996.
31. The Null Hypothesis, Royal Astronomical Society and Joint Associations for Geophysics discussion meeting on Assessment of Schemes for Earthquake Prediction, London, England, 1996.
30. On the consistency of multiple inference in inverse problems using l_p confidence sets, International Conference on Multiple Comparisons, Tel Aviv, Israel, 1996.
29. Confidence Intervals in Inverse Problems, Conference in Honor of George Backus, Institute for Geophysics and Planetary Physics, La Jolla, CA, 1995.
28. The Need for Wave-Equation Travel-Time Tomography, Institute for Mathematics and Its Applications, Conference on Tomography, Minneapolis, MN, 1995.
27. Inference, Prior Information, and Misfit Measures, Interdisciplinary Inversion Conference on Methodology, Computation and Integrated Applications, University of Aarhus, Aarhus, Denmark, 1995.
26. Optimization and Inference in Travel-Time Seismology, National Research Council Board on Mathematical Sciences Symposium on Mathematical Sciences in Seismology, Washington, DC, 1995.
25. Prior Information and Confidence Intervals in Inverse Problems, International Union of Geodesy and Geophysics Meeting, Boulder, CO, 1995.

P.B. Stark: CV

November 18, 2016

55

24. Something AGAINST Nothing: A Confidence Game, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL, 1995.
23. Uncertainties in Travel-Time Seismology, SIAM/GAMM Symposium on Inverse Problems: Geophysical Applications, Fish Camp, CA, 1995.
22. Toward Tubular Tomography, 27th General Assembly of the Int. Assoc. of Seismology and Phys. of the Earth's Inter. (IASPEI), Wellington, New Zealand, 1994.
21. Alternative Data Analysis Techniques, Global Oscillation Network Group annual meeting, Los Angeles, CA, (presented by C. Genovese due to illness), 1994.
20. Mathematical Aspects of Integral Equation Inversion, Global Oscillation Network Group workshop, Sydney, Australia, 1994.
19. Conservative Finite-Sample Confidence Envelopes for Monotone and Unimodal Densities, Mathematisches Forschungsinstitut Oberwolfach meeting on Curves, Images and Massive Computation, Oberwolfach, Germany, 1993.
18. Invited discussant, Joint IMS/ASA/ENAR Meeting, Philadelphia, PA, 1993.
17. Uncertainty of the Quadrupole Component of the Cosmic Microwave Background, Israel Statistical Association Annual Meeting, Tel Aviv, 1993.

P.B. Stark: CV

November 18, 2016

56

16. Brute-Force Minimax Estimation in Geochemistry, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Francisco, CA, 1993.
15. Conservative Numerical Uncertainty Estimates in Inverse Problems, SIAM 40th Anniversary Meeting, Los Angeles, CA, 1992.
14. Minimax Estimation in Geomagnetism, European Geophysical Society Annual Meeting, Wiesbaden, Germany, 1991.
13. Minimax Estimation in Geophysical Inverse Problems: Applications to Seismic Tomography and Geomagnetism, Schmitt Institute for Physics of the Earth, Academy of Sciences of the USSR, Moscow, 1991.
12. Imagining Earth's Interior: Controversies in Seismology and Geomagnetism, Mathematical Sciences Research Institute Workshop on Statistical Methods in Imaging, Berkeley, CA, 1991.
11. Discretization and its Discontents: New Methods in Inverse Theory, Institute for Theoretical Physics program Helioseismology—Probing the Interior of a Star, National Science Foundation Institute for Theoretical Physics, University of California, Santa Barbara, 1990.
10. Inference in Infinite-Dimensional Inverse Problems, Schmitt Institute for Physics of the Earth, Academy of Sciences of the USSR, Moscow, 1990.
9. Inference in Infinite-Dimensions: Discretization and Duality, Israel Statistical Association Annual Meeting, Jerusalem, 1990.

*P.B. Stark: CV**November 18, 2016*

57

8. Superresolution: What, When and How?, Institute for Theoretical Physics program Helioseismology—Probing the Interior of a Star, National Science Foundation Institute for Theoretical Physics, University of California, Santa Barbara, 1990.
7. Sparsity-Constrained Deconvolution, International Union of Radio Science Meeting, Boulder, CO, 1989.
6. Invited discussant, Statistics, Earth and Space Sciences Meeting of the Bernoulli Society, Leuven, Belgium, 1989.
5. Rigorous Computer Solutions to Infinite-Dimensional Inverse Problems, rcp 264 problemes inverses, Montpellier, France, 1989.
4. Duality and Discretization Error, Conference on Mathematical Geophysics, Blanes, Spain, 1988.
3. Spectral extrapolation with positivity, International Union of Radio Science Meeting, Boulder, CO, 1987.
2. Travel-Time Constraints on Core Structure, Special Session on Geophysics of the Core and Core-Mantle Boundary, American Geophysical Union Spring Meeting, Baltimore, MD, 1986.
1. Smooth Models from $\tau(p)$ and $X(p)$ Data, Scripps Industrial Associates Short Course on Inverse Theory, Scripps Institution of Oceanography, La Jolla, CA, 1986.

Other Invited Seminars

California State University, Chico (Mathematics 1993)

P.B. Stark: CV

November 18, 2016

58

Colorado School of Mines (Mathematical and Computer Sciences 1997)

Copenhagen University (Niels Bohr Institute for Astronomy, Physics, and Geophysics 1996)

Hebrew University of Jerusalem (Statistics 1993)

IT University of Copenhagen (2013, 2014, 2016)

Kansas State University (Statistics 2008)

Pennsylvania State University (Statistics 1010)

National Solar Observatory (1997)

Naval Postgraduate School (Operations Research, 2001)

Reed College (Mathematics, 2007, 2008, 2011)

Rice University (Statistics, 2010)

Schlumberger-Doll Research (1988, 1990, 1991, 1992)

Southern Methodist University (Statistical Sciences, 1998)

Stanford University (Center for Space Physics and Astrophysics 1992; Mathematics 1997; Geology and Geophysics 1993, 1997; Statistics 1988, 1993, 1995, 2011)

The Technion (Statistics 1987)

Tel Aviv University (Geology and Geophysics 1988, 1991; Statistics 1991, 2010)

University of Bologna (Physics and Astronomy, 2013)

University of British Columbia (Geophysics and Astronomy 1996)

University of California, Berkeley (Astronomy 1996; Center for Pure and Applied Mathematics 1988; Geology and Geophysics 1988; Materials Science and Mineral Engineering 1988; Physics, 2001; Seismographic Stations, 1991, 1992, 1996; Statistics 1987, 1988(2), 1989(2), 1990, 1991, 1992, 1994, 1996(2), 1997, 2006, 2009, 2011)

P.B. Stark: CV

November 18, 2016

59

University of California, Davis (Statistics 1995, 2006; Mathematics 2000)

University of California, Los Angeles (Mathematics 1992; Statistics 2000, 2008, 2013)

University of California, Riverside (Earth Sciences 1996; Statistics 1996)

University of California, San Diego (Institute for Geophysics and Planetary Physics 1985, 1986, 1987, 1988(2), 1990, 1998, 2005; Mathematics 1994)

University of Cambridge (Institute for Astronomy 1992, 1997)

University of Chicago (Statistics 1990)

University of Edinburgh (Earth Sciences, 1998)

University of Luxembourg (Interdisciplinary Centre for Security, Reliability and Trust 2012)

University of Paris, Institute de Physique du Globe de Paris (2011)

University of Pennsylvania (Wharton Statistics Department, 2011)

University of Texas at Austin (Geological Sciences 1988; Mathematics 1990, 1991; Institute for Geophysics 1990)

Veterans Affairs Northern California Health Care System, Martinez, CA (East Bay Institute for Research and Education, 2007)

Yale University (Geology and Geophysics 1988; Statistics 1988)

Press

141. Electoral Organizations Call For Nationwide Audit, Ethan Harfenist, *Vocativ*, 18 November 2016. (Election integrity) <http://www.vocativ.com/377544/election-audit/>

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140. Against all Odds, Gavin Off and Adam Bell, *The Charlotte Observer*, 29 September 2016. (Lottery fraud) <http://www.charlotteobserver.com/news/special-reports/against-all-odds/>
139. Exercise and therapy cure for ME seriously flawed, Tom Whipple, *The Times of London*, 28 September 2016. (Myalgic encephalomyelitis, chronic fatigue syndrome, clinical trials)
138. Livestream interview: Audits in California—How to Improve, *Ballots for Bernie*, 25 September 2016. (Election integrity) <https://www.facebook.com/events/536276663233125/>
137. Foraging: Where the wild foods are, Shannon Eblen, *Courier-Post / USA Today*, 21 September 2016. (Urban foraging, food security, food safety) <http://www.courierpostonline.com/story/life/2016/09/21/foraging-food-edibles-deptford/90494736/>
136. Bad science misled millions with chronic fatigue syndrome. Here's how we fought back, Julie Rehmeyer, *STAT*, 21 September 2016. (Chronic fatigue syndrome, analysis of clinical trials) <https://www.statnews.com/2016/09/21/chronic-fatigue-syndrome-pace-trial/>
135. How to Hack an Election in 7 Minutes, Ben Wofford, *Politico Magazine*, 5 August 2016. (election integrity, election auditing) <http://www.politico.com/magazine/story/2016/08/2016-elections-russia-hack-how-to-hack-an-election-in-seven-minutes-214144>
134. Instead of Pokémon, Try Using Your Smartphone To Catch Tasty Wild Edibles, Jill Neimark, *Good*, 2 August 2016. (urban foraging, wild/feral food) <https://food.good.is/articles/foragers-call-these-apps-the-tinder-for-wild-food>

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133. The Bias in Student Course Evaluations, Joey Sprague, *Inside Higher Ed*, 17 June 2016. (teaching evaluations, gender bias) <https://www.insidehighered.com/advice/2016/06/17/removing-bias-student-evaluations-faculty-members-essay>
132. How One Professor Is Trying to Paint a Richer Portrait of Effective Teaching, Emma Pettit, *The Chronicle of Higher Education*, 16 June 2016. (teaching evaluations, gender bias) <http://chronicle.com/article/How-One-Professor-Is-Trying-to/236827>
131. Survival of the Smartest: Berkeley Prof Stocks Up On Skill to Outlast Apocalypse, Krissy Eliot, *California Magazine*, 31 May 2016. (urban foraging, cooking, food, trail running) <http://alumni.berkeley.edu/california-magazine/just-in/2016-05-31/survival-smartest-berkeley-prof-stocks-skill-outlast>
130. MSU Professors Read Mean Reviews, *Detroit Free Press*, 2 May 2016. (teaching evaluations, gender bias) <http://www.freep.com/story/news/local/michigan/2016/05/02/msu-professors-read-mean-reviews/83836716/>
129. Embracing ‘Messy’ Science, Colleen Flaherty, *Inside Higher Ed*, 15 March 2016. (*P*-values) <https://www.insidehighered.com/news/2016/03/15/american-statistical-association-seeks-usher-new-era-statistical-significance>
128. Are College Students Sexist? New Research Says They Grade Female Profs More Harshly, Krissy Eliot, *California Magazine*, 3 February 2016. (Gender bias, teaching evaluations) <http://alumni.berkeley.edu/california-magazine/just-in/2016-02-03/are-college-students-sexist-new-research-says-they-grade>
127. Are student evaluations fair on female teachers?, Alecia Simmonds, *Daily Life*, 3 February 2016. (Gender bias, teaching evaluations) <http://www.dailylife.com.au/news-and-views/dl-opinion/are-student-evaluations-fair-on-female-teachers-20160202-gmjuw6.h>

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62

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126. Scientists: Subtle Seismic Activity Hints at Predicting Large Quakes, Steve Herman, *Voice of America*, 28 January 2016. (Earthquake prediction) <http://www.voanews.com/content/subtle-seismic-activity-hints-predicting-large-quakes/3167842.html>
125. New Study Shows College Students Are Overwhelmingly Biased Against Female Professors: Student evaluations aren't just based on the effectiveness of teachers. Noelle Devoe, *Seventeen*, 27 January 2016. (Gender bias, teaching evaluations) <http://www.seventeen.com/life/school/news/a37577/new-study-shows-college-students-are-overwhelmingly-biased-against-female-professors/>
124. Les évaluations des enseignements par les étudiants et les stéréotypes de genre, Anne Boring, *The Conversation*, 26 January 2016. (Gender bias, teaching evaluations) <https://theconversation.com/les-evaluations-des-enseignements-par-les-etudiants-et-les-stereotypes-de-genre-53590>
123. Students Are Kind of Harsh When Evaluating Their Female Professors, Tanya Basu, *New York Magazine*, 26 January 2016. (Gender bias, teaching evaluations) <http://nymag.com/scienceofus/2016/01/students-give-women-professors-worse-evaluations.html>
122. Student Evaluations Of College Professors Are Biased Against Women, Study Finds, Showing How Sexism Warps Our Views Of Competency, Erin Mckelle Fischer, *Bustle*, 26 January 2016. (Gender bias, teaching evaluations) <http://www.bustle.com/articles/137889-student-evaluations-of-college-professors-are-biased-against-women-study-finds-showing-how-sexism-warps-our>
121. New Study Shows That Students Overwhelmingly Prefer Male Professors to Female Ones, but does having a male teacher mean a higher

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November 18, 2016

63

GPA? Kate Dwyer, *Teen Vogue*, 26 January 2016. (Gender bias, teaching evaluations) <http://www.teenvogue.com/story/students-evaluate-male-professors-more-favorably>

120. Students Favor Male Professors Regardless of Their Skills and Teaching Style, Madeleine Davies, *Jezebel*, 25 January 2016 (Gender bias, teaching evaluations) <http://jezebel.com/students-favor-male-professors-regardless-of-their-skil-1754947463>
119. Why Female Professors Get Lower Ratings, Anya Kamenetz, *NPR Education*, 25 January 2016. (Gender bias, teaching evaluations) <http://www.npr.org/sections/ed/2016/01/25/463846130/why-women-professors-get-lower-ratings/>
118. The Glaring Flaw In Student Evaluations, Casey Quinlan, *Think Progress*, 14 January 2016. (Gender bias, teaching evaluations) <http://thinkprogress.org/education/2016/01/14/3739455/gender-bias-professors/>
117. Bias Against Female Instructors, Colleen Flaherty, *Inside Higher Ed*, 11 January 2016. (Gender bias, teaching evaluations) <https://www.insidehighered.com/news/2016/01/11/new-analysis-offers-more-evidence-against-student-evaluations-teaching>
Reprinted as It's Time to Kill the Student Evaluation: More and more evidence shows bias against female instructors, *Slate*, 14 January 2016. http://www.slate.com/articles/life/inside_higher_ed/2016/01/student_evaluations_show_bias_against_female_instructors.html
116. There's No Easy Fix for Gender Bias in Students' Evaluation of Teachers, Nathan Collins, *Pacific Standard*, 8 January 2016. (Gender bias, teaching evaluations) <http://www.psmag.com/politics-and-law/kids-will-be-gender-biased-kids>
115. Is food foraged in cities safe to eat?, Christina Boyes, *Civil Eats*, 11 November 11 2015. (Urban foraging, nutrition, food safety) <http://c>

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ivileats.com/2015/11/11/is-urban-foraging-cities-safe-to-eat-boston/

114. Terra Verde interview, by Jason Mark, *KPFA*, 21 August 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://archives.kpfa.org/data/20150821-Fri1400.mp3>

113. Un repas au coin du bitume, Julie Zaugg, *Le Temps*, 8 August 2015. (Urban foraging, nutrition, food equity, food security, sustainability) http://www.letemps.ch/Page/Uuid/e58f7054-3d24-11e5-9458-9f31f164eeae/Un_repas_au_coin_du_bitume

112. A Walk on the Wild (Edibles) Side, Mark Bittman, *The New York Times*, 9 July 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://www.nytimes.com/2015/07/09/opinion/mark-bittman-a-walk-on-the-wild-edibles-side.html>

111. Why Mark Bittman Is Eating Weeds on Oakland's Sidewalks, Yahoo Food Editors, *Yahoo! Food*, 9 July 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <https://www.yahoo.com/food/why-mark-bittman-is-eating-edible-weeds-on-123662813296.html>

110. The Logistics of Urban Food Foraging, Katherine Spiers, *KCET*, 8 July 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://www.kcet.org/living/food/the-nosh/the-logistics-of-urban-food-foraging.html>

109. With apps in hand, foragers find food underfoot, *Rustik Magazine*, 28 June 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://rustikmagazine.com/technology-urban-foraging/>

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108. Flawed Evaluations. Colleen Flaherty, *Inside Higher Ed*, 10 June 2015. (Teaching evaluations) <https://www.insidehighered.com/news/2015/06/10/aaup-committee-survey-data-raise-questions-effectiveness-student-teaching>
107. Take a walk on the wild (edible) side. Mark Bittman, *California Matters*, 8 June 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <https://youtu.be/F8BLU3iaLgM>
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105. Edible urban weeds—Oakland's sidewalk salads. Paul Belz, *Wild Oakland*, 30 May 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://wildoakland.org/2015/05/edible-urban-weeds-oaklands-sidewalk-salads/>
104. Eat Your Weeds: Get outside and forage for your food in the forests and sidewalk cracks of the East Bay. Sascha Bos, *East Bay Express*, 20 May 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://www.eastbayexpress.com/oakland/eat-your-weeds/Content?oid=4289051>
103. Student Evaluations: Feared, Loathed, and Not Going Anywhere. Stacey Patton, *Chronicle of Higher Education*, 19 May 2015. (Teaching evaluations) <https://chroniclevitae.com/news/1011-student-evaluations-feared-loathed-and-not-going-anywhere>
102. Q&A: Philip Stark. Rose Hayden-Smith, *UC Food Observer*, 11 May 2015. (Urban foraging, nutrition, food equity, food security,

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66

sustainability, ecology) <http://ucfoodobserver.com/2015/05/11/qa-philip-stark/>

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100. Dandelions Should Be the New Kale. Emiko Jozuka, *Motherboard/Vice*, 27 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://motherboard.vice.com/read/dandelions-should-be-the-new-kale>
99. Salad at Your Feet. Nicholas Boer, *Diablo Magazine*, 27 April 2015. <http://www.diablomag.com/May-2015/Salad-at-Your-Feet/>
98. Weeds are the future of healthy eating. Jason Mark, *Salon.com*, 18 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) http://www.salon.com/2015/04/18/weeds_are_the_future_of_fine_dining_partner/
97. Weed Eaters: Accompanying Berkeley's Urban Foragers from Weed Patch to Dining Table. Kristine A. Wong, *California Magazine*, 15 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://alumni.berkeley.edu/california-magazine/just-in/2015-04-15/weed-eaters-accompanying-berkeleys-urban-foragers-weed-patch>
96. Up Front with Vylma V, *KPFA Radio*, 9 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <https://kpfa.org/episode/up-front-april-9-2015/> (at 30:02)

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November 18, 2016

67

95. Bay Area Restaurants Cooking Weeds for Wild Food Week. Don Ford, *KPIX CBS News*, 8 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://sanfrancisco.cbslocal.com/2015/04/08/bay-area-restaurants-cooking-weeds-wild-food-week/>
94. Weeds — They're What's for Dinner, Jason Mark, *Earth Island Journal*, 8 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) http://www.earthisland.org/journal/index.php/elist/eListRead/weeds_theyre_whats_for_dinner/
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68

88. San Francisco Bay Restaurants Serving Weeds For Wild Food Week, *Growing Magazine*, 1 April 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://www.growingmagazine.com/take-control/san-francisco-bay-restaurants-serving-weeds-for-wild-food-week/>
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83. Let Them Eat Weeds: App Helps People Forage Their Way out of Hunger, Sarah McColl, *TakePart*, 19 February 2015. (Urban foraging, nutrition, food equity, food security, sustainability) <http://www.takepart.com/article/2015/02/19/foraging-apps-food-insecurity>

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69

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November 18, 2016

70

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November 18, 2016

71

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November 18, 2016

72

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November 18, 2016

73

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49. Imagining a Census Survey Without a Mandate. Carl Bialik, *The Wall Street Journal*, 30 March 2012. (census)
<http://blogs.wsj.com/numbersguy/imagining-a-census-survey-without-a-mandate-1129/>
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47. New Equation for Voting Technology: Auditing > Testing? Doug Chapin, University of Minnesota Program for excellence in Election Administration, 12 January 2012.
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43. Mega-quake clusters unlikely: study. Anna Salleh, *ABC*, 20 December 2011. (Earthquake clustering) <http://www.abc.net.au/science/articles/2011/12/20/3394245.htm>
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November 18, 2016

76

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November 18, 2016

77

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30. California Assembly committee endorses UC Berkeley statistician's election auditing method. Robert Sanders, Media Relations, *UC Berkeley News*, 26 April 2010. (Election auditing) http://www.berkeley.edu/news/media/releases/2010/04/26_canvass.shtml

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26. Novato Sanitary board race tightens. Jim Welte, *The Marin Independent Journal*, 12 November 2009. (Contested election) http://www.marinij.com/election/ci_13773039

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16. Checking It Twice. Julie J. Rehmeyer, *Science News*, 19 January 2008. (Election auditing) http://www.sciencenews.org/view/generic/id/9292/title/Math_Trek__Checking_It_Twice
15. *Reelz Channel Dailies* "Is it Real?" Reelz Channel, 15 June 2007. (gambling odds, probability)
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13. Internet Content Filters Fail to Block Sexually Explicit Material. Thomas Claburn, *Information Week*, 14 November 2006. (Internet content filtering) <http://www.informationweek.com/news/showArticle.jhtml?articleID=194300677§ion=All+Stories>
12. 1 percent of Web sites deemed pornographic. Maryclaire Dale, *Associated Press*, 14 November 2006. (Internet content filtering) <http://www.msnbc.msn.com/id/15721799/>
11. Only 1 percent of Web pages have porn? Declan McCullagh, *News.com*, 14 November 2006. (Internet content filtering) <http://www>

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November 18, 2016

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9. Google privacy issue enters court. *Al Jazeera*, 14 March 2006. (Internet content filtering) <http://english.aljazeera.net/archive/2006/03/2008410131655473737.html>
8. In Case About Google's Secrets, Yours Are Safe. Adam Liptak, *New York Times*, 26 January 2006. (Internet content filtering) http://www.nytimes.com/2006/01/26/technology/26privacy.html?_r=1&emc=eta1&oref=slogin
7. Google Resists U.S. Subpoena of Search Data. Katie Hafner and Matt Richtel, *New York Times*, 20 January 2006. (Internet content filtering) http://www.nytimes.com/2006/01/20/technology/20google.html?pagewanted=1&_r=1
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5. *AFC NewSource* story on airline security [Airings: The Osgood File (CBS Radio Network), 29 July 2003, 18 February 2003; KRON-TV (San Francisco), 3 February 2003]. (statistical auditing, security) http://www.acfnewsource.org/science/random_security.html
4. *The Fred Ebert Show* program on probability and statistics. KIRO 710, Seattle, WA, 27 October 2003. (live appearance re the Monty

P.B. Stark: CV

November 18, 2016

81

Hall problem, Statistics, Probability)

3. *ABC 7 News* story on census adjustment, 30 November 1998. (recorded appearance re census)
2. KQED-FM Forum program on the 2000 Census, San Francisco, CA, 17 July 1998. (live appearance re census) <http://www.kqed.org/radio/programs/forum/>
1. How deep is an earthquake? *Science News*, 2 March 1985. (Deep earthquakes)

Teaching and Advising

Courses

BerkeleyX 2.1x* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-1x-introduction-594>, an Introductory Statistics MOOC (52,661 students enrolled in first offering; 15.5% completion rate. As of 21 October 2015, this was one of the 50 most popular MOOCs of all time)

BerkeleyX 2.2x* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-2x-introduction-685>, an Introductory Statistics MOOC (20,871 students enrolled in first offering; 17% completion rate)

BerkeleyX 2.3x* <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-stat2-3x-introduction-825>, an Introductory Statistics MOOC (22,443 students enrolled in first offering; 12% completion rate)

Introduction to Statistics (Statistics 2)

Introduction to Probability and Statistics (Statistics 20)

Introductory Probability and Statistics for Business (Statistics 21, N21*, W21*)

P.B. Stark: CV

November 18, 2016

82

Introduction to Probability and Statistics for Scientists and Engineers (Statistics 25)

Societal Risks and the Law* (Statistics C79)

Freshman Seminar on Statistics (Statistics 39)

Statistical Inferences for Social and Life Scientists (Statistics 131A)

Concepts of Probability (Statistics 134)

Concepts of Statistics (Statistics 135)

Linear Modeling: Theory and Applications (Statistics 151A)

Reproducible and Collaborative Statistical Data Science* (Statistics 157, now 159/259). Video review: <http://youtu.be/Bq71Pqdukeo>

Probability and Statistics for Physical Science and Engineering PhD Students*

Statistics for Engineering PhD students*

Introduction to Probability and Statistics at an Advanced Level (Statistics 200A)

Theoretical Statistics (Statistics 210B)

Statistical Models: Theory and Applications (Statistics 215A, Statistics 215B)

Not enough Statistics for Journalists* (Journalism 219)

Statistics Masters Program Capstone* (Statistics 222)

Nonparametric and Robust Methods (Statistics 240)

Topics in Probability and Statistics (Statistics 260)

Statistical Consulting (Statistics 272)

* Course I created or co-created.

P.B. Stark: CV

November 18, 2016

83

Former Graduate Students and Postdocs

Imola K. Fodor, Roche

Johann Gagnon-Bartsch, University of California, Berkeley

Christopher R. Genovese, Carnegie Mellon University

Niklaus W. Hengartner, Los Alamos National Laboratory

Janne Huttunen, University of Auckland and University of Kuopio

Bradley Luen, Indiana University

Tian Luo, U.S. Bureau of Labor Statistics

Dmitry I. Nikolayev, Schmidt Institute for Physics of the Earth

R. Jay Pulliam, University of Texas at Austin

Karthik Ram, University of California, Berkeley

Jeffery Regier, University of California, Berkeley

Chad M. Schafer, Carnegie Mellon University

Daniel Turek, University of California, Berkeley

Vincent S. Yates, Yammer

Graduate Committees

1. Alameida, Jose, Mathematics. Ph.D. qualifying examination, 2008
2. Bach, Andre, Physics. Ph.D. qualifying examination, 2011
3. Bar-Yossef, Ziv, Computer Science. Ph.D. qualifying examination, 2001; dissertation committee, "The Complexity of Massive Data Set Computations," 2002
4. Bein, Ed, Biostatistics. MA examination, 2002

P.B. Stark: CV

November 18, 2016

84

5. Berny, Axel Dominique, EECS. Ph.D. qualifying examination, 2004; dissertation committee, "Analysis and Design of Wideband LC VCOs," 2006
6. Bloniarz, Adam, Statistics. Ph.D. qualifying examination, 2014
7. Bodik, Peter, Computer Science. Ph.D. qualifying examination, 2007; dissertation committee, "Automating Datacenter Operations Using Machine Learning," 2010
8. Bowman, John Penfield, IEOR. Ph.D. qualifying examination, 2003
9. Bunn, Emory Freeman, Physics. Ph.D. qualifying examination, 1994; dissertation committee, "Statistical Analysis of Cosmic Microwave Background Anisotropy," 1995
10. Burstein, Richard David II, Mathematics. Ph.D. qualifying examination, 2004; dissertation committee, "Hadamard Subfactors of Bisch-Haagerup Type," 2008
11. Buttrey, Samuel Edward, Statistics. Ph.D. qualifying examination, 1994; dissertation committee, "Nearest-Neighbor Classification with Categorical Variables," 1996
12. Calef, Brandoch Hugh, Applied Mathematics. Ph.D. qualifying examination, 1997; dissertation committee, "Optimal Sampling of the Discrete Fourier Transform," 2002
13. Charman, Andrew Emile, Physics. Ph.D. qualifying examination, 2003; dissertation committee, "Random Aspects of Beam Physics and Laser-Plasma Interactions," 2006
14. Chen, Raymond Lei, EECS. Ph.D. qualifying examination, 1993; dissertation committee, "A Qualitative Modeling Framework of Semiconductor Manufacturing Processes: Self-Learning Fuzzy Inference System and the Statistical Analysis of Categorical Data," 1994
15. Chien, George, EECS. Ph.D. qualifying examination, 1998
16. Feldman, Arnold R., EECS. Ph.D. qualifying examination, 1995; dissertation committee, "High-Speed, Low-Power Sigma-Delta Modulators for RF Baseband Channel Applications," 1997

P.B. Stark: CV

November 18, 2016

85

17. Fodor, Imola K., Statistics. Ph.D. qualifying examination, 1997; chair, dissertation committee, "Spectrum Estimation in Helioseismology," 1999
18. Fong, Keng Leong, EECS. Ph.D. qualifying examination, 1996; dissertation committee, "Design and Optimization Techniques for Monolithic RF Downconversion Mixers," 1997
19. Gagnon-Bartsch, Johann, Statistics. Ph.D. qualifying examination, 2009; co-chair, dissertation committee "Removing Unwanted Variation from Microarray Data with Negative Controls," 2012
20. Gawiser, Eric Joseph, Physics. Ph.D. qualifying examination, 1998
21. Genovese, Christopher Ralph, Statistics. Ph.D. qualifying examination, 1992; chair, dissertation committee, "Statistical Problems in Helioseismology," 1994
22. Goldman, Megan, Biostatistics. Chair, Ph.D. qualifying examination, 2009
23. Gung, Yuan-Cheng, Geophysics. Dissertation committee, "Q Tomography of the Earth Mantle," 2003
24. Hansen, Bendek, Statistics. Chair, MA thesis committee, "Minimax Expected Length Confidence Intervals," 2000
25. Hansen, Mark Henry, Statistics. Chair, Ph.D. qualifying examination, 1992
26. Hengartner, Niklaus Walther, Statistics. Co-chair, dissertation committee, "Topics in Density Estimation," 1993
27. Higgins, Mike, Statistics. Ph.D. qualifying examination, 2009, 2010
28. Huang, Hsiang-Ping, Mathematics. Ph.D. qualifying examination, 1996
29. Huang, Jianhua, Statistics. Ph.D. qualifying examination, 1994; dissertation committee, "Topics in Extended Linear Modeling," 1997

*P.B. Stark: CV**November 18, 2016*

86

30. Huang, Yuanlin, Civil Engineering. Ph.D. qualifying examination, 1993, 1994
31. Jiang, Xuesong, EECS. Ph.D. qualifying examination, 2001
32. Jones, David Morgan, Mathematics. Ph.D. qualifying examination, 1994; dissertation committee, "On Modular Galois Representations in Characteristic 3," 1998
33. Katsis, Dimitrios, EECS. Ph.D. qualifying examination, 2005
34. Kiesling, Max Karl, Civil Engineering. Ph.D. qualifying examination, 1994
35. Kuusela, Mikael Johan, Statistics, École Polytechnique Fédérale de Lausanne, dissertation committee, "Uncertainty quantification in unfolding elementary particle spectra at the Large Hadron Collider," 2016
36. Li, Bo, Statistics. Ph.D. qualifying examination, 2004
37. Loscutoff, Peter, Physics. Ph.D. qualifying examination, 2011; dissertation committee, "Search for resonant $WZ \rightarrow \ell\nu\ell\ell$ production using $13fb^{-1}$ in $\sqrt{s} = 8TeV$ pp collisions with the ATLAS detector," 2013
38. Luen, Bradley, Statistics. Ph.D. qualifying examination, 2006; Chair, dissertation committee, "Earthquake Prediction: Simple Methods for Complex Phenomena," 2010
39. Luo, Tian, Statistics. MA thesis chair, "Nonparametric estimation of business survival with an application to restaurant startups," 2014
40. Madar, Vered, Statistics and Operations Research, Tel Aviv University. MA thesis committee, "Non-equivariant confidence intervals," 2002; Ph.D. committee, "Simultaneous Confidence Intervals for Multiple Parameters with More Power to Determine the Sign," 2007
41. Megnin, Charles Henri, Geophysics. Ph.D. qualifying examination, 1996; dissertation committee, "The Shear Velocity Structure of the Mantle from the Inversion of Time-Domain Waveform Data," 1999
42. Mieler, Michael William, Civil Engineering. Ph.D. qualifying examination, 2011

P.B. Stark: CV

November 18, 2016

87

43. Millman, Kenneth Jarrod, Biostatistics. MA thesis committee, “permute—a Python package for permutation tests and confidence sets,” 2015
44. Miratrix, Luke W., Statistics. Chair, Ph.D. qualifying examination, 2010
45. Murmann, Boris, EECS. Ph.D. qualifying examination, 2002; dissertation committee, “Digital Calibration for Low-Power High-Performance A/D Conversion,” 2003
46. Ou, Jeffrey Jiajiunn, EECS. Ph.D. qualifying examination, 1995
47. Petkov, Vladimir Plamenov, EECS. Ph.D. qualifying examination, 2003
48. Poobuapheun, Nuntachai, EECS. Ph.D. qualifying examination, 2005; dissertation committee, “LNA and Mixer Designs for Multi-Band Receiver Front-Ends,” 2009
49. Puente, Suzette, Statistics. M.A. committee, 2013
50. Pulliam, R. Jay, Geophysics. Ph.D. dissertation committee, “Imaging Earth’s Interior: Tomographic Inversion of Mantle P-Wave Velocity Structure,” 1991
51. Qian, Kun, EECS. Ph.D. qualifying examination, 2009; dissertation committee, “Variability Modeling and Statistical Parameter Extraction for CMOS Devices,” 2015
52. Regier, Jeffery, Statistics. Chair, M.A. committee, 2013; dissertation committee, “Topics in large-scale statistical inference,” 2016
53. Rein, Steven Richard, Statistics. Chair, Ph.D. qualifying examination, 1990
54. Schafer, Chad Michael, Statistics. Ph.D. qualifying examination, 2001; chair, dissertation committee, “Constructing Confidence Regions of Optimal Expected Size: Theory and Application to Cosmic Microwave Inference,” 2004

P.B. Stark: CV

November 18, 2016

88

55. Son, Sang Won, EECS. Ph.D. qualifying examination, 2000; dissertation committee, "High Dynamic Range CMOS Mixer Design," 2002
56. Suzuki, Toru, Demography. Ph.D. qualifying examination, 1995; dissertation committee, "Projection of Households in Japan with a Dynamic Macro-Simulation Model," 1999
57. Tee, Luns, EECS. Ph.D. qualifying examination, 2001
58. Tenorio, Luis-Francisco, Mathematics. Ph.D. dissertation committee, "Asymptotic Dynamics of Locally Oblique Solitary Wave Solutions of the KP Equation," 1992
59. Thompson, Neil, Statistics. M.A. committee, 2012
60. To, Albert Chi Fu, Statistics. M.A. committee, 2005
61. Wagner, Tim Allen, CS. Ph.D. qualifying examination, 1995; dissertation committee, "Practical Algorithms for Incremental Software Development Environments," 1997
62. Wicks, Charles Wesley Jr., Geophysics. Ph.D. qualifying examination, 1990; dissertation committee, "An Investigation of Mantle Discontinuities Beneath the Southwest Pacific," 1994
63. Yao, Shijing, EECS. Ph.D. qualifying examination, 2015.
64. Yates, Vincent, Statistics. Chair, M.A. committee, 2012
65. Ying, Jun, Naval Architecture. D. Eng. qualifying examination, 1995; dissertation committee, "Development and Verification of Computer Simulation Models for Evaluation of Siting Strategies and Evacuation Procedures for Mobile Drilling Units in Hurricanes," 1996
66. Zhang, Xiaoyan, Statistics. Ph.D. qualifying examination, 1997
67. Zagheni, Emilio, Demography. Ph.D. qualifying examination, 2008
68. Zamora, Joel Barajas, UC Santa Cruz, EE. Ph.D. dissertation defense, 2015; dissertation committee, "Online Display Advertising Causal Attribution and Evaluation," 2015

P.B. Stark: CV

November 18, 2016

89

First-year PhD advising

2014–15 Thanh-Nhan (Andrew) Do

2014–15 Kellie Ottoboni

2014– Kellie Ottoboni

Undergraduate Research and Honors Thesis Advisees

2015 Fang Cai

2015 Catherine Darin, U. Pennsylvania

2014 He Ma

2014 Rachel Redberg

2014 Hriday Kemburu

2010–2011 Katherine McLaughlin

2010 Aaron Taylor

2010 Hua Yang

2009 Joshua M. Levin

2008 Jonathan Ong

2007 Gerold Ng

2003–2004 Feng Tang

1993–1996 Dendy Harjanto

1988–1993 10 others

*P.B. Stark: CV**November 18, 2016*

90

Service**Professional Societies and Government Agencies**

- 2016 – Advisory Board, U.S. Election Assistance Commission
- Consultant, Colorado Secretary of State
- Travis County Texas Elections Division STAR-Vote System Brain Trust
- Founding Steering Committee and Editorial Board, USENIX Journal of Voting Technology
- Associate editor, SIAM/ASA Journal of Uncertainty Quantification
- Editorial Board, *ScienceOpen*
- Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X_WG)
- Program committee, 2016 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'16, held in conjunction with the 2016 Conference on Financial Cryptography and Data Security, FC'16)
- Program committee, 2017 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'16, held in conjunction with the 2017 Conference on Financial Cryptography and Data Security, FC'17)
- Program committee, 12th International Joint Conference on Electronic Voting (E-Vote-ID 2016), Bregenz, Austria
- Session co-organizer, “Productive Ecologies in the Anthropocene: Foraging Systems,” Sixth International Conference on Food Studies, Berkeley, CA
- 2015 – Consultant, Colorado Secretary of State
- Travis County Texas Elections Division STAR-Vote System Brain Trust
- Founding Steering Committee and Editorial Board, USENIX Journal of Voting Technology

P.B. Stark: CV

November 18, 2016

91

- Associate editor, SIAM/ASA Journal of Uncertainty Quantification
 - Editorial Board, *ScienceOpen*
 - Chair for Auditability, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X-WG)
 - Program committee, VoteID 2015: The 5th International Conference on e-Voting and Identity, Bern, Switzerland. <http://www.voteid15.org/>
 - Program committee, 2015 European Symposium on Research in Computer Security (ESORICS 2015), Vienna, Austria. <http://esorics2015.sba-research.org/>
 - Program committee, 2016 Workshop on Advances in Secure Electronic Voting Schemes (VOTING'16, held in conjunction with the 2016 Conference on Financial Cryptography and Data Security, FC'16)
 - Session organizer, Teaching Computational Thinking and Practice, 2015 SIAM Conference on Computational Science and Engineering (CSE15)
 - Organizer, Berkeley Institute for Data Sciences and Moore/Sloan Data Science Environments 2015 Conference on Reproducibility
 - Referee, PeerJ
- 2014
- Consultant, Colorado Secretary of State
 - Travis County Texas Elections Division STAR-Vote System Brain Trust
 - Founding Steering Committee and Editorial Board, USENIX Journal of Election Technology and Systems (JETS)
 - Associate editor, SIAM/ASA Journal of Uncertainty Quantification
 - Editorial Board, *ScienceOpen*
 - Member, IEEE/NIST Voting System Standards Committee (VSSC) Working Group For Voting Methods Mathematical Models (C/VSSC/1622.X-WG)

*P.B. Stark: CV**November 18, 2016*

92

- Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
 - Program committee, VoteID 2015: The 5th International Conference on e-Voting and Identity, Bern, Switzerland. <http://www.voteid15.org/>
 - Program committee, 2015 European Symposium on Research in Computer Security (ESORICS 2015), Vienna, Austria. <http://esorics2015.sba-research.org/>
 - Session organizer, late-breaking session on Reproducibility, 2014 Joint Statistical Meetings, Boston, MA
 - Session organizer and chair, 2014 Conference of the International Society for Nonparametric Statistics, Cadiz, Spain
 - Session organizer, Teaching Computational Thinking and Practice, 2015 SIAM Conference on Computational Science and Engineering (CSE15)
 - Referee, PLoS One
- 2013
- Consultant, California Secretary of State
 - Consultant, Colorado Secretary of State
 - Consultant, U.S. Department of Justice, Civil Division
 - Travis County Texas Elections Division STAR-Vote System Brain Trust
 - Founding Steering Committee and Editorial Board, USENIX Journal of Election Technology and Systems (JETS)
 - Associate editor, SIAM/ASA Journal of Uncertainty Quantification
 - Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
 - Session organizer, Conference of the International Society for Nonparametric Statistics, Cadiz, Spain
- 2012
- Consultant, California Secretary of State
 - Consultant, Colorado Secretary of State
 - Consultant, U.S. Department of Justice

*P.B. Stark: CV**November 18, 2016*

93

- Travis County Texas Elections Division STAR-Vote System Brain Trust
 - Founding Steering Committee, USENIX Journal of Election Technology and Systems (JETS)
 - Reviewer, National Science Foundation
 - Program committee, 2012 Electronic Voting Technology / Workshop on Transparent Elections (EVT/WOTE '12), USENIX Security Symposium, Bellevue, WA
 - Session organizer, 2012 Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Diego, CA
 - Session organizer, 1st Conference of the International Society for NonParametric Statistics, Chalkidiki, Greece
 - Organizing committee co-chair, 2014 SIAM/ASA Conference on Uncertainty Quantification, Savannah, GA
 - Program committee, 2012 SIAM/ASA/SAMSI/USACM Conference on Uncertainty Quantification, Raleigh, NC
 - Session organizer, Election Verification Network (EVN) annual conference, Santa Fe, NM
- 2011
- Consultant and Expert Witness, U.S. Department of Justice, Civil Division (for U.S. Department of Housing and Urban Development)
 - Program committee, 2012 SIAM/ASA/SAMSI/USACM Conference on Uncertainty Quantification, Raleigh, NC
 - Consultant, California Secretary of State
 - Consultant, Colorado Secretary of State
 - Session organizer, Election Verification Network (EVN) annual conference, Chicago, IL
- 2010
- Consultant and Expert Witness, U.S. Department of Justice, Civil Division (for Department of Housing and Urban Development)
 - Consultant, State of Illinois

*P.B. Stark: CV**November 18, 2016*

94

- Consultant, California Attorney General (for California Highway Patrol)
 - Consultant, New York State Senate
 - Reviewer, Department of Defense Strategic Environmental Research and Development Program
 - Session organizer, Election Verification Network (EVN) annual conference, Washington, DC
- 2009 – Consultant, California Secretary of State
- 2008 – Consultant, California Secretary of State
- 2007 – California Secretary of State Post-Election Audit Standards Working Group
http://www.sos.ca.gov/elections/elections_peas.htm
- 2006 – Consultant and Expert Witness, U.S. Department of Justice, Civil Division
- 2005 – Consultant, U.S. Department of Justice, Civil Division
 – Consultant, U.S. Department of Veterans Affairs Medical Center
 – Consultant, Habeas Corpus Resource Center
- 2004 – Reviewer, National Science Foundation
 – Consultant, U.S. Department of Justice, Civil Division
 – Consultant, U.S. Attorney's Office
 – Consultant, U.S. Department of Veterans Affairs Medical Center
- 2003 – Reviewer, National Science Foundation
 – Referee, National Sciences and Engineering Research Council of Canada
 – Consultant, U.S. Department of Veterans Affairs Medical Center
- 2002 – Consultant, U.S. Department of Agriculture
 – Consultant, U.S. Department of Justice, Civil Division
- 2001 – Consultant, U.S. Department of Justice, Civil Division

P.B. Stark: CV

November 18, 2016

95

- Co-organizer, Institute for Mathematics and Its Applications Annual Program *Mathematics in the Geosciences* and workshop on Inverse Problems and the Quantification of Uncertainty
- 2000 – Invited discussant, National Academy of Science Committee on National Statistics workshop on dual-system estimation for the 2000 Census
- Consultant, U.S. Department of Justice, Civil Division
- 1998 – Witness, U.S. House of Representatives Subcommittee on the Census.
- Panelist, National Science Foundation
- 1997 – Session organizer, International Statistical Institute and Bernoulli Society Meeting, Istanbul, Turkey
- 1996–present – Global Oscillation Network Group (GONG) Data Users Committee (Chair, 1996–1998)
- Reviewer for United States Geological Survey
- 1996–1999 – Consultant, National Security Agency
- 1995 – Institute of Mathematical Statistics Program Chair, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, Orlando, FL
- 1994–1996 – Consultant to Federal Trade Commission
- 1993 – Session organizer and chair, IMS/ASA/ENAR meeting, Philadelphia, PA
- Session organizer and chair, Joint Statistical Meetings of the American Statistical Association, International Biometric Society, and Institute of Mathematical Statistics, San Francisco, CA
- 1992 – Faculty sponsor, Department of Energy TRAC program
- 1990–1994 – Bernoulli Society Committee on Statistics in the Physical Sciences

*P.B. Stark: CV**November 18, 2016*

96

- 1991–present – Reviewer for National Aeronautics and Space Administration (Space Physics Division)
- 1991 – Local organizer and session chair, Mathematical Sciences Research Institute Workshop on Statistical Methods in Imaging, Berkeley, CA
- 1989 – Session organizer and chair, Bernoulli Society Satellite Meeting, Leuven, Belgium
- 1989–present – Reviewer for National Science Foundation (Atmospheric Sciences; Infrastructure; International Programs; Mathematical Sciences; Methodology, Measurement, and Statistics; Solar-Terrestrial Program; Statistics and Probability)

Foundations, Non-Profit Corporations, and Industry

- 2013–present – Board of Directors, Verified Voting Foundation
- 2011–present – Board of Advisors, Verified Voting Foundation
- 2010–2011 – Technical Advisory Board, Clear Ballot Group
- 2007 – Advisory Board, Facebar, Inc.
- 2000–2001 – Technical Advisory Board, Cogit.com
- 2000–2002 – National Advisory Board, eTextbooksOnline.com
- Technical Advisory Board, Atomic Dog Publishing

Editorial and Referee Service

Editorial Service

- 2014–present – Faculty Review Board, Berkeley Scientific Journal
- 2013–present – Editorial Board, ScienceOpen
- 2013–present – Associate Editor, SIAM/ASA Journal on Uncertainty Quantification

*P.B. Stark: CV**November 18, 2016*

97

- 2012–present – Founding Steering Committee and Editorial Board, USENIX
Journal of Election Technology and Systems (JETS)
- 2011–present – Editor, Frontiers in Statistics and Probability (Springer)
- 2008 – Guest Editor, Inverse Problems
- 1998–1999 – Editor, Statistical Science
- 1997–2000 – Editorial Board, Inverse Problems
- 1994–1998 – Associate Editor, Journal of Geophysical Research

Referee Service

1. American Association for the Advancement of Science
2. American Mathematical Monthly
3. Annales Geophysicae
4. Annals of the Institute of Statistical Mathematics
5. Annals of Statistics
6. Arabian Journal for Science and Engineering
7. Astrophysical Journal
8. Bulletin of the Seismological Society of America
9. Cambridge University Press
10. Chapman-Hall
11. Computational Statistics and Data Analysis
12. Electronic Journal of Statistics
13. Geophysical Journal International
14. Geophysical Research Letters
15. Geophysics

P.B. Stark: CV

November 18, 2016

98

16. Geophysical & Astrophysical Fluid Dynamics
17. HarperCollins
18. IEEE Journal on Acoustics, Speech and Signal Processing
19. IEEE Journal on Information Theory
20. Inverse Problems
21. Inverse Problems and Imaging
22. Journal of the American Statistical Association
23. Journal of Computational Physics
24. Journal of Economic Literature
25. Journal of Geophysical Research
26. Jurimetrics
27. Nature
28. Nature Climate Change
29. PeerJ
30. Political Analysis
31. Physics of the Earth and Planetary Interiors
32. PLoS One
33. Proceedings of the National Academy of Sciences
34. Science
35. SIAM Review
36. Simon and Schuster
37. Springer-Verlag
38. Statistics, Politics, and Policy

*P.B. Stark: CV**November 18, 2016*

99

39. Statistical Science

40. Tectonophysics

University Service

- 2016–2017
 - Associate Dean, Division of Mathematical and Physical Sciences
 - Director, Statistical Computing Facility
 - Advisory Board, Berkeley Institute for Data Science (BIDS)
 - Scientific Advisory Board, European Union H2020 Project Moving Towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC), Universitat Autònoma de Barcelona (Spain) and University of Bergen (Norway)
 - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
 - Faculty Advisory Committee, Athletic Study Center
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
 - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2015–2016
 - Associate Dean, Division of Mathematical and Physical Sciences
 - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
 - Faculty Advisory Committee, Athletic Study Center
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
 - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2014–2015
 - Chair, Department of Statistics
 - Director, Statistical Computing Facility
 - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)

*P.B. Stark: CV**November 18, 2016*

100

- Campus Working Group on Course Curriculum and Design
 - Faculty Advisory Committee, Athletic Study Center
 - Engineering Science Advisory Committee, College of Engineering
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
 - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2013–2014
- Chair, Department of Statistics
 - Director, Statistical Computing Facility
 - Commission on the Future of the UC Berkeley Library <http://academic-senate.berkeley.edu/issues/commission-future-uc-berkeley-library>
 Charge: <http://evcp.berkeley.edu/sites/default/files/Library%20Commission%2009.21.2012.pdf>
 Final Report: <http://evcp.berkeley.edu/news/commission-future-uc-berkeley-library-report>
 - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
 - Campus Working Group on Course Curriculum and Design
 - Faculty Advisory Committee, Athletic Study Center
 - Engineering Science Advisory Committee, College of Engineering
 - Search Committee, Director of IT for College of Letters and Sciences
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
 - External Review Committee, Department of Applied Mathematics and Statistics, Colorado School of Mines
 - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2012–2013
- Chair, Department of Statistics
 - Director, Statistical Computing Facility

*P.B. Stark: CV**November 18, 2016*

101

- Commission on the Future of the UC Berkeley Library
 - Faculty Advisory Committee, Berkeley Resource Center for Online Education (BRCOE)
 - Engineering Science Advisory Committee, College of Engineering
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
 - Member, Berkeley Science Network <http://bsn.berkeley.edu>
- 2011–2012
- Acting Department Chair, Department of Statistics, July–August
 - Vice Chair, Department of Statistics
 - Academic Senate Alternate Representative to University of California Systemwide Assembly
 - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
 - Campus Committee on Classroom Policy and Management (CC-CPM)
 - Business Resumption Coordination Group (BRCG)
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University
- 2010–2011
- Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
 - Campus Committee on Classroom Policy and Management (CC-CPM)
 - Course Note-Taking Taskforce (<http://campuspol.chance.berkeley.edu/policies/coursenotes.pdf>)
 - *Ad hoc* tenure/promotion committee
 - Faculty Athletic Fellow
 - Program Advisory Committee, Doctor of Business Administration Program, Lincoln University

*P.B. Stark: CV**November 18, 2016*

102

- 2009–2010 – Academic Senate Committee on Computing and Communications (COMP)
- Faculty Athletic Fellow
- 2008–2009 – Faculty Athletic Fellow
- 2007–2008 – Undergraduate Student Learning Initiative Faculty Advisory Committee
- Faculty Athletic Fellow
- 2006–2007 – Faculty Athletic Fellow
- 2005–2006 – Faculty Athletic Fellow
- 2004–2005 – Chair, Educational Technology Committee
- e-Berkeley Steering Committee
- e-Berkeley Committee of Chairs
- e-Berkeley Implementation Task Force
- CourseWeb Steering Committee
- Faculty Athletic Fellow
- 2003–2004 – Chair, Educational Technology Committee
- e-Berkeley Steering Committee
- e-Berkeley Implementation Task Force
- Student Systems Policy Committee
- CourseWeb Steering Committee
- 2002–2003 – Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education)
- Chair, Educational Technology Committee
- Provost’s Academic Council
- e-Berkeley Steering Committee
- e-Berkeley Implementation Task Force
- Campus Committee on Classroom Policy and Management (CC-CPM)

P.B. Stark: CV

November 18, 2016

103

- Student Systems Policy Committee
 - e-Berkeley Symposium Program Committee
 - Faculty Search Committee, Graduate School of Education
 - CourseWeb Steering Committee
- 2001–2002
- Faculty Assistant in Educational Technology (to Vice Provost for Undergraduate Education)
 - Chair, Educational Technology Committee
 - Provost’s Academic Council
 - e-Berkeley Steering Committee
 - e-Berkeley Implementation Task Force
 - Campus Committee on Classroom Policy and Management (CC-CPM)
 - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
 - CITRIS II Program Committee
 - TeleBEARS and BearFacts Committees (combined into Student Systems Policy Committee as of 3/2002)
 - e-Berkeley Portal Working Group
 - Faculty search committee, Graduate School of Education
- 2000–2001
- Space Allocation and Capital Improvements (SACI)
 - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA)
 - CAPRA Subcommittee on Expanded Enrollment
 - CAPRA Subcommittee on changes to Academic Coordinator title
 - *Ad hoc* hiring/tenure committee
- 1999–2000
- Space Allocation and Capital Improvements (SACI)
 - Academic Senate Library Committee (LIBR)
 - Academic Senate Committee on Academic Planning and Resource Allocation (CAPRA), Physical Planning Subcommittee, *ex officio* representative from Library Committee

*P.B. Stark: CV**November 18, 2016*

104

- Academic Effects Study Committee, Molecular Engineering Building
- *Ad hoc* tenure/promotion committee
- SACI subcommittee to audit space in Barrows Hall
- 1998–1999 – Space Allocation and Capital Improvements (SACI)
- Electronic Dissertations Project
- Planning Space for the Physical Sciences Libraries
- 1997–1998 – *Ad hoc* tenure/promotion committee
- 1996 – Review of College of Science, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia
- 1994–1999 – University review committee for Department of Agricultural and Resource Economics, University of California, Berkeley
- 1993–1995 – Physical Sciences Division committee for Graduate Affirmative Action and Retention
- Physical Sciences Division committee for Science and Mathematics Academic Re-Training (SMART)

Contracts and Grants

1. PI, NASA Grant NAG 5-883, “Constructing Core Fields Consistent with Geomagnetic Data and Geophysical Constraints,” 1987–1990.
2. Project Director and PI, NSF Grant DMS-8810192, “Inference in Curved-Ray Tomography: Solid Earth Structure,” 1989–1992.
3. PI, NSF Grant INT-9205103, “Long and Medium-Term Research: Inference in Seismological Investigations of Subducting Lithosphere,” 1992–1994.
4. PI, NSF Grant DMS-930006P, “Estimating the Sun’s Internal Angular Velocity from Free-Oscillation Frequency Splittings,” 1993–1994.
5. PI, NSF Presidential Young Investigator Award DMS-8957573, 1989–1995.

P.B. Stark: CV

November 18, 2016

105

6. Co-I, NASA Grant NAG5-2438, "The Analysis of Cobe DMR Sky Maps," 1993–1994. PI: J. Silk
7. PI, NASA Grant NAGW-2515, "New Methods for Inversion and Analysis of Solar Free-Oscillation Data," 1991–1995.
8. PI, NSF Grant DMS-9404276, "New Methods for Inference From COBE Data," 1994–1997.
9. PI, NSF Grant AST-9504410, "Function Estimation and Inference in Helioseismology," 1995–1998.
10. PI, LLNL/IGPP Grant 97-AP028, "Helioseismology with Solar Luminosity Constraints," 1996–1997.
11. Co-I, NASA Grant NAG5-3941, "Development of data analysis, compression and visualization tools for large data sets in astrophysics and cosmology," 1997–1998. PI: J. Silk
12. PI, NASA Grant NRA-96-09-OSS-034SOHO, "Modern Statistical Methods for Helioseismic Spectrum Estimation," 1997–1998.
13. PI, NASA Grant NAG 5-3919, "Data Sampling Rate Reduction for the Oersted Satellite," 1997–1998.
14. PI, UC Berkeley Classroom Technologies Grant, "Statistics *Statim*," 1997–1998.
15. Co-I, NSF Grant DMS-9872979, "*KDI: Computational Challenges in Cosmology*," 1998–2000. PI: A. Jaffe.
16. Co-I, NSF Grant IIS-98-17353, "*Re-Inventing Scholarly Information Dissemination and Use*," 4/1/1999–3/31/2004. PI: R. Wilensky and D. Forsythe.
17. PI, Hewlett Packard Company Grant 89293, "Applied Mobile Technology Solutions in Learning Environments," 3/19/2003–8/31/2004. Status report:
<http://www.stat.berkeley.edu/~stark/Grants/hp89293.htm>

*P.B. Stark: CV**November 18, 2016*

106

18. PI, Hewlett Packard Company Grant 14928, “Applied Mobile Technology Solutions in Learning Environments—2004 Extension Grant,” 4/1/2004–6/30/2005.
19. PI, LLNL Grant B565605, “Uncertainty in Complex Simulations,” 4/3/2007–9/30/2007.
20. PI, LLNL Grant B585264, “Uncertainty Quantification with Applications to Climate Modeling,” 11/3/2009–9/30/2010.
21. PI, Genentech Inc. Grant 008485, “Measuring Glucose with NIR,” 2/24/2010–10/31/2010.
22. Co-I, NSF Grant DUE-1060487, “S-STEM Berkeley Science Network Scholarship Program,” 3/1/2011–2/28/2015. PI: M. Richards.
23. PI, State of Colorado U.S. Election Assistance Commission subaward UC01, 2010 Pre-Election Logic and Accuracy Testing and Post-Election Audit Initiative, 5/23/2011–4/23/2013.
24. PI, State of California Election Assistance Commission subaward 10I10066, Post Election Risk-Limiting Audit Pilot Program, 9/13/2011–4/23/2013.
25. PI, Bill and Melinda Gates Foundation Grant OPP1077697, “An Introductory Statistics MOOC With Field-Tested Online Assessments,” 12/20/2012–7/31/2013.
26. Co-I, UC Berkeley MOOCLab Grant, “Forum Usage in Statistics MOOCs: Disentangling Correlation from Causation,” 10/2013–8/2014. PI: M. Hearst.
27. Co-I, Berkeley Institute for Data Science, grant from the Gordon and Betty Moore Foundation and the Sloan Foundation. 12/2013–12/2018. PI: S. Perlmutter.
28. PI, UC Berkeley Food Institute Grant, “Reaping without Sowing: Urban Foraging, Sustainability, Nutrition, and Social Welfare,” 2/2014–8/2015.
29. Co-I, “NRT-DESE Data Science for the 21st Century (DS421),” NSF, 1450053 2015–2020. PI: D. Ackerley.

P.B. Stark: CV

November 18, 2016

107

30. PI, UC Berkeley Food Institute Grant, “Wild Food: Investigating and Reducing Barriers to the Consumption of Foraged Foods,” 5/2015–12/2015.
31. PI, State Street Bank and Trust Company Grant, “Industry Partners Program: Consortium for Data Analytics in Risk (CDAR); and Berkeley Institute for Data Science (BIDS) at UC Berkeley,” 2/2015–6/2017.

Consulting and Expert Witness Experience

Baker & McKenzie LLP, New York, NY: sampling and uncertainty quantification (client Nuclear Electric Insurance Limited, NEIL)

Bartlit Beck Herman Palenchar & Scott LLP, Denver, CO: intellectual property litigation (client Tessera)

Bingham McCutchen LLP, Los Angeles, CA: sampling in litigation

Bramson, Plutzik, Mahler & Birkhaeuser LLP, Walnut Creek, CA: consumer class action litigation

Brinks, Hofer, Gilson & Lione, Chicago, IL: intellectual property litigation (clients R.J. Reynolds, Actavis)

Calfee, Halter & Griswold LLP, Cleveland, OH: tort litigation (client FirstEnergy Corp)

Capital One: economic modeling and credit risk management; intellectual property litigation; credit loss forecasting

Carey and Carey, Palo Alto, CA: equal protection, civil litigation

CIBC: economic modeling and credit risk management

Cisco Systems: predicting email spool fill

City of Santa Rosa, CA: water treatment monitoring

Cogit.com, San Francisco, CA: Technical advisory board; data mining, targeted web advertising

P.B. Stark: CV

November 18, 2016

108

Contra Costa County Public Defender, Richmond, CA: equal protection

Crosby, Heafey, Roach, & May, Oakland, CA: insurance litigation (client Farmer's Insurance)

Croskery Law Offices, Cincinnati, OH: employment discrimination litigation

East Bay Utilities District: water treatment monitoring

EEG Systems Laboratory, San Francisco, CA: inverse problems for electrical activity of the brain

eTextbooksOnline.com, New York, NY: National Advisory board

Farella Braun + Martel LLP, San Francisco, CA: sampling and estimation in litigation

Federal Trade Commission, San Francisco, CA: sampling in litigation

Florida Education Association, Tallahassee, FL: teaching evaluations in employment decisions

Folger, Levin & Kahn, LLP, San Francisco, CA: sampling and risk management in litigation (client California Self-Insurers' Security Fund)

Fried, Frank, Harris, Shriver & Jacobsen LLP, New York, NY: sampling and estimation in securities litigation (clients Citigroup Global Markets Inc.; Goldman, Sachs & Co.; UBS Securities LLC)

Fuller-Austin Joint Defense Group: modeling in litigation

Gibson, Dunn & Crutcher, New York, NY: sampling and estimation in litigation (client AIG / Lavastone Capital)

GMAC Financial Services: economic modeling and credit risk management

Habeas Corpus Resource Center, San Francisco, CA: bias in jury selection

P.B. Stark: CV

November 18, 2016

109

Howard, Rice, Nemerovski, Canady, Falk, & Rabkin, San Francisco, CA: sampling in litigation; inference from retail sales data (clients K-Mart Corp., R.J. Reynolds)

Howrey LLP, East Palo Alto, CA: sampling in litigation (client Apple Inc.)

HSBC: economic modeling and credit risk management

Kaiser Permanente Northern California, Redwood City, CA: clinical trials in oncology

Kelley Jasons McGuire & Spinelli, LLP: insurance litigation (client St. Paul Fire & Marine Insurance Company)

Kipling Law Group, Seattle, WA: sampling in litigation (client AT&T Wireless)

KLA Instruments Corporation, San Jose, CA: calibration of algorithms to detect IC mask flaws

Kramer, Levin, Naftalis, & Frankel, New York, NY: sampling in litigation

Latham & Watkins, LLP, Menlo Park, CA, and San Francisco, CA: sampling in consumer class action litigation (clients Apple Inc., Silver Spring Networks)

Law Offices of Gorman & Miller, San Jose, CA: trade secret litigation

Law Offices of Ilson W. New, San Francisco, CA: natural resource legislation (client California Abalone Association)

Law Offices of Ramirez, Tollner, Stebbins, Bahrnick, & Sasseen, San Jose, CA: trade secret litigation

Law Offices of Welebir & McCune, Woodside, CA: product liability litigation

Law Offices of Wells, Pinckney & McHugh, Austin, TX: employment discrimination arbitration

P.B. Stark: CV

November 18, 2016

110

Law Offices of Wolkin & Timpane, San Francisco, CA: insurance litigation (client CIGNA)

Law Offices of Scott K. Zimmerman, Brentwood, CA: product liability litigation

Life Chiropractic College West, Hayward, CA: experimental design

Littler Mendelson, P.C., Dallas, TX, Los Angeles, CA, and San Francisco, CA: sampling in employment wage and hour class action litigation

Los Angeles Superior Court, Central District: sampling in employment wage and hour litigation

Mayer, Brown, Rowe & Maw, Chicago, IL: intellectual property litigation (client Capital One)

Mayer Brown LLP, New York, NY: mortgage backed securities litigation (clients Bank of New York Mellon, Citibank N.A.)

Memorial University Faculty Association, St. Johns, NL, Canada: teaching evaluations

Meyers Nave, Oakland, CA: election dispute litigation (client Novato Sanitary District)

Morgan, Lewis & Bockius LLP, Los Angeles, CA: sampling in litigation

Morrison & Foerster, San Francisco, CA: product liability class action litigation, causal inference in litigation (clients American Cemwood, Iovate Health Sciences)

Munger, Tolles & Olson, LLP, San Francisco, CA and Los Angeles, CA: consumer class action litigation, intellectual property litigation, sampling (clients Verizon Wireless, Philip Morris, Tessera)

Murphy & McGonigle, Washington, DC: risk management and credit loss forecasting (client Capital One)

National Security Agency: adaptive filtering, combining expert opinions, digital communications, information retrieval, estimation

P.B. Stark: CV

November 18, 2016

111

National Solar Observatory, Tucson, AZ: spectrum estimation

Albert A. Natoli, P.C., New York, NY: surveys in consumer class action litigation

Nichols Kaster PLLP, Minneapolis, MN: sampling and damage estimation in consumer class action litigation

Norton Rose Fulbright US LLP, Houston, TX: construction defect litigation (client M.J. Dean Construction, Inc.)

Office of the Attorney General, State of California, Oakland, CA: sampling in litigation (client California Highway Patrol)

Ontario Confederation of University Faculty Associations (OCUFA) and Ryerson Faculty Association, Toronto, ON: teaching evaluations in employment decisions

Oracle: sampling and risk analysis

Orrick, Herrington & Sutcliffe LLP, Los Angeles and Sacramento, CA: sampling in litigation

Pacific Gas & Electric Co., San Francisco, CA: statistics and causal inference in litigation

Paul, Hastings, Janofsky & Walker LLP, Washington, DC: intellectual property litigation (client Capital One)

Phillips & Cohen LLP, San Francisco, CA: statistical inference in *Qui Tam* litigation

Porter & Hedges, LLP, Houston, TX: sampling in litigation

Schlumberger-Doll Research, Ridgefield, CT: inverse problems, signal processing

Shearman & Sterling, Washington, DC: survival analysis in litigation

Skadden, Arps, Slate, Meagher & Flom LLP, San Francisco, CA: case-control studies in litigation

Spriggs & Hollingsworth, Washington, DC: environmental litigation

P.B. Stark: CV

November 18, 2016

112

State of Illinois, Monroe County State's Attorney, Waterloo, IL: evidence in capital prosecution

St. Paul Fire and Marine Insurance Company, Baltimore, MD: projecting tort liability

Travis County, TX: design of auditable voting systems

United Faculty of Florida, Tallahassee, FL: teaching evaluations in employment decisions

U.S. Attorney's Office, Northern District of California: ethnic bias in grand jury selection

U.S. Department of Agriculture, Washington, D.C.: fairness in lending, import restrictions and risk assessment

U.S. Department of Commerce, Bureau of the Census, Washington, D.C.: estimation and modeling

U.S. Department of Housing and Urban Development, Washington, D.C.: disparate impact of hurricane Katrina relief program

U.S. Department of Justice, Civil Division, Federal Programs Branch, Washington, D.C.: sampling the Internet and testing Internet content filters; USDA import restrictions on cattle and beef; disparate racial impact in HUD disaster relief; fairness in lending; prevalence of "sexting" among young adults

U.S. Department of Veterans Affairs Medical Center, Martinez, CA: speech and non-speech hearing segregation in aging

U.S. House of Representatives, Washington, D.C.: sampling to adjust the U.S. Census

Weintraub Genshlea Chediak Law Corporation, Sacramento, CA: wage and hour class action litigation (client Tai Wah, Inc.)

Wiegel Law Group, San Francisco, CA: sampling in class action litigation (client Trinity Management Services)

Willoughby, Stuart & Bening, San Jose, CA: insurance litigation

P.B. Stark: CV

November 18, 2016

113

Winston & Strawn LLP, Chicago, IL: consumer class action litigation

Zimmerman Reed, Scottsdale, AZ: consumer class action litigation

Recent Testimony (incomplete prior to 2003)

34. **October 2016.** Citizens Oversight, Inc., a Delaware non-profit corporation; and Raymond Lutz, an individual, Plaintiffs, *vs.* Michael Vu, San Diego Registrar of Voters; Helen N. Robbins-Meyer, San Diego County Chief Administrative Officer; County of San Diego, a public entity; and Does 10–10, Defendants. (Superior Court of California, County of San Diego–Central Division, 37-2016-00020273-CL-MC-CTL). Trial testimony.
33. **July 2016.** Loc Vu-Quoc *vs.* University of Florida. (American Arbitration Association Case no. 01-15-0006-1052). Arbitration testimony.
32. **July 2016.** Memorial University of Newfoundland Faculty Association *vs.* Memorial University of Newfoundland (Arbitration I15-07). Arbitration testimony.
31. **June 2016.** Gasia Thomas, et al., *vs.* First Energy Corporation, et al. (Court Of Common Pleas, Cuyahoga County, Ohio, 13-CV-798520) Deposition testimony.
30. **May 2016.** The Western and Southern Life Insurance Company, et al., *vs.* The Bank of New York Mellon. (Court Of Common Pleas, Hamilton County, Ohio, A1302490) Deposition testimony.
29. **February 2016.** Palms Place, LLC, a Nevada limited liability company, *vs.* Kittrell Garlock & Associates, Architects, AIA, LTD. d/b/a

P.B. Stark: CV

November 18, 2016

114

KGA Architecture, a Nevada professional corporation; M.J. Dean Construction, LLC, a Nevada limited liability company; Does I through X; Roe Corporations I through X; and Roe LLC I through X, Defendants.

M.J. Dean Construction, Inc., a Nevada corporation, Counterclaimant, *vs.* Palms Place, LLC, a Nevada limited liability company, Does I-X, Roe Corporations I-X, Boe Bonding Companies I-X, Loe Lenders I-X and Toe Tenants I-X, Counterdefendants.

Kittrell Garlock & Associates, Architects, AIA, Ltd. d/b/a KGA Architecture, a Nevada professional corporation, Counterclaimant, *vs.* Palms Place, LLC, a Nevada limited liability company, and Toes I XV, Counterdefendants.

M.J. Dean Construction, Inc., a Nevada corporation, Third-Party Plaintiff, *vs.* Embassy Glass, Inc., a Nevada corporation; Zetian Systems, Inc., a Nevada corporation; Bombard Mechanical, LLC, a Limited Liability Company; Century Steel, Inc., a Nevada corporation; Pacific Custom Pools, Inc., a Nevada corporation; Superior Tile & Mechanical, Inc., a Nevada corporation; Mesa Mechanical, LLC, a Limited Liability Company; Dean Roofing Co., a Nevada Corporation; Does 1 through 50; Roe Corporations 1 through 50, Third-Party Defendants.

Palms Place, LLC, a Nevada limited liability company, Cross-Claimant, *vs.* Embassy Glass, Inc., a Nevada corporation; Zetian Systems, Inc., a Nevada corporation; Does 1 through 50; Roe Corporations 1 through 50, Cross-Defendants. (Nevada District Court, Clark County, Nevada, A-11-645150-C) Deposition Testimony.

28. **September 2015.** Lavastone Capitol LLC *vs.* Coventry First LLC, LST I LLC, LST II LLC, LST Holdings LTD., Montgomery Capital, Inc., Alan Buerger, Reid Buerger, Constance Buerger, and Krista Lake. (U.S. District Court, Southern District of New York, 14-CV-07139 JSR) Trial testimony.
27. **May 2015.** Lavastone Capitol LLC *vs.* Coventry First LLC, LST I LLC, LST II LLC, LST Holdings LTD., Montgomery Capital, Inc., Alan Buerger, Reid Buerger, Constance Buerger, and Krista

P.B. Stark: CV

November 18, 2016

115

Lake. (U.S. District Court, Southern District of New York, 14-CV-07139 JSR) Deposition.

26. **April 2015.** Testimony before the California State Assembly Committee on Elections and Redistricting. Legislative hearing. <http://www.stat.berkeley.edu/~stark/Preprints/ab44-assembly-2015-4-15.htm>
25. **July 2014.** New Jersey Carpenters Health Fund, New Jersey Carpenters Vacation Fund, and Boilermaker Blacksmith National Pension Trust, on Behalf of Themselves and All Others Similarly Situated, *vs.* Residential Capital, LLC; Residential Funding, LLC; Residential Accredited Loans, Inc.; Bruce J. Paradis; Kenneth M. Duncan; Davee L. Olson; Ralph T. Flees; Lisa R. Lundsten; James G. Jones; David M. Bricker; James N. Young; Residential Funding Securities Corporation d/b/a GMAC RFC Securities; Goldman, Sachs & Co.; RBS Securities, Inc. f/k/a Greenwich Capital Markets, Inc. d/b/a RBS Greenwich Capital; Deutsche Bank Securities, Inc.; Citigroup Global Markets, Inc.; Credit Suisse Securities (USA) LLC; Bank of America Corporation as successor-in-interest to Merrill Lynch, Pierce, Fenner & Smith, Inc.; UBS Securities LLC; JPMorgan Chase & Co., Inc. as successor-in-interest to Bear, Stearns & Co., Inc.; and Morgan Stanley & Co., Inc. (U.S. District Court, Southern District of New York, Case 08-CV-8781 HB) Deposition.
24. **October 2013.** United States, the States of California, Delaware, Florida, Illinois, Indiana, Nevada, New Mexico, New York, and Tennessee, the Commonwealths Of Massachusetts and Virginia, and The District Of Columbia Ex Rel. John Hendrix, Plaintiffs, *vs.* J-M Manufacturing Company, Inc., d/b/a JM Eagle, a Delaware corporation, and Formosa Plastics Corporation, U.S.A., a Delaware corporation (U.S. District Court, Central District of California, Case 06-00055 GW). Trial testimony.
23. **September 2013.** Tessera, Inc. *vs.* Advanced Micro Devices, Inc., a

P.B. Stark: CV

November 18, 2016

116

Delaware corporation; Spansion, LLC, a Delaware limited liability corporation; Spansion, Inc., a Delaware corporation; Spansion Technology, Inc., a Delaware corporation; Advanced Semiconductor Engineering, Inc., a Republic of China corporation; ASE (U.S.), Inc., a California corporation; ChipMOS Technologies, Inc., a Republic of China corporation; ChipMOS U.S.A., Inc., a California corporation; Siliconware Precision Industries Co., Ltd., a Republic of China corporation; Siliconware USA, Inc., a California corporation; STMicroelectronics N.V., a Netherlands corporation; STMicroelectronics, Inc., a Delaware corporation; STATS ChipPAC, Inc., a Delaware corporation; STATS ChipPAC (BVI), Inc., a British Virgin Islands company; STATS ChipPAC, Ltd., a Singapore company (U.S. District Court, Northern District of California, Case C 05-04063 CW). Deposition.

22. **July 2013.** United States, the States Of California, Delaware, Florida, Illinois, Indiana, Nevada, New Mexico, New York, and Tennessee, the Commonwealths Of Massachusetts And Virginia, and The District Of Columbia Ex Rel. John Hendrix, Plaintiffs, *vs.* J-M Manufacturing Company, Inc., d/b/a JM Eagle, a Delaware corporation, and Formosa Plastics Corporation, U.S.A., a Delaware corporation (U.S. District Court, Central District of California, Case 06-00055 GW). Deposition.
21. **June 2013.** Free Speech Coalition, Inc., American Society Of Media Photographers, Inc.; Michael Barone; David Connors a/k/a Dave Cummings; Thomas Hymes; Townsend Enterprises, Inc. d/b/a Sinclair Institute; C1R Distribution, LLC d/b/a Channel 1 Releasing; Barbara Alper; Carol Queen; Barbara Nitke; David Steinberg; Marie L. Levine a/k/a Nina Hartley; Dave Levingston; Betty Dodson; Carlin Ross *vs.* Eric H. Holder, Jr., Attorney General of the United States (U.S. District Court, Eastern District of Pennsylvania, Case 2:09-4607 MMB). Trial testimony.
20. **October 2011.** Jonathan Buckheit *vs.* Tony Dennis, Dean Devlugt, Town of Atherton, County of San Mateo, Anthony Kockler and Jerry Carlson (U.S. District Court, Northern District of California, Case

P.B. Stark: CV

November 18, 2016

117

CV09-5000 JCS). Deposition.

19. **June 2010.** Testimony before California State Senate Committee on Elections, Reapportionment and Constitutional Amendments. Legislative hearing. <http://www.stat.berkeley.edu/~stark/Preprints/ab2023-senate-15-6-10.htm>
18. **April 2010.** Testimony before California State Assembly Committee on Elections and Redistricting. Legislative hearing. <http://www.stat.berkeley.edu/~stark/Preprints/ab2023-assembly-20-4-10.htm>
17. **March 2010.** Suzan Sharpley and Robert Abeling *vs.* William Long; Novato Sanitary District; Elaine Ginnold, Marin County Registrar of Voters; Does 1–10. (State of California Superior Court, County of Marin, Case CIV 096368). Trial testimony.
16. **January 2010.** Kastanos et al. *vs.* Central Concrete Supply Co., Inc. (State of California Superior Court, County of Alameda, Lead Case No. HG 07-319366). Trial testimony.
15. **June 2009.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504). Trial testimony.
14. **May 2009.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504). Deposition.
13. **July 2008.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332). Deposition.

P.B. Stark: CV

November 18, 2016

118

12. **April 2008.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332). Deposition.
11. **August 2007.** Self-Insurers' Security Fund *vs.* Gallagher Bassett Services, Inc. (U.S. District Court, Northern District of California, Case No. C 06-02828 JSW). Deposition.
10. **March 2007.** Peter Wachtell *vs.* Capital One Financial Corporation and Capital One Services, Inc. (U.S. District Court, District of Idaho, Case No. CIV03-267-S-MHW). Deposition.
9. **November 2006.** Coordination Proceeding Special Title (Rule 1550(b)) Cellphone Termination Fee Cases (State of California Superior Court, County of Alameda, Case 4332). Deposition.
8. **November 2006.** ACLU *vs.* Gonzales (U.S. District Court, Eastern District of Pennsylvania, Civil Action No. 98-5591). Trial testimony.
7. **August 2006.** ACLU *vs.* Gonzales (U.S. District Court, Eastern District of Pennsylvania, Civil Action No. 98-5591). Deposition.
6. **December 2004.** Star Scientific, Inc., *vs.* R.J. Reynolds Tobacco Company, et al. (U.S. District Court, Maryland District, Northern Division, Case Nos. MJG-01 1504 and MJG-02 2504). Trial testimony.
5. **December 2003.** Richison et al. *vs.* American Cemwood Corporation (State of California Superior Court, San Joaquin County, Case No. 005532). Trial testimony.
4. **December 2003.** Pacific Gas and Electric Co. *vs.* City and County of San Francisco (U.S. District Court, Northern District of California,

P.B. Stark: CV

November 18, 2016

119

Case No. C99-2071 VRW). Deposition.

3. **May 2003.** Richison et al. *vs.* American Cemwood Corporation (State of California Superior Court, San Joaquin County, Case No. 005532). Deposition.
2. **May 1998.** Testimony before the U.S. House of Representatives Subcommittee on the Census. Legislative hearing.
1. **1997.** Testimony before the State of California Senate Committee on Natural Resources. Legislative hearing.

<http://www.stat.berkeley.edu/~stark/bio.pdf>

Last modified November 18, 2016.

Exhibit B

Voting Technologies and Ward Vote Data from Wisconsin

November 27, 2016

Did the outcome of voting for president in Wisconsin accurately reflect the intentions of the electors? Concerns have been raised about errors in vote counts produced using electronic technology—were machines hacked?—and a recount may occur.

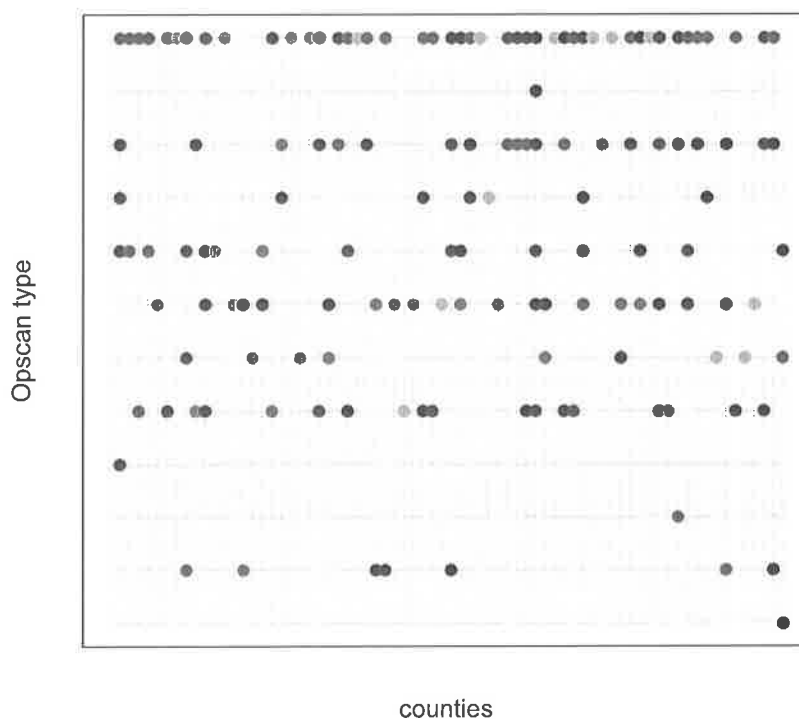
Some statistical analysis has been discussed using data for counties, but such analysis cannot resolve questions about whether voting technology—paper or electronics?—affected the votes for president. Technology, demographics and all other covariates vary within counties, and as argued here there is little reason to believe relationships among all those variables and votes are the same across the whole state or even across a single county.

Variation within counties and the likely diversity of relationships mean the county-level analysis does not give a reliable impression regarding whether voting technology relates to votes. With ward data we can do better, but an audit is needed to get a definitive answer.

That different voters in a county often used different voting technologies is clear from the figure. Many counties used multiple technologies, almost all used electronic vote tabulation technology, and some used both direct-record electronic (DRE) and optical scanner (Opscan) technologies (see the list of equipment used by each municipality). Opscan technologies mark votes on paper but tabulate the votes electronically.

Each horizontal line corresponds to a type of optical scanner technology, and each vertical line corresponds to a county. “None” for the Opscan type (the top row) reflects an unknown mix of DRE technologies and hand-tabulated paper ballots. Down the subsequent rows the other types are: (2) Dominion (Premier)-Accuvote-OS; (3) Dominion (Premier)/Command Central-Accuvote-OS; (4) Dominion (Sequoia)- Sequoia Insight; (5) Dominion (Sequoia)/Command Central- Sequoia Insight; (6) Dominion ImageCast Evolution; (7) ES&S DS200; (8) ES&S M100; (9) Optech- Eagle; (10) Optech/Command Central- Eagle; (11) Optech/Command Central- Eagle, Dominion (Sequoia)/Command Central- Sequoia Insight.

Figure 1: Types of Voting Technology Used by Voters in Wisconsin Counties



Note: Each row represents a different type of Opscan technology (the top row is type “None,” which means there is either DRE or hand-counted paper ballot technology). Counties in alphabetical order correspond to columns. Each green dot shows a county where all voters used the same kind of technology. Red-blue (purple) dots appear when different voters in a county used different technologies: the most frequently used technologies are more blue and the least frequently used are more red. The red-blue color proportion in each dot matches each county’s proportion of voters using each type of technology.

A green dot appears when all the voters in a county used the same kind of technology. Purple dots appear when the technologies used in a county are diverse: the most frequently used technologies are more blue and the least frequently used are more red. In only 26 of the 72 counties were all votes recorded using the same kind of voting technology.

Even if all votes cast using technology type “None” were cast using a DRE system, most counties are internally heterogeneous with respect to whether votes were cast on paper. A county-level analysis is hard pressed to overcome that measurement error, which compromises the analysis. At best, measurement error reduces the apparent magnitude of effects technology type has on votes or on features of votes.

With ward-level data we can do a bit better to assess how technologies relate to features of votes. Wards are the smallest aggregation unit at which vote counts are reported in Wisconsin.

If we could obtain useful ward-level covariates like the demographic characteristics of each ward and the voting histories of the voters in each ward, we might attempt regression-style analysis using ward observations. Unfortunately ward covariates are scant, and we lack such data.

We can use the Election Forensics Toolkit (a website developed as part of a USAID-funded project) to look at features of the ward data. The features of the ward vote counts vary depending on the number of votes cast in the ward and on the type of voting technology used in the ward, so we consider subsets of the Wisconsin wards separately.

For the table a “Small” ward has less than 100 votes. All the statistics in the table that should cause concern occur for Small wards that use some kind of Opscan technology.

One statistic (`LastC`) is the mean of the last digits of the vote counts. At least for large vote counts, this article argues that each of the ten possible last digits of vote counts should occur equally often, in which case the mean is 4.5. Other patterns may suggest the counts were manipulated.

In the Small, Opscan wards the last digits of vote counts for Trump and for Clinton

Table 1: Distribution and Digit Tests, Wisconsin 2016, Wards

Ward Size	Opscan	Name	2BL	LastC	P05s	C05s	DipT	Obs
Small	Yes	Trump	3.809 (3.008, 4.591)	3.458 (2.959, 3.969)	0.448 (0.354, 0.552)	0.177 (0.094, 0.25)	0 --	96
Small	Yes	Clinton	4.617 (3.785, 5.52)	3.765 (3.215, 4.306)	0.469 (0.368, 0.571)	0.122 (0.061, 0.184)	0 --	98
Small	None	Trump	4.727 (4.099, 5.328)	4.614 (4.024, 5.18)	0.253 (0.157, 0.349)	0.181 (0.096, 0.253)	0.99 --	83
Small	None	Clinton	4.014 (3.32, 4.698)	4.049 (3.407, 4.691)	0.148 (0.074, 0.222)	0.185 (0.099, 0.259)	0.987 --	81
Big	Yes	Trump	4.257 (4.15, 4.369)	4.474 (4.357, 4.584)	0.194 (0.178, 0.21)	0.195 (0.18, 0.21)	0.994 --	2525
Big	Yes	Clinton	4.191 (4.079, 4.305)	4.44 (4.334, 4.562)	0.2 (0.185, 0.217)	0.204 (0.189, 0.219)	0.862 --	2525
Big	None	Trump	4.283 (4.088, 4.485)	4.49 (4.3, 4.705)	0.196 (0.166, 0.224)	0.2 (0.169, 0.229)	0.996 --	769
Big	None	Clinton	3.973 (3.766, 4.183)	4.493 (4.289, 4.706)	0.209 (0.179, 0.235)	0.208 (0.179, 0.237)	0.992 --	769

Note: ward vote counts of zero are omitted before computing statistics. “Obs,” number of ward observations. Values in parentheses are 95% nonparametric bootstrap confidence intervals. Point estimates in red differ significantly from the values expected if there are no anomalies.

have means (LastC) that are much less than 4.5. Each “confidence interval” for a statistic give a range of estimates we could have observed given variations in the data that might have occurred by chance. The two LastC intervals do not include 4.5, which is why the point estimates are shown in red.

As this article points out, last-digit diagnostics have not been claimed to work when vote counts are small. So one view is that we have no reason to expect any particular result for those statistics, so there is nothing to worry about.

Even so, among Small wards the wards that use Opscan technologies exhibit anomalies while those using different technologies do not.

Another statistic (C05s) is the mean of a variable indicating whether the last digit of the vote count is zero or five. Based on the same rationale about digit frequencies as for LastC, C05s should be 0.2 if there are no problems. C05s being too large may mean that someone was sloppy and simply wrote down approximate numbers. C05s too small might

mean that someone is faking the numbers (it has been found that 2 and 7 are favorite numbers for people trying to produce random numbers out of their heads).

In the Small, OpSCAN wards C05s for Clinton is too small, showing that vote counts for Clinton too rarely have a last digit of zero or five. Notably this statistic is significantly too large if ward vote counts of zero are included.

The P05s statistic, which is the mean of a variable indicating whether the last digit of the rounded percentage of a candidate's votes is zero or five, has a specific motivation from the idea that people who commit frauds want to allow their efforts to be detected in order to claim credit. Such "signaling" frequently occurs in Russian elections. Like C05s, P05s should be 0.2 if no signaling is occurring, but larger values of P05s are concerning.

Votes in the Small, OpSCAN wards exhibit a "signaling" pattern (P05s).

Having vote percentages concentrated around more than one distinct value, which would mean the distribution of percentages is multimodal, is also a potential problem. For instance, there might be a set of wards where a candidate received 30 percent of the votes and another cluster where the candidate received 60 percent.

In an elaborate model for election frauds, multimodality is an important indicator that one candidate is gaining fraudulent votes. We'd have to know how many voters registered in each ward to be able to estimate that model.

DipT is the p -value from a test that there is no multimodality that we can do without having the data needed for the fancier model.

Vote percentages in the Small, OpSCAN wards are significantly multimodal.

In contrast to the array of anomalies in the Small wards with OpSCAN technology, none of the statistics in Small wards without OpSCAN technology have values to worry about.

None of the statistics in "Big" wards have values to worry about, although additional analysis shows the Big wards set is diverse: some OpSCAN machines, particularly the Dominion (Sequoia)/Command Central- Sequoia Insight (in 209 Big wards) and the Dominion ImageCast Evolution (in 272 Big wards), exhibit anomalies.

The mean of the second digits in the vote counts (2BL) is a statistic some have argued can be used to detect frauds, but actually the statistic responds to many features of normal politics and is ambiguous. The second-digit mean (2BL) for Clinton in Big wards without OpSCAN systems deviates from the value Benford's Law would imply, but the observed value is not unusual (see Chapter 9 in this book).

Why do Small wards with OpSCAN technology (and several other kinds of wards) have anomalies, and do the anomalies mean the reported vote counts do not accurately reflect the intentions of the electors? Given all the information we have, it is hard to say.

A rigorous post-election audit, like some are trying to have happen in several states, is not subject to the limitations that prevent a full regression-style analysis nor to the interpretive uncertainty involved in using statistics like those from the Toolkit.

A crucial feature of an audit is that paper ballots are inspected directly by humans and not merely tabulated again by a machine, which can happen in a recount under some state recount procedures. An audit can tell us at least whether the votes marked on paper have been correctly tabulated by the machines.

A rigorous audit or a full recount that has humans manually checking the paper ballots can provide convincing evidence about who won the election. In the current environment, the reassurance such an audit may provide would contribute to the incoming government's legitimacy.

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