July 2014 • Issue #445

AMSTATNEWS

The Membership Magazine of the American Statistical Association • *http://magazine.amstat.org*

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ASA Participates in Capitol Hill Event Highlighting NSF-Funded Research

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American Statistical Association
732 North Washington Street
Alexandria, VA 22314–1943 USA
(703) 684–1221 • FAX: (703) 684-2037
ASA GENERAL: *asainfo@amstat.org*
ADDRESS CHANGES: *addresschange@amstat.org*
AMSTAT EDITORIAL: *amstat@amstat.org*
ADVERTISING: *advertise@amstat.org*
WEBSITE: *http://magazine.amstat.org*

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features

columns

STAT*tr@k* is a column in *Amstat News* and a website geared toward people who are in a statistics program, recently graduated from a statistics program, or recently entered the job world. To read more articles like this one, visit the website at *http://stattrak.amstat.org*. If you have suggestions for future articles, or would like to submit an article, please email Megan Murphy, *Amstat News* managing editor, at *megan@amstat.org*.

Shrenk

Contributing Editor

James Shrenk works as a pricing analytics professional in Arizona. He has a diverse background in several industries, including finance, telecommunications, and environmental services. His keen interests in statistical modeling and simulation keep him motivated to find new ways of transforming data into valuable information.

The ASA will celebrate its 175th anniversary in 2014. In preparation, column "175"—written by members of the ASA's 175th Anniversary Steering Committee and other ASA members—will chronicle the theme chosen for the celebration, status of preparations, activities to take place, and, best yet, how you can get involved in propelling the ASA toward its bicentennial.

Price

Herring

Contributing Editors

Dionne Price is a mathematical statistician and team leader at the U.S. Food and Drug Administration. She served as the 2010 program chair for the Biopharmaceutical Section and is the section's current secretary.

Amy Herring is professor of biostatistics at The University of North Carolina at Chapel Hill and past president of ENAR. She earned her doctorate in biostatistics from Harvard University and is a Fellow of the ASA.

TRIVIA *CHALLENGE*

The ASA's Trivia Challenge is a fun way to read *Amstat News* and learn about the ASA. Every month, there will be three questions asked here, with the answers scattered throughout the magazine. Search for those answers while you're reading the issue and input your answers at *www.amstat.org/asa175/triviachallenge.cfm*. Whoever has the most correct answers at the end of each quarter will be entered into a drawing to win a 175th anniversary T-shirt!

1. Jessica Utts, who was recently elected to serve as the 111th president of the American Statistical Association, is a very active member of the ASA. One of her many activities is:

   A. Council of Chapter representative on the association's board of directors

   B. President of the 2010 Education Work Group

   C. Co-captain of the Waller Award Committee

   D. Secretary-Treasurer of the Section on Bayesian Statistical Science

2. Genevera Allen, a professor in the department of statistics and electrical and computer engineering at Rice University, recently represented the ASA during the annual Capitol Hill Exhibition. Allen's research team includes an oncologist, a bioinformatician/geneticist, and a:

   A. Marketing director
   B. Neurologist
   C. Computer scientist
   D. Data scientist

3. The 2015 Joint Statistical Meetings will be held in Atlanta, Georgia.

   True
   False

This quarter's winner will be announced in the August issue.

departments

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member news

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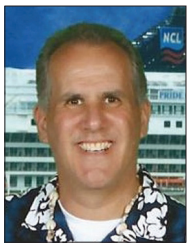
What Should I Tell a Soon-to-Be College Freshman About the Value of Taking a Statistics Course?



Nathaniel Schenker

In my June column, I chatted with Mary Kwasny about the ASA's public relations campaign for statistics, to be launched in August, for which the primary goal is to encourage high-school and undergraduate students to study statistics, or even major in it in college. Coincidentally, also in June, my son, Joseph, graduated from high school. And in August, as the ASA is launching the campaign for statistics, Joseph will be traveling across the country to start his freshman year at the University of California, Berkeley.

Of course, when I brag to colleagues about Joseph, one of the first questions I receive is, "Is he going to be a statistician like you?" My honest answer is, "I doubt it." Joseph is interested and talented in science and applied math, but perhaps his greatest talent is writing. He is also very interested in medicine and thinking about becoming a doctor, which would certainly make his father proud ("My son, the doctor!"). So, if I had to bet, I'd put my money on his being a pre-med comparative literature major at Cal. That might be a losing bet, however. After all, I recall changing my notion of what my major should be several times while I was in college. Perhaps that's how it should be, given that the college years are often a great time to explore one's interests.

Now, if a colleague were to ask me if I was going to advise Joseph to take a course in statistics, my answer would be "Absolutely!" After all, I fondly remember my first course in statistics. As a sophomore at Princeton, I took Statistics 101, "Introduction to Exploratory Data Analysis." The course was taught by Jane Menken, and the "text" was a preliminary, typed manuscript version of John Tukey's now-classic "orange EDA book," which would be published later in the same decade. The manuscript was placed on reserve at the library, and students were allowed to check it out for two hours at a time. I remember how I first encountered the joy of looking at data and learning about stem-and-leaf plots, box plots, median polish, transformations (in Tukey's words, "re-expressions"), etc. The emphasis at the time was on conducting analyses by hand, but we also learned to do them using the APL programming language. For my final paper, I wrote up an exploratory analysis of income trends in the United States based on data from the U.S. Census Bureau. Menken complimented me on my analysis, interpretation, and write-up and told me I should take more statistics. So, I followed her advice and ended up majoring in statistics. The rest is history. [Professor Menken: In case you see this column, "Thank you!"]

OK, enough digressing, reminiscing, and showing my age. What should I tell Joseph, the incoming UC Berkeley student and aspiring doctor/scientist/

Nathaniel and Joseph Schenker display their Cal apparel.

writer, about the value of taking one or more statistics courses in college? Here are a few reasons why I'd recommend such courses, besides the fact that I enjoyed taking them myself.

Statistics is helpful in a wide variety of careers. I recall that when I was a faculty member in the UCLA School of Public Health, the school's alumni survey revealed that many graduates who were out in the work force wished they had taken more courses on quantitative methods. Employers often look to hire people who are comfortable with data and can analyze them and present the results clearly. Taking statistics will help you develop those marketable skills, and learning how to reason statistically will help you think logically and insightfully.

So, you might want to be a doctor? Well then, you're going to read many articles about medical studies and recommended treatments. If you want to be able to look at those articles with a careful, critical eye, you'd better study some statistics. And if you decide to go into medical research, you'll almost certainly work with statisticians, so it would be beneficial for you to know some statistics yourself.

Maybe being a scientist will be more to your liking? Well, data are collected, analyzed, and interpreted in virtually every science, so studying statistics will help you as a scientist. It also will strengthen your understanding of several concepts that are important in science, such as sampling, measurement error, probability, bias, and uncertainty. In fact, statistics has been described as the "keeper of the scientific method": formulating hypotheses, collecting data to address the hypotheses, analyzing the data in a way that provides clear information about the hypotheses, and using the information to test or update the hypotheses.

Data are everywhere, and they have a major influence on our everyday lives. Just think about how often statistical information is quoted in the news, in commercials, in discussions with our doctors, in speeches by our country's leaders, etc. To understand statements based on data and evaluate them critically, nothing beats having some experience in collecting and analyzing data and interpreting the results. And what better way to gain that experience in college than by taking a course or two in statistics?

Joseph, your upcoming career path very well may not follow the proverb, "like father like son." Nevertheless, I hope the following advice will be helpful to you and to other recent high-school graduates who are going to college: Explore different areas of study, find one you like, or better yet, are passionate about, and pursue it. And whether your final area of concentration is statistics, as it was for me, or something else, you'll find great value from taking one or more courses in statistics.

Nathaniel Schenker

Strengthening the Profession Through Chapter Involvement

John R. Stevens of Utah State University, 2014 Chair of the Council of Chapters Governing Board

Like many ASA members, I have greatly benefited from associating with statisticians in academia, industry, and government in my local geographic area. The chapter structure of the ASA provides a natural environment to make such connections, which are professionally rewarding and personally refreshing. A recent *Amstat News* article (*http://magazine.amstat.org/blog/2014/04/01/175chapters*) gives an excellent history of the development and current state of this chapter structure, including the Council of Chapters (COC).

In addition to supporting individual chapter-level activities and association-wide initiatives (such as the traveling course program), the COC is dedicated to making use of JSM to strengthen chapters (and by extension, strengthen the profession). For each JSM, all chapters are encouraged to send a representative to two meetings sponsored by the COC and held on Tuesday. The first is a breakfast meeting, where chapter-related business items are addressed and ideas are shared between chapters. The second is the late-afternoon Officer Appreciation Reception and Workshop, where ASA members are recognized for service to their local chapters and topics relevant to chapters are explored. Usually, chapters send their elected chapter representative, but any chapter officer or their designee can represent their chapter at these meetings.

The JSM 2013 workshop included roundtable discussions titled "Using Chapters to Influence Local Science Policy," "Keys to an Active Chapter," "Using Chapters to Foster Local Academic-Industry Connections," "Using Chapters to Develop 'Soft Skills'," and "Chapter Career Days." These discussions were led by Ann Cannon, John Schoolfield, Rishi Chakraborty, Janet Buckingham, and Harold Dyck, respectively. All in attendance left with ideas to share with their chapters and a renewed energy to strengthen the profession through their chapter involvement. The JSM 2014 workshop promises to be equally enriching, and all chapter representatives (or their designees) are encouraged to attend.

> I have greatly benefited from associating with statisticians in academia, industry, and government in my local geographic area.

Chapter representatives take part in roundtable discussions during their JSM 2013 workshop.

Like all other branches of the ASA, the COC relies on volunteers to serve and welcomes participation. In addition to serving in your local chapter, consider service at a national level by running for election to the Council of Chapters Governing Board (COCGB). If you are interested in being considered for a position on the COCGB, contact COCGB Nominations Committee Chair Linda Young at *linda.young@nass.usda.gov*. ■

Jessica Utts Elected 111th ASA President

Robert Santos selected as vice president

Utts

Santos

Jessica M. Utts, professor of statistics and chair of the department of statistics at the University of California, Irvine, has been elected as the 111th president of the American Statistical Association. She will become president January 1, 2016.

Additionally, ASA members elected Robert L. Santos, chief methodologist at the Urban Institute in Washington, DC, as an ASA vice president. He will begin his three-year term January 1, 2015.

"I'm excited about the opportunity to serve as president of the ASA—a thriving organization with a membership and a staff devoted to promoting statistical science," said Utts. "With the increasing demand for statisticians, one of my primary goals will be to educate high-school and college students about the diverse and exciting career opportunities in statistics. Another goal will be to continue my career's work to promote the importance of statistical literacy to the public."

Utts is a highly active member of the ASA. She has served as the Council of Sections representative on the association's board of directors; chair of several ASA groups and committees, including the 2010 Education Work Group, Section on Statistical Education, Committee on Outstanding Statistical Application, and Waller Award Committee; secretary-treasurer of the Section on Bayesian Statistical Science; and member of the Strategic Plan Task Force, GAISE Report Writing Group, Founders Award Committee, ASA Nominating Committee, and Joint Statistical Meetings Program Committee. She also served as associate editor of *The American Statistician*, the Theory & Methods section of the *Journal of the American Statistical Association (JASA),* and the Reviews section of *JASA*.

For her service to the ASA and the profession, she was honored with the association's Founders Award in 2009 and selected as an ASA Fellow in 1990. In addition, Utts is active in the American Association for the Advancement of Science Section U (Statistics), Institute of Mathematical Statistics, and the Association for Psychological Science. She was named a fellow of each organization.

Before joining the Urban Institute, Santos held successive executive-level positions at the Survey Research Center at the University of Michigan and the National Opinion Research Center (NORC) at the University of Chicago. He also was a partner at NuStats, LLC, a full-service survey research consultancy based in Austin, Texas. Santos earned his master's degree in statistics from the University of Michigan.

Santos has been an active ASA member since 1976. He also has served on Transportation Research Board, Institute of Medicine, and Committee on National Statistics panels for the National Academies. He is the president of the American Association for Public Opinion Research (AAPOR) and has served on the editorial board of *Public Opinion Quarterly* and held a variety of elected positions in the ASA and Washington Statistical Society.

Santos is an ASA Fellow and the 2006 honoree of the ASA Founder's Award.

New officers also were elected for each of the ASA's 27 sections. Following are the complete ASA election results.

AAPOR Releases Report on Mobile Technologies

The American Association for Public Opinion Research (AAPOR) recently released a report from the Emerging Technologies Task Force on the use of mobile technologies—such as smartphones and tablets—for the collection of survey data and new forms of information such as location, visuals, and connected device data. The report, *Mobile Technologies for Conducting, Augmenting, and Potentially Replacing Surveys*," offers an initial set of guidelines and considerations for researchers and highlights both the opportunities and new challenges posed by the use of these technologies.

The report is available as a PDF download at *http://bit.ly/1ljDUEg*.

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ASA Participates in Capitol Hill Event Highlighting NSF-Funded Research

Genevera Allen explains her research to National Science Foundation Division of Mathematical Sciences Director Michael Vogelius.

Genevera Allen with Jim Moran (D-VA), whose district includes the ASA headquarters

The annual Capitol Hill Exhibition to highlight research funding sponsored by the National Science Foundation (NSF) took place during deliberations of NSF's fiscal year 2015 (FY15) budget and consideration of a controversial House Science, Space, and Technology Committee (HSSTC) bill reauthorizing the NSF (see sidebar).

Representing the American Statistical Association for a second straight year was Genevera Allen, a professor in the department of statistics and electrical and computer engineering at Rice University and the Neurological Research Institute at the Baylor College of Medicine, both in Houston, Texas.

Texas has two members of Congress on the House appropriations panel (out of 11), which determines the NSF budget, and eight on the HSSTC (out of 40). Prior to the evening reception, Allen and ASA Director of Science Policy Steve Pierson visited the offices of both the key NSF Texas appropriators, two of the HSSTC members, and a member of Congress representing one of Allen's institutions. Four of the offices expressed their strong support for NSF and its budget. The fifth was a freshman office still exploring the issue and receptive to Allen's and the ASA's messages in support of the NSF.

While the afternoon meetings in congressional offices focused on support for NSF's budget and policies, the evening reception highlighted the NSF-sponsored research, giving Allen an opportunity to discuss her cancer genomics research with members of Congress, congressional staff, officials from NSF and the White House Office of Science and Technology Policy, and other exhibit attendees. Allen's poster highlighted to her audience two challenges of her Big Data research—non-Gaussian data and heterogeneous data sources—emphasizing the strengths statistical scientists bring to scientific (and societal) challenges demanding multidisciplinary research. Allen's research team, funded by the NSF Division of Mathematical Sciences (DMS), includes an oncologist, computer scientist, and bioinformatician/geneticist. DMS

Genevera Allen with Rep. John Carter (R-TX)

Controversial NSF Bill Advances in U.S. House of Representatives

On a party line vote, the House Science, Space, and Technology Committee (HSSTC) advanced in late May H.R. 4186, the Frontiers in Innovation, Research, Science, and Technology (FIRST) Act of 2014, which reauthorizes the National Science Foundation (NSF).

The scientific community has opposed the bill because of its sharp cuts to the budget for the Social, Behavioral, and Economic (SBE) Sciences Directorate, additional requirements for the funding of awards, and a lackluster funding vision.

The original bill cut the SBE budget by 40%, an amount reduced to 20% when a HSSTC subcommittee considered and advanced the bill in March. The full committee restored this cut to 40%. The bill also has additional requirements for the funding of awards that many perceive as having political undertones. Finally, following the 2007 NSF authorization to double the foundation's budget over seven years and the 2010 reauthorization with a 10-year doubling, many criticize the HSSTC's bill for only a 1.4% increase for FY15 over the FY14 budget.

The Senate is expected to introduce its NSF reauthorization bill before the August recess.

For more information about and updates on the FIRST Act, visit *http://bit.ly/1xdT8ja*.

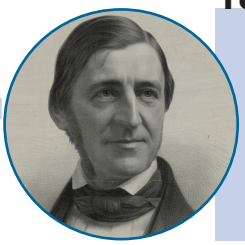
Director Michael Vogelius—in his third month at NSF—and DMS Deputy Director Henry Warchall were two of the visitors to the ASA booth who spoke with Allen.

This is the fifth straight year of the ASA participating in the event, which started in 1995 and is sponsored by the Coalition for National Science Funding (CNSF). CNSF is a coalition of 130 professional societies, universities, and other stakeholders who work together to support the budget of the NSF.

If you are interested in having your department/institution represent the ASA at a future CNSF event, contact Pierson at *pierson@amstat.org*. (Note that preference is given to those in states whose federal delegation include members of the Commerce, Justice, and Science Appropriations Subcommittee, the panel that determines the NSF budget.) ■

This month in ASA's history … JULY

1840

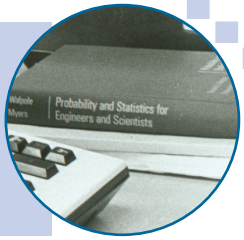


In the July 1840 meeting of the association, a list of documents and reports that were donated to the association were read. Some of these reports included the Massachusetts Pauper abstract for 1839, the First Census of the United States, a list of persons taxed in Boston in 1839, and Emerson's Lecture by the author. Yes, that Emerson.

Photo of Ralph Waldo Emerson courtesy of the Library of Congress

1971

In July of 1971, the entire membership was polled to find out if a section on statistical computing was necessary to meet the needs of statisticians working in the computer field. Nearly 1,400 members indicated they would wish to be a member of the proposed section—or "well over twice the number of votes required for its establishment." *TAS*, October, 1971.



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Famous July Birthdays

William G. Cochran, Sir David R. Cox, William "Vilim" Feller, Emil Gumbel, Leslie Kish, Isobel Loutit, Paul Meier, Vilfredo Pareto, Carroll Wright

Merit Matters Most: Meet Jean D. Gibbons

Amy Munice, ALM Communications

Jean Gibbons

At 34, she was probably the youngest female ever elected as a Fellow of the American Statistical Association. She also was an ASA board member for four terms and the first chair of the Committee on Women in Statistics, but you would make a big mistake in suggesting to Jean D. Gibbons that she is a "woman's woman."

"Statistician's statistician" would be the more apt moniker.

She graduated in 1958 magna cum laude with an AB in mathematics from Duke University, and then earned her master's from Duke and PhD from Virginia Polytechnic Institute in Statistics in 1962 (at age 24). While working on her PhD, she also taught at Mercer University and the University of Cincinnati. Her publication history is legion. An expert in nonparametric statistical inference, her first book on that subject was published in 1970 and is now in its fifth edition. She has penned 10 scholarly books on statistics and published nearly 100 articles on topics as wide ranging as statistics in sports to tourism. Many articles focused on statistical methods.

Gibbons states, "I'm happy to be a role model for young women, but I also like being a role model for young men. One of my pet peeves is that some women expect special consideration just because they are women. It's not appropriate. If a woman wants to succeed in any career, she has to do it on her own merits.

"As a role model, I want to show women that it can be done. You have to be exceptional to succeed in a male-dominated world. Today's women statisticians have the opportunity to be hired at salaries commensurate with their male counterparts. But then they disappear from the scene. My feeling is that they do so because they don't wish to compete." (See *http://magazine.amstat.org/blog/2014/04/01/response-to-olkin)*.

Gibbons has little sympathy for women who are not willing to give their all to their career. Gibbons, who made her mark in the profession without any help from the affirmative action laws, says, "The difficulty for women statisticians today is in competing for advancement and tenure. You have to be willing to give up an emphasis on certain things that you hold dear, like advising students and acting as a mentor. You need to be more self-centered and concentrate on advancing your career.

"The way some women behave gives women as a whole a bad image. My brief experience with the AAUW (American Association of University Women) has reinforced this view. I was appointed to an office that offered legal advice to women who felt they were being discriminated against because they were female. I very much am against discrimination of any kind. However, I discovered that AAUW expected to support all women who made such claims. The assumption was that if you were female and not promoted, the only reason could be discrimination. This kind of thinking gives women as a whole a bad mark. I think now and will always think—the merits of any case must be investigated before support can be given."

This is no small matter to Gibbons and an area in which she will not brook compromise, even if there is a personal cost to her in refusing to do so. Years ago, she lost a dear friend—a fellow female faculty member—who was incensed that Gibbons voted against granting tenure and promotion to a female who had not published enough. Her friend never spoke to her again. But to Gibbons, the idea of supporting a candidate simply because she is female was and is absolutely unthinkable.

You—male or female—can look to Gibbons' life story as an example of how merit matters most with hard work sealing success. She reached the heights of the profession without any special treatment. She's smart enough to be at the top and she knows it. And she also knows her hard work and thick skin got her to the top, or as she puts it, "You've got to be willing to give more than 100% of yourself to be successful, and you have to be willing to sacrifice a lot."

There is no happy memory of her parents encouraging her to succeed. Quite the contrary, her exemplary math skills were of no interest to them. Rather, they expected her to pursue a more feminine career such as nursing or teaching and devote herself to giving them grandchildren. Even when she earned her doctorate in statistics from Virginia Tech, parental approval was not forthcoming. Gibbons shares, "It didn't change their attitudes. … They weren't interested in my career and wanted me to devote more time to traditional female activities. They weren't impressed." She continues, chuckling, "Of course, this just made me work harder for the approval that would never come."

The shyness Gibbons now says plagued her younger years was nowhere to be found when it came to her profession. Imagine the moxie of a recently minted PhD walking uninvited into the Wharton offices and asking why she hadn't received a response to her job application. The department chair confided that he'd never considered hiring a female. Meeting Gibbons changed his views, however. She was hired, a rare young female faculty member in 1963. She was so young that she could easily be mistaken for one of her students—except they were all male.

Yet, Gibbons will tell you she made several mistakes in her life that affected her career, and they were the kind of mistakes that only women make. She says, "The thing I regret most in my career is not keeping my maiden name of Dickinson. No matter how much you love your husband, you just shouldn't change your name. It was especially terrible that when I married for a second time, I had to change my name again.

> I'm happy to be a role model for young women, but I also like being a role model for young men.

"I accepted a secondary role in my marriages and I regret this. I had a much better position at the University of Pennsylvania, but instead of staying there, I followed my then husband to teach at the University of Alabama. I resented it terribly. If it had been five years later, when divorce was more acceptable, I would never have considered the move, but instead would have chosen to remain at the better university."

That said, it would be wrong to think of Gibbons as a hard-boiled woman who never knew marital bliss. As circumstances would have it, she met her second husband in Alabama and decided to stay on as a bigger fish in a smaller pond because that was where he was. Because he was 15 years her senior, she took an early retirement at the age of 57. No regrets there, as it allowed a decade of constant companionship. During that time, they wrote together the self-help book on writing *Throw Me the Bottom Line, I'm Drowning in Email* (*http://amzn.to/1hJDsQa*).

Unfortunately, their joy was robbed when her husband developed Alzheimer's. She says, "He was 15 years older than I. I knew when I married him that I would likely outlive him, but I didn't expect the Alzheimer's. He was brilliant, and you tend to think that a brain like that will continue forever. It's a terrible disease, making an adult into an infant, and it's difficult to watch."

In hopes that she can help other older people avoid Alzheimer's by keeping their minds active, Gibbons now devotes some of her time to a lifelong learning program. She endowed the Fielden Institute for Lifelong Learning at Indian River State College in Florida to honor her late husband, John Fielden. There, she teaches not statistics, but a course on books and their film adaptations.

She has not forgotten her roots in statistics, however. Gibbons gives annual scholarships to students in statistics at Virginia Tech. These awards are for both males and females and are based solely on merit. ■

Statistical Scientists Advance Federal Research Initiatives

Steve Pierson, ASA Science Policy Director

Responding to calls from the National Science Foundation (NSF) and White House Office of Science and Technology Policy (OSTP), three ASA groups have written whitepapers detailing how statisticians can contribute to administration research initiatives and priorities. The whitepapers, profiled in the accompanying sidebars, cover the BRAIN Initiative (*www.whitehouse.gov/share/brain-initiative*), the Big Data Research and Development Initiative (*www.whitehouse.gov/blog/2012/03/29/big-data-big-deal*), and climate change (*www.whitehouse.gov/administration/eop/ostp/initiatives*). Each was written by a group of about 12 people, with Rob Kass chairing the BRAIN Initiative group, Cynthia Rudin the Big Data group, and Bruno Sanso climate change.

The whitepapers are, in part, a response to invitations from the current and former directors of the NSF Division of Mathematical Sciences (DMS)—Michael Vogelius and Sastry Pantula, respectively—to provide whitepapers to inform future NSF budgets. As described in a November ASA Community blog entry *(http://bit.ly/1q57qAC)* by ASA Director of Science Policy Steve Pierson, ASA staff also received various indications from other NSF directorates, OSTP, and the White House Office of Management and Budget for the utility of such whitepapers. Perhaps most compellingly, the computer science community has had enormous success in guiding federal research direction at NSF and OSTP through the Computing Community Consortium (CCC) whitepapers (*www.cra.org/ccc/visioning/ccc-led-white-papers)*, as described in a November Amstat News column at *http://magazine.amstat.org/blog/2013/11/01/sciencepolicynov2013*.

As the whitepapers were being developed, ASA staff informed NSF (including DMS) officials of the efforts and received guidance for their content. Since their completion, these discussions have continued and widened to include officials from OSTP and other agencies. The feedback so far has been encouraging. For example, Vogelius commented, "These efforts of the ASA are in my opinion very valuable and will be helpful in advancing the central idea that mathematics and statistics are indispensable tools when dealing with the OSTP research priority areas."

The common themes of the whitepapers are three-fold:

(i) Statistics/statisticians can help to make important advances on OSTP priorities

(ii) The most productive approach will involve multidisciplinary teams of statisticians, domain scientists, and others (e.g., computer scientists)

(iii) There is a need to attract, train, and retain the next generation of statisticians so as to contribute to all interdisciplinary research challenges

Completing such whitepapers takes the willingness of members of the community to work on them. Asked his motivation for leading the ASA BRAIN Initiative group, Carnegie Mellon University statistics professor Rob Kass noted the

Statistical Science: Contributions to the Administration's Research Priority on Climate Change

www.amstat.org/policy/pdfs/ClimateStatisticsApril2014.pdf

Bruno Sanso, chair of the ASA Advisory Committee on Climate Change Policy; chair of the Department of Applied Mathematics and Statistics, University of California, Santa Cruz

Authors: Bruno Sanso, University of California, Santa Cruz (chair); L. Mark Berliner, The Ohio State University; Daniel S. Cooley, Colorado State University; Peter Craigmile, The Ohio State University; Noel A. Cressie, University of Wollongong; Murali Haran, The Pennsylvania State University; Robert B. Lund, Clemson University; Douglas W. Nychka, National Center for Atmospheric Research; Chris Paciorek, University of California, Berkeley; Stephan R. Sain, National Center for Atmospheric Research; Richard L. Smith, Statistical and Applied Mathematical Sciences Institute; Michael L. Stein, The University of Chicago

Executive Summary

Climate data sets are increasing in number, size, and complexity and challenge traditional methods of data analysis. Satellite remote sensing campaigns, automated weather monitoring networks, and climate-model experiments have contributed to a data explosion that provides a wealth of new information but can overwhelm standard approaches. Developing new statistical approaches is an essential part of understanding climate and its impact on society in the presence of uncertainty. Experience has shown that rapid progress can be made when Big Data is used with statistics to derive new technologies. Crucial to this success are new statistical methods that recognize uncertainties in the measurements and scientific processes but also are tailored to the unique scientific questions being studied.

This white paper makes the case for the National Science Foundation (NSF) to establish an interdisciplinary research program around climate, where statisticians have the opportunity to collaborate with researchers from other disciplines to advance the understanding of the climate system (e.g., quantification of uncertainties, the development of powerful tests of scientific hypotheses). Although NSF supports basic and applied statistical research, these efforts often do not involve scientists and statisticians in partnerships or in teams to address problems in climate science. This program also would address the critical need for training a new generation of interdisciplinary researchers who can tackle challenging scientific problems that require complex data analysis by developing and using the necessary sophisticated statistical methods.

Discovery with Data: Leveraging Statistics with Computer Science to Transform Science and Society

www.amstat.org/policy/pdfs/BigDataStatisticsJune2014.pdf

Cynthia Rudin, chair of the ASA Big Data R&D Initiative Working Group; Computer Science and Artificial Intelligence Laboratory and Sloan School of Management, MIT

Authors: Cynthia Rudin, MIT (chair); David Dunson, Duke University; Rafael Irizarry, Harvard University; Hongkai Ji, The Johns Hopkins University; Eric Laber, North Carolina State University; Jeffrey Leek, The Johns Hopkins University; Tyler McCormick, University of Washington; Sherri Rose, Harvard University; Chad Schafer, Carnegie Mellon University; Mark van der Laan, University of California, Berkeley; Larry Wasserman, Carnegie Mellon University; Lingzhou Xue, The Pennsylvania State University

Executive Summary

The Big Data Research and Development Initiative is now in its third year and making great strides to address the challenges of Big Data. To further advance this initiative, we describe how statistical thinking can help tackle the many Big Data challenges, emphasizing that often the most productive approach will involve multidisciplinary teams with statistical, computational, mathematical, and scientific domain expertise.

With a major Big Data objective of turning data into knowledge, statistics is an essential scientific discipline because of its sophisticated methods for statistical inference, prediction, quantification of uncertainty, and experimental design. Such methods have helped and will continue to enable researchers to make discoveries in science, government, and industry.

The paper discusses the statistical components of scientific challenges facing many broad areas being transformed by Big Data—including health care, social sciences, civic infrastructure, and the physical sciences—and describes how statistical advances made in collaboration with other scientists can address these challenges. We also emphasize the need to attract, train, and retain the next generation of statisticians necessary to address the research challenges outlined here.

I view these whitepapers as an important way for the statistical community to convey the message that statisticians play a vital role in advancing the science important to our nation and society.

opportunity to work with a group of accomplished statisticians with extensive experience in the brain sciences and the window of providing some guidance, especially to NSF as it develops its funding priorities connected to the BRAIN Initiative for the coming year.

Asked her motivation, MIT professor Cynthia Rudin, who led the ASA Big Data working group, replied, "I was honored to be asked by Marie Davidian to lead this group. I was also surprised, given my background is machine learning—not typically considered to be "mainstream" statistics. I have appreciated the open mindedness of the wonderful statisticians with whom I have had the pleasure to collaborate—people who share the view of the blurred porous boundaries between statistics and computer science—and their many synergies. The "big tent" view of statistics exemplifies that "statistics" is very broad, and includes the type of work I do. By asking me to lead this effort, Marie showed that the statistics community is willing to put people who might sometimes be considered at the outer edges of the culture right into the middle. In that sense, how could I not agree to lead this effort?"

Bruno Sanso noted as his motivation to lead the climate change initiative the opportunity to foster collaborations between statisticians and climate scientists, enhance the participation of statistical scientists in federal research funding, increase the

visibility of statisticians in NSF, and build awareness among policymakers about the importance of funding research that increases our understanding of the uncertainty in climate change. He also saw the effort as a way to build awareness within the statistical community of the important role statisticians play in the study of climate and the many opportunities the field offers for developing interesting statistical models and implementing sophisticated computational methods.

2013 ASA President Marie Davidian, who has led many of the ASA's meetings at NSF and OSTP and with CCC, commended members of the three groups for their accomplishments, "I'm very grateful to Cynthia, Bruno, and Rob for their leadership in the writing of these three whitepapers and to all the authors who contributed to them. I view these whitepapers as an important way for the statistical community to convey the message that statisticians play a vital role in advancing the science important to our nation and society."

For next steps—besides further outreach to NSF, OSTP, and other agencies on these whitepapers—the ASA will explore whitepapers on other topics. The annual OMB/OSTP research and development memo for FY15 includes the following multiagency priorities:

Advanced manufacturing

Clean energy

Global climate change

Research and development for informed policymaking and management

Information technology

Research and development for national security missions

Innovation in biology and neuroscience

Science, technology, engineering, and mathematics (STEM) education

Innovation and commercialization

If you are interested in helping with a whitepaper on any of these topics, contact Pierson at *pierson@amstat.org*. ■

Statistical Research and Training Under the BRAIN Initiative

www.amstat.org/policy/pdfs/StatisticsBRAIN_April2014.pdf

Rob Kass, chair of the ASA BRAIN Initiative Working Group; Department of Statistics, Department of Machine Learning, and Center for the Neural Basis of Cognition, Carnegie Mellon University

Authors: Robert E. Kass, Carnegie Mellon University (chair); Genevera Allen, Rice University; Brian Caffo, The Johns Hopkins University; John Cunningham, Columbia University; Uri Eden, Boston University; Timothy D. Johnson, University of Michigan; Martin A. Lindquist, The Johns Hopkins University; Thomas A Nichols, University of Warwick; Hernando Ombao, University of California, Irvine; Liam Paninski, Columbia University; Russell T. Shinohara, University of Pennsylvania; Bin Yu, University of California, Berkeley

Executive Summary

The BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative aims to produce a sophisticated understanding of the link between brain and behavior and to uncover new ways to treat, prevent, and cure brain disorders. Success in meeting these multifaceted challenges will require scientific and technological paradigms that incorporate novel statistical methods for data acquisition and analysis. Our purpose here is to substantiate this proposition and identify implications for training.

Brain research relies on a wide variety of existing methods for collecting human and animal neural data, including neuroimaging (radiography, fMRI, MEG, PET), electrophysiology from multiple electrodes (EEG, ECoG, LFP, spike trains), calcium imaging, optical imaging, optogenetics, and anatomical methods (diffusion imaging, electron microscopy, fluorescent microscopy). Each of these modalities produces data with its own set of statistical and analytical challenges. As neuroscientists improve these techniques and develop new ones, data are being acquired at very large scales …

These advances have begun to produce exciting breakthroughs. But, to realize their potential, new analysis and computational techniques are needed to optimize data acquisition; manage acquired data on the fly; screen and segment the data; correct for artifacts; and align and register data across multiple time points, multiple experiments, multiple subjects, or different laboratories. In addition, as the data-generation process becomes more complex and the data sets get larger and more varied, it is crucial that reliability and scientific relevance of results be assessed against the backdrop of natural variation and measurement noise. This is the essential role of statistical analysis.

Meet John H. Thompson, U.S. Census Bureau Director

Amstat News invited John H. Thompson, director of the U.S. Census Bureau, to respond to the following questions so readers could learn more about him and the agency he leads.

A statistician and executive, John Thompson has been president and CEO of NORC at the University of Chicago since 2008. He served as the independent research organization's executive vice president from 2002–2008.

What about this position appealed to you?

As some of your readers probably know, I am actually returning to the Census Bureau for the second time in my career and I'm really excited about our future. I spent 27 years at the Census Bureau, and my final job was director of the 2000 Census. After I retired, I joined the National Opinion Research Center (NORC) at the University of Chicago and had a great experience in the private sector. I returned to the Census Bureau because I saw there were important opportunities to make critical improvements in the way we conduct the census and surveys.

In 2000, we didn't have the technology to equip field representatives with smartphones and tablets. In fact, we used the same basic design as the 1990 Census, and the Census Bureau used that design again in 2010. It's incredible to think that, with these devices, we can reengineer our fieldwork. Instead of sending the enumerators out with a stack of questionnaires and then meeting each day to collect the work, we will be able to assign cases intelligently, get the data back in real time, and gather all the important payroll information. We also will not be sending an enumerator out to a household that just remembered to send their questionnaire in after the deadline. We will have a way to remove those cases from our workload. These don't sound like big changes, but I can assure you technology has a big role to play in the 2020 Census that will save the taxpayers money.

Describe the top 2–3 priorities you have for the U.S. Census Bureau.

While it seems like I spend a lot of my time talking about the 2020 Census and design changes, what I really want to do across the entire agency is encourage a culture that is continuously self-evaluative, adaptable, and innovative. I also think that making our data more easily accessible and developing new relevant products, including those for the business community, is extremely critical at this time.

What do you see as your biggest challenge(s) for the Census Bureau?

These are exciting times, and we have many opportunities to introduce improvements and innovations to the way we do our business, involving not only the great staff at the Census Bureau, but our colleagues across the statistical agencies. However, there seems to be so little time to accomplish what I see as critical goals for our agency.

What kind of support from the statistical community do you look for?

One of the things that has not changed since my previous tenure at the Census Bureau is the great collaboration we have with the statistical community (through formal advisory bodies, Committee on National Statistics panels, conferences, informal discussions, etc.) across all of our disciplines, including our economic, demographic, decennial, and IT areas. I also would note that I am pleased there is a lot of work going on with respect to "Big Data" both in the federal statistical system and in the community at-large.

Prior to your tenure, what do you see as the biggest recent accomplishment of the agency?

It's hard to pick one accomplishment, so here are three. I think delivering the 2010 Census was a major accomplishment; I know how hard and how big the decennial is to conduct. The 2012 Economic Census has been the exemplar within the agency about how to use the Internet effectively. Finally, the Census Bureau has been making the right decisions about how integrate its IT functions across the agency so we are no longer just thinking about one-off systems for each census or survey. This is an important innovation that will pay dividends by allowing us to conserve our resources to tackle the challenge of delivering relevant data for an ever-changing nation.

STAT*tr@k*

Managing Large Data Sets

James Shrenk, Pricing Analytics Professional

Statistical professionals and data analysts often are confronted with data that do not conform to our expectations of quality and definition. For example, data often come with poor documentation or—worse—no documentation at all. Even data that reside in a functional and mature data warehouse come with no guarantees. Documentation may be unclear or there is so much documentation and complexity that the task of bringing sense to the data is nearly impossible. In the new world of Big Data, these issues become increasingly exaggerated and generally more challenging. How can we navigate data, and especially Big Data, in meaningful ways?

First, it is important to understand that the definition of Big Data is context specific. Some analysts regard data sets of several thousand observations as fairly large. Clinical trials are one domain in which it is often expensive and time consuming to collect even moderate amounts of data. Others, for example in the world of marketing, may process Internet web logs containing millions of transactions (and consuming terabytes of space in large storage arrays). The goals of analysis remain the same: generate insights that define a problem or opportunity, bring clarity to the data, and connect the data to a meaningful result, whether it be furthering academic research or improving bottom-line profits.

The process used to accomplish these goals is important to every analyst and manager. While every analysis or project presents its own challenges, the better we are at generalizing our process, the greater the likelihood that we produce consistent, accurate, and reproducible results. Working with large data sets presents many opportunities to generalize the process and gain valuable experience that can be transferred to new and larger projects. Some parts of the process are technical, such as choice of data processing tools, working with data warehouses, and sampling strategies. Less technical, but arguably more important areas, include problemsolving capabilities, data intuition, and ensuring that the end product is relevant and understandable to stakeholders.

Tool selection is a necessary first step. Often, the choice of tools is decided well in advance of the specific project of interest. Organizations make the decision to use SAS, SPSS, R, or even Excel for all their data analysis needs. Since specific applications of those tools are not all known in advance, the choice is made for one-size-fits-all needs. If given the choice or flexibility to choose other tools, think carefully

about the capabilities needed. If running R, is there concern about running out of memory given the size of data? Can these concerns be addressed with a better server, more memory, or other tools such as Hadoop? Even tools such as SAS come with practical concerns that should be carefully considered.

Give thought to the limitations of your tools and plan for contingencies. With larger data sets, data aggregation and reduction techniques often are worth applying. Handling the first aggregation of a data set within a data warehouse (accessed via SQL) can often save time and effort by reducing millions of records to thousands. However, remain aware that although database platforms are fantastically efficient at data aggregation, there is a price. That first aggregation often eliminates relevant details that can remain hidden throughout an analysis. It is often best to design and inspect the detail before grouping your results into a more manageable data set.

Perhaps data reduction for a project may be accomplished through a sampling strategy. This may not always work when small effect sizes are expected, but otherwise sampling remains a viable strategy to reduce the size of the data without losing a great deal of information.

Perhaps the problem can be split into groups and analyzed within each group. Split-apply-combine techniques such as those detailed by Hadley Wickham at *www.jstatsoft.org/v40/i01/paper* can provide relief from data too large to effectively analyze otherwise. Along those lines, spend time

... never overlook an opportunity to offer analytical insight, politely and professionally increase the knowledge of others lacking information-driven insights, or challenge long-held intuitions—whether they are your own or others.

learning and researching methods for dealing with large data sets. Dirk Eddelbuettel maintains the High-Performance and Parallel Computing with R task view at *http://cran.r-project.org/web/views/HighPerformanceComputing.html.* Many packages are available to enable the analyst to accomplish their goals.

Learning and implementing these techniques—regardless of the tool being used—enables the analyst to develop valuable intuition when working with data. After years of practice and, indeed, many failures and successes, problems will become increasingly apparent before writing a line of code. Too many observations? Perhaps it is efficient to prototype using a small sample. Too many variables? Perhaps a principle component analysis is in order. Watching a process run for hours ultimately provides the spark of inspiration needed to learn how to parallelize the process!

Developing good data intuition is often a mysterious art among data analysts and statisticians. As a group, we constantly express the need to let data drive decisionmaking. Just as important is developing a "good feel" for what the data is so as to enable those insights. Also know that too much data is sometimes the problem, rather than the solution. Data sense-making expert Stephen Few describes the necessity of being able to differentiate signal from noise at *www.perceptualedge.com/blog/?p=1749.* Indeed, popular books are written (e.g., *The Signal and the Noise* by Nate Silver) that provide guidance on developing this practical skill.

In the end, the most important facet of working with data is in generating insights for those with whom we work. To remain relevant and vital to decisionmakers (whether they are managers, directors, foundations that provide grants, or university administrators) requires the analyst to be practical and skilled. It is often necessary to take small steps, iterate over an analysis many times, and accept imperfection to achieve great results. Embrace data, large and small, as it enables us to achieve great things. Finally, never overlook an opportunity to offer analytical insight, politely and professionally increase the knowledge of others lacking information-driven insights, or challenge long-held intuitions—whether they are your own or others. ■

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You Are Cordially Invited …

Dionne Price and Amy Herring, 175th Anniversary Steering Committee

While the ASA's official 175th anniversary will occur in late fall, we plan to commemorate it in our society's hometown of Boston during the Joint Statistical Meetings with a champagne toast, hors d'oeuvres, dessert, and the ASA's Got Talent Competition. The evening promises to energize our future with Master of Ceremonies Ron Wasserstein at the helm and four member-led performances by the following ASA's Got Talent Competition finalists:

The Imposteriors

Brad Carlin (University of Minnesota), Mark Glickman (Boston University), Michael Jordan (University of California at Berkeley), Jennifer Hill (New York University), and Don Hedeker (University of Illinois-Chicago)

Fifth Moment Band

$E[X^5]$

Kristin Linn, Bradley Turnbull, Sidd Roy, Joe Usset, and Jason Osborne (North Carolina State University)

Jami Jackson

JAMI JACKSON

(North Carolina State University)

Almost Shirley

a. s.

Avner Halevy with Nico Ballarini and Tracy Spears (The University of North Carolina at Chapel Hill)

CELEBRATE OUR PAST • ENERGIZE OUR FUTURE
ASA
FOUNDED 1839
175th ANNIVERSARY

The ASA's **175th Anniversary Celebration** will feature:

ASA's Got Talent contest

Sweet and savory treats

A celebratory toast

Tuesday, August 5, 8:00 p.m. – 9:30 p.m.

Boston Convention and Exhibition Center, Ballroom East

Tickets are $20 and can be added to your registration at *www.amstat.org/meetings/jsm/2014/registration.cfm.*

The audience will vote live for their favorite performance!

In addition to the celebration, be sure to stop by the ASA booth to see historical vignettes, pick up anniversary memorabilia, and learn more about how the ASA plans to energize our future. For a head start, check out the historical information online at *www.amstat.org/asa175/celebrateourpast.cfm.* ■

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The World of Statistics News

The Swiss Association for Analytics recently launched a new publication called *Swiss Analytics Magazine*. Each issue will feature interviews with leaders in analytics, technical articles, case studies, book reviews, company profiles, and event agenda. In its inaugural issue, the magazine covers several analytics topics with a focus on forecasting. For instance, Marcel Baumgartner explains forecasting at Nestlé, SAS's Mike Gilliland is interviewed about forecasting performance, and Jean-Marc Vandenabeele describes bounce rates in web analytics. The English-language magazine will be published twice annually. You can read *Swiss Analytics Magazine* at *mag.swiss-analytics.ch*. Free printed copies will be handed out at several upcoming events, including the Swiss Statistical Society event October 8–10.

News Round-Up

Caribbean Community—Philomen Harrison, project director for regional statistics, Caribbean Community (CARICOM) Secretariat, was named the first president of the newly formed Caribbean Association of Professional Statisticians (CAPS) at the organization's inaugural meeting last month in St. George's, Grenada.

Additional members of the board of directors include the following:

Vice President: Iwan Sno, director, General Bureau of Statistics, Suriname

Vice President: Statchel Edwards, chief statistician, Statistics Department, Ministry of Finance, Economy and Public Administration, Antigua and Barbuda

Representative of Council of Chapters: Sean Mathurin, program officer, Statistics, Organisation of Eastern Caribbean States (OECS) Secretariat

Representative of Council of Chapters: Carol Coy, director-general, Statistical Institute of Jamaica

Representative of Council of Chapters: Dave Clement, former director of statistics, Central Statistical Office, Trinidad and Tobago

International Representative: Eric Rancourt, director, International Cooperation Division, Statistics Canada

Secretary: Gatlin Roberts, chief statistician, Finance Statistical Office, Ministry of Finance and Economic Planning, Central Planning Division, St. Vincent and the Grenadines

Treasurer: Sonia Jackson, former director-general, Statistical Institute of Jamaica

Malaysia—The newly formed International Statistical Institute (ISI) South East Asia (SEA) Regional Network invites you to Kuala Lumpur for the ISI Regional Statistics Conference 2014 (*www.isi-rsc2014.my*) November 16–19. The conference, themed "Statistical Science for a Better Tomorrow," will bring together statisticians and practitioners from industry, academia, and government and students, researchers, and policymakers to share insights on the application of statistical science for discovery, innovation, and policy to create a better tomorrow.

United Arab Emirates—A high-level delegation from Statistics Center-Abu Dhabi (SCAD) recently visited their counterparts in South Korea to finalize an agreement for mutual cooperation and data exchange between the two national statistical organizations. The meeting resulted in the activation of a memorandum of understanding (MoU) that SCAD signed with Statistics Korea in September 2012. The MoU addresses the provision and management of mutual support and the development of various forms of cooperation in the field of official statistics.

United States—The Bureau of Justice Statistics and its data-collection agents—RTI International, Westat, NORC at the University of Chicago, and the U.S. Census Bureau—recently received the American Association for Public Opinion Research's (AAPOR) 2014 Policy Impact Award for their innovative efforts to measure sexual victimization in correctional facilities. They were selected for state-of-the art, multi-measure, multi-mode data collections that relied on victim self-report surveys and administrative records and the subsequent findings from the research that were widely covered by the media. The award was presented at the AAPOR annual conference in May. ■

Three Lesson Plans Win STEW Competition

Rebecca Nichols, ASA Director of Education, and Mary Richardson, STEW Editor

STatistics Education Web
STEW
online journal of K-12 statistics lesson plans

One of the goals of the American Statistical Association is to improve statistics education at all levels. Through the STatistics Education Web (STEW) and its lesson plan competition, the ASA reaches out to K–12 mathematics and science teachers who teach statistics concepts in their classrooms. The following lesson plans were chosen as winners in this year's competition:

Bubble Trouble!

Peter Banwarth of Oregon State University

Statistical Topics: comparing distributions, descriptive statistics, comparative boxplots
GAISE Level B

In this lesson, students determine if the size of a bubble blown in water is affected by different additions to the water. Students will design an activity to explore this. They will use numeric summaries including the mean and five-number summary, comparative boxplots, and dotplots to summarize the data they collect. Students will draw conclusions about the effect of additions to water on bubble size based on these numerical and visual representations of the data.

How Random Is the iPod's Shuffle?

Joan Garfield and Laura Ziegler of the University of Minnesota

Statistical Topics: randomly generated data, probability
GAISE Level A

This activity begins with a claim that songs are not randomly generated using the iPod shuffle function. Students are given three samples of data: a set of 25 randomly generated playlists for students to use as a basis to describe characteristics of a random sample. After students come up with their ideas about what characteristics to look for, they are given a set of five additional playlists (also randomly generated) on which to test their rules. Once they feel confident their rules can be used to determine if a set of songs have not been randomly generated, they are then given three disputed playlists, which students are asked to judge based on their rules. Students work in groups to examine the data, come up with rules, and write a report about their finding and whether they believe the three disputed playlists were not randomly generated.

Now You See It, Now You Don't: Using SeeIt to Compare Stacked Dotplots to Boxplots

Alberto Guzman-Alvarez, Amy Falk Smith, Marco Molinaro, and Rafael Diaz of the University of California Davis, iAMSTEM Hub and California State University Sacramento

Statistical Topics: dotplot, boxplot, comparing distributions
GAISE Level B

In the first part of the lesson , students will collect a data set by measuring the height of their right-hand reach. Then, they will learn how to enter the data online into the freely available statistical software SeeIt to visualize their data using a stacked dotplot (all SeeIt visualizations used in this lesson also are available in Fathom). In the second part of the lesson, students will use SeeIt to organize the individual dots on the stacked dotplot of their right-hand reach in a way that leads to the creation of a boxplot. This part of the lesson shows students how to recognize a boxplot from a stacked dotplot, and vice versa. The lesson concludes by showing students that even though the individual elements of a data set cannot be seen in a boxplot, this popular type of graph provides, in many instances, several advantages over stacked dotplots.

The winning lessons and other free peer-reviewed K–12 statistics lesson plans are available on the STEW website (*www.amstat.org/education/stew*). Also on the website is a template for submitting your own favorite lesson plans, which can be sent to *steweditor@amstat.org*.

For more information about getting involved with K–12 statistics education outreach activities, contact Rebecca Nichols at *rebecca@amstat.org*. ■

MWM
Meeting Within a Meeting
a statistics workshop for K-12 teachers

Mathematics and Science Teachers

(*www.amstat.org/education/mwm*)

Sponsored by the American Statistical Association (ASA) 2014 Joint Statistical Meetings (JSM)*

Based on the Common Core State Standards for Mathematics (*corestandards.org*) and *Guidelines for Assessment and Instruction in Statistics Education (GAISE): A Pre-K–12 Curriculum Framework* (*www.amstat.org/education/gaise*)

Dates: Tuesday, August 5, and Wednesday, August 6, 2014, 8:00 a.m. to 4:00 p.m.

Place: Boston, Massachusetts – Boston Convention and Exhibition Center or a nearby conference hotel (workshop meeting room location to be announced)

Audience: Middle- and high-school mathematics and science teachers. Multiple mathematics/science teachers from the same school are especially encouraged to attend. Note: Experienced AP Statistics teachers should register for the Beyond AP Statistics (BAPS) workshop. See *www.amstat.org/education/baps* for more information.

Objectives: Enhance understanding and teaching of statistics within the mathematics/science curriculum through conceptual understanding, active learning, real-world data applications, and appropriate technology

Content: Teachers will explore problems that require them to formulate questions; collect, organize, analyze, and draw conclusions from data; and apply basic concepts of probability. The MWM program will include examining what students can be expected to do at the most basic level of understanding and what can be expected of them as their skills develop and their experience broadens. Content is consistent with Common Core standards, GAISE recommendations, and *NCTM Principles and Standards for School Mathematics.*

Presenters: GAISE authors and prominent statistics educators

Format:
Middle-school and high-school statistics sessions
One-day pass to attend activities at JSM (statistics education sessions, poster sessions, exhibit hall)
Activity-based sessions, including lesson plan development

Provided:
Refreshments
Complimentary one-day pass to attend the Joint Statistical Meetings
Handouts
Certificate of participation from the ASA certifying professional development hours
Optional graduate credit available

Cost: The course fee for the two days is $50. Course attendees do not need to register for the Joint Statistical Meetings to participate in this workshop.

Follow up:
Follow-up activities and webinars (*www.amstat.org/education/k12webinars*)
Network with statisticians and teachers to organize learning communities

Registration: More information and online registration is available at *www.amstat.org/education/mwm*. Space is limited. If interested in attending, please register as soon as possible.

Contact: Rebecca Nichols, *rebecca@amstat.org*; (703) 684-1221, Ext. 1877

*The Joint Statistical Meetings are the largest annual gathering of statisticians, where thousands from around the world meet to share advances in statistical knowledge. The JSM activities include statistics education sessions, posters sessions, and the exhibit hall.

2015 JSM Program Committee Roster

2015 JSM Program Chair
Peiyong (Annie) Qu
University of Illinois at Urbana-Champaign
anniequ@illinois.edu

International Biometric Society (ENAR)
Olga Marchenko
Quintiles
olga.marchenko@quintiles.com

International Biometric Society (WNAR)
TBD

Institute of Mathematical Statistics (Invited)
Igor Pruenster
University of Torino
igor.pruenster@unito.it

Antonio Lijoi
University of Pavia
lijoi@unipv.it

Institute of Mathematical Statistics (Contributed)
Donatello Telesca
University of California, Los Angeles
donatello.telesca@gmail.com

Statistical Society of Canada (SSC)
Angelo Canty
McMaster University
cantya@mcmaster.ca

International Chinese Statistical Association (ICSA)
Faming Liang
Texas A&M University
fliang@stat.tamu.edu

International Indian Statistical Association (IISA)
N. Rao Chaganty
Old Dominion University
rchagant@odu.edu

Korean International Statistical Society (KISS)
Mikyoung Jun
Texas A&M University
mjun@stat.tamu.edu

International Society of Bayesian Analysis (ISBA)
Lurdes Y. T. Inoue
University of Washington
linoue@u.washington.edu

Royal Statistical Society (RSS)
TBD

Council of Chapters, ASA
TBD

Leadership Support Council, ASA
Demissie Alemayehu
Pfizer
alemad@pfizer.com

General Methodology, ASA
Xiaotong Shen
University of Minnesota
xshen@stat.umn.edu

General Methodology, ASA
Xiaofeng Shao
University of Illinois at Urbana-Champaign
xshao@illinois.edu

Invited and Contributed Posters
Lan Xue
Oregon State University
xuel@stat.oregonstate.edu

Section on Bayesian Statistical Science, ASA
Catherine Calder
Ohio State University
calder@stat.ohio-state.edu

Biometrics Section, ASA
Rebecca Hubbard
Group Health Research Institute
hubbard.r@ghc.org

Biopharmaceutical Section, ASA
Gary Aras
Amgen
garas@amgen.com

Business & Economic Statistics Section, ASA
Beth Andrews
Northwestern University
bandrews@northwestern.edu

Government Statistics Section, ASA
Jenny Guarino
USDOT / FMCSA
jenny.guarino@dot.gov

Health Policy Statistics Section, ASA
Yuanjia Wang
Columbia University
yuanjia.wang@columbia.edu

Mental Health Statistics Section, ASA
Nicholas Horton
nhorton@amherst.edu

Section on Nonparametric Statistics, ASA
Chunming Zhang
University of Wisconsin
cmzhang@stat.wisc.edu

Section on Physical & Engineering Sciences, ASA
William Li
University of Minnesota
setosa@yahoo.com

Quality & Productivity Section, ASA
Alix Ann Robertson
Sandia National Labs
aarober@sandia.gov

Section on Risk Analysis, ASA
Matthew Wheeler
Centers for Disease Control and Prevention
mwheeler@cdc.gov

Social Statistics Section, ASA
Barbara Downs
U.S. Census Bureau
barbara.a.downs@census.gov

Section on Statistical Computing, ASA
Feng Liang
University of Illinois at Urbana-Champaign
liangf@illinois.edu

Section on Statistical Consulting, ASA
Kim Love-Myers
University of Georgia
krlove@uga.edu

Section on Statistical Education, ASA
Erin Blankenship
University of Nebraska
eblankenship2@unl.edu

Section on Statistical Graphics, ASA
Matt Shotwell
Vanderbilt University
Matt.Shotwell@Vanderbilt.edu

Section on Statistics in Imaging, ASA
Haipeng Shen
University of North Carolina at Chapel Hill
shenhaipeng@gmail.com

Section on Statistical Learning and Data Mining, ASA
Matt Taddy
University of Chicago
taddy@chicagobooth.edu

Section for Statistical Programmers and Analysts, ASA
Michael Carniello
Takeda Global Research & Development
carmichael_oneill@yahoo.com

Section on Statistics and the Environment, ASA
Edward L. Boone
Virginia Commonwealth University
elboone@vcu.edu

Section on Statistics in Defense and National Security, ASA
Jeffrey Solka
Naval Surface Warfare Center
jeffrey.solka@navy.mil

Section on Statistics in Epidemiology, ASA
Haitao Chu
University of Minnesota at Twin City
chux0051@umn.edu

Section on Statistics in Marketing, ASA
Michael Braun
Southern Methodist University
braunm@smu.edu

Section on Statistics in Sports, ASA
Tracy Morris
University of Central Oklahoma
tmorris2@uco.edu

Survey Research Methods Section, ASA
Daniell Toth
Bureau of Labor Statistics
toth.daniell@bls.gov

Section on Teaching of Statistics in the Health Sciences, ASA
Jeffrey Szychowski
University of Alabama
jszychow@uab.edu

ASA Meetings Department Contacts
Kathleen Wert, Director of Meetings
kathleen@amstat.org

Cheryl Behrens, Meetings Planner
cheryl@amstat.org

Naomi Friedman, Meetings Planner
naomi@amstat.org

Christina Link, Meetings Planner
christina@amstat.org

Invited Session, IOL Proposals Wanted for JSM 2015

Annie Qu, 2015 JSM Program Chair

The 2015 JSM Program Committee is soliciting invited session and introductory overview lecture proposals. Of particular interest are sessions that appeal to diverse audiences and are closely related to the theme: "Statistics: Making Better Decisions."

Invited sessions include invited papers, panels, and posters. Invited paper sessions consist of 2–6 speakers, invited panels have 3–6 panelists providing commentary on a particular topic, and invited posters have 10–12 participants with posters addressing a common theme. An invited session proposal includes a session title, general description of the session, list of participants, and tentative talk titles and abstracts.

If you are interested in organizing one of the 183 invited sessions, you should select a session topic and solicit potential speakers who are active in that area. Once you have a sufficient number of committed speakers, you can contact JSM program committee members whose sections or societies would be likely to sponsor your session. If your proposal does not fit among any of the ASA sections or societies, you can contact the general methodology chairs for invited papers or panels or the poster chair for invited posters.

The deadline for submitting invited proposals is September 4. For best results, make sure to read the rules for session participants at *www.amstat.org/meetings/jsm/2015/guidelines.cfm* before submitting.

The program committee will post the final invited sessions, including competition sessions, by the end of September. Note that most ASA sections or societies have limited slots for invited sessions (1–4), so it is important to make your session proposal competitive with interesting topics and strong speakers. Also, to have a better chance of securing an invited session slot, you should contact program committee members as early as possible.

The committee also is soliciting proposals for introductory overview lectures, which should be closely related to the JSM 2015 theme, as well. These might address, for example, how to extract crucial information from large-scale data to make more informed and successful decisions.

August 8–13
JSM2015
Seattle

The 2015 Joint Statistical Meetings will be held in Seattle, Washington. Seattle is a delightful city to visit in August, with an average daily temperature of 70F. It features many fun places to visit such as Pike Place Market, the Space Needle, and the downtown waterfront. A little farther away are the world-famous Olympic and Mount Rainier national parks. For more about Seattle, visit *www.visitseattle.org*.

See you in Seattle! ■

New England Statistics Symposium a Success

Scott Evans, 2014 NESS Executive Committee Chair

The 28th annual New England Statistics Symposium (NESS) was hosted by the department of biostatistics at the Harvard School of Public Health April 26. NESS is intended to foster statistics and its applications by promoting research in statistics; provide an educational opportunity for students and others to learn about statistical methods and applications; encourage collaboration and the exchange of ideas among statisticians from academia, industry, and government; and provide a forum to discuss important issues in the statistics profession.

The 2014 NESS had record-breaking attendance, with more than 260 pre-registrants, and a diverse high-quality program consisting of two keynote speakers, three short courses, 12 invited sessions, six contributed sessions, a poster session, and a student paper competition.

Alan Agresti was the first keynote speaker, giving a talk titled "Rising of Academic Statistics and Biostatistics with a Focus on New England," a fitting topic given the historical significance of this year for the statistics profession (the 175th anniversary of the ASA, which began in Boston in 1839). In addition to his well-known work in categorical data, Agresti is the co-editor of the book *Strength in Numbers: The Rising of Academic Statistics Departments in the U.S.* and is no stranger to New England (he owns a home in the Boston area and has an appointment as a visiting professor in the Harvard Statistics Department).

The other keynote speaker was **L.J. Wei** from the Harvard School of Public Health. Wei's reputation as a world-renowned statistical methodologist is matched only by his reputation for humor and entertaining stories. He discussed moving beyond the comfort zone in practicing translational statistics and offered many compelling observations made throughout his career.

NESS also featured three short courses. **John Buonaccorsi** of the University of Massachusetts/Amherst offered "Measurement Error and Misclassification," **Cyrus Mehta** and **Charles Lui** of Cytel offered "Adaptive Designs for Confirmatory Trials," and **Han Liu** of Princeton University offered "Analysis of Big Data."

The Program Committee—consisting of **Luis Carvalho, Mark Glickman, Fangxin Hong, Nick Horton, Tom Lane, Lingling Li, Mingfei Li, Xihong Lin, Sherri Rose, Sachiko Miyahara, Aleksey Polunchenko, Lihui Zhao**, and **Cory Zigler**—organized 12 invited sessions with diverse themes, including the following:

- Prospective Routine Medical
- Product Safety Surveillance: The FDA Mini-Sentinel System
- New Statistical Methods in Personalized Medicine
- Performance Evaluation and Measurement in Sports
- Statistical Issues in Infectious Disease Research
- Statistics in Oncology Clinical Trials
- Innovations in Statistics Education
- Latest Advances in Sequential Analysis with Applications
- Career Development
- Innovations in Comparative Effectiveness Research
- Business Statistics
- Sequential Statistical Analysis for Large Networks and Big Data
- Statistical Inference for Networks and Stochastic Models
- Bayesian Applications in Genetics
- Applications in High Dimensional Data
- Statistical Methods
- Applications in Genetics
- Applications for Network Data
- Applications in Clinical Data

The Student Paper Competition Committee reviewed approximately 20 student paper submissions and gave four student awards. **Elham Azizi** of Boston University won for the paper "Learning Modular Structures from Network Data and Node Variables." **Thiago Costa** of Harvard University won for the paper "Local Algorithm to Estimate Graphons by Stochastic Blockmodels Approximation." **Peng Ding**, also of Harvard University, won for the paper "A Paradox from Randomization-Based Causal Inference." And **Ian Johnston** of Boston University won for the paper "Hierarchical Gene-Proximity Models for Genome-Wide Association Studies." The Student Paper Competition Committee was chaired by **Dianne Finkelstein** with **Nick Horton, John Quackenbush,**

David Schoenfeld, and **Lorenzo Trippa** as members.

NESS featured more than 50 contributed abstracts and an interactive poster session. Sachiko Miyahara led the collection of the contributed abstracts and organized the contributed sessions while Elham Azizi, **Saran Vardhanabhuti, Ming Yang, Daniel Klein, Ana Ciconelle,** and **Grace Montepiedra** assisted. The poster session highlighted contributed work such as the following:

- Connecting Point Level and Gridded Data in the Analysis of Climate Extremes
- Quantifying the Bias from Preferential Sampling in Air Pollution Studies
- Modeling Recovery Curves with Application to Prostatectomy
- A Predictive Model of Maize Yield in the Midwest United States
- Item Response Theory for Genetic Mapping in Rheumatoid Arthritis
- A Multiresolution Semi-Markov Process Model for Predicting Basketball Possession Outcomes
- The National Effect of Marijuana Legalization

New England features a diverse array of statisticians working to improve the profession and the ability to use data to make decisions. NESS remains an effective vehicle to help bring this group together on an annual basis. ■

Presentation Skills Course Provided to NC Chapter

Course participants discuss presentation skills during a group exercise.

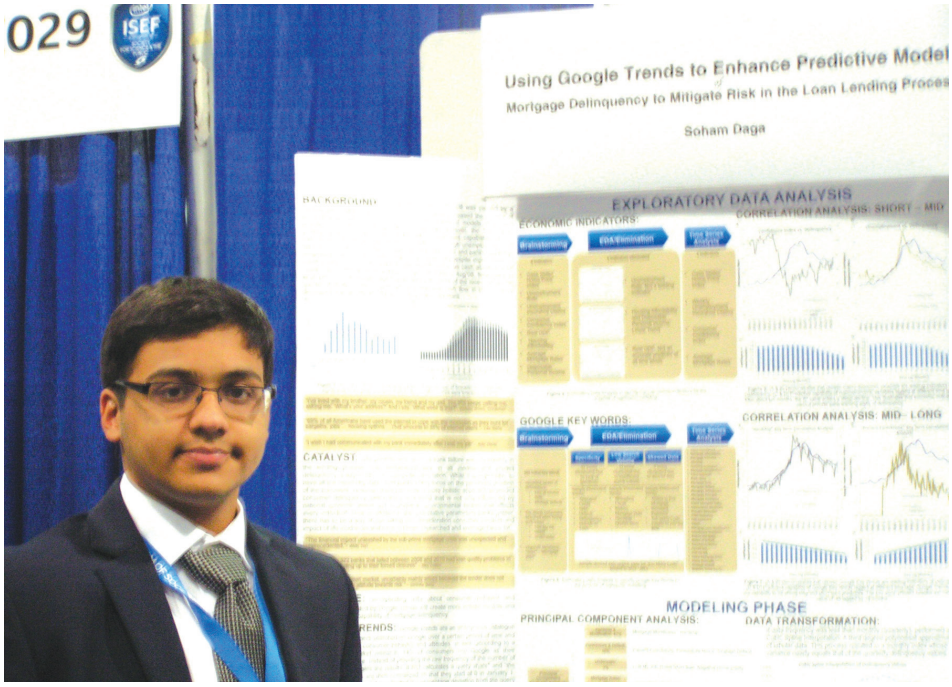
A presentation skills course was held for members of the North Carolina Chapter at the SAS campus in Cary, North Carolina, in May. The instructors were **Bob Starbuck**, who contributed to the development of the course content under a 2012 ASA presidential initiative, and **Bobby Gutierrez**, a SAS employee who took the first "train-the-trainer" course, given at JSM 2012 in San Diego.

Twenty-five people from universities (students and faculty), industry, and government attended the one-day course, coming from as far away as Charlotte and Wilmington, North Carolina.

Feedback from the attendees was highly positive. "I strongly recommend this course because it teaches statisticians to think carefully about their audiences and to communicate appropriately for a specific audience," commented participant Gerardo Hurtado. The chapter is now considering conducting the course in other North Carolina locations.

For other ASA chapters, giving the course is a great opportunity to provide value to their members, and a number of trained ASA volunteer instructors are available. To learn more about how your chapter can arrange the course, contact Ron Wasserstein, ASA executive director, at *ron@amstat.org*. Likewise, if you have completed the "train-the-trainer" course and are interested in presenting it, contact Wasserstein for more information. ■

Chapters Participate in Intel International Science and Engineering Fair



Soham Daga, 17, from Stuyvesant High School, Manhattan, New York won first place

The Southern California and Orange County/Long Beach chapters participated in the 2014 Intel International Science and Engineering Fair (ISEF) May 12–16 in Los Angeles. More than 35 judges evaluated more than 1,400 projects from virtually every scientific and engineering discipline (because statistics is used in every discipline).

On the first day of reviews, the judges selected about 85 projects that incorporated detailed statistical analysis. From this group, they chose 16 entries for the final interview round the next day. After conducting interviews with the finalists in the morning, the judges selected the three winners and awarded honorable mention to the rest.

The first-place winner was **Soham Daga**, 17, from Stuyvesant High School in New York. His econometrics project used Google Trends analytic data to enhance prediction of mortgage default within 1–2 years with the goal of providing an optimal window to banks to help protect borrowers from default. Toward that end, he did a principal component analysis to field a long list of economic predictors and then a time series analysis with and without Google Trend data over standard economic predictors. Daga received $1,500, while the second- and third-place winners received $500 and $250, respectively.

Alan Rong (president, Southern California Chapter) of Amgen and **Harry Hiner** (vice president, Orange County/Long Beach Chapter) of Hiner Partners attended the special awards night to present ASA certificates to the winners. All winners and honorable mention awardees received one-year student memberships in the ASA, which included subscriptions to *Significance* and *CHANCE.*

Many of the judges indicated that they were energized and transformed by the breadth and depth of the research methods and concomitant inferential analysis applied to address pressing issues in areas as diverse as health care, energy, sustainability, material science, pharmacology, biochemistry, and financial economics. The students offered background literature (with references), purposeful hypotheses, detailed analysis and results (occasionally with explanatory code on their laptops), and integrated conclusions. The judges were particularly impressed with the rich diversity of students, including groups of students from Qatar, Egypt, Tunisia, Brazil, Japan, Russia, and historically under-represented areas in the United States.

In addition to reviewing the projects, judges also participated in outreach to students beyond the top winners for the first time. Four hundred of the most promising projects brought their creators a copy of *CHANCE* magazine and a certificate for a free ebook.

Also, **Tom Short** of John Carroll University presented a Tuesday morning symposium for ISEF finalists, teachers, and mentors. Approximately 80 people were in attendance as he presented a talk titled "Statistics and Data Science: Design, Significance, and Modeling in Context." After the symposium, finalists and teachers had many questions about specific science fair projects and the broader role of statistics in K–12 science education. ■

Ghosh

The Statistical and Applied Mathematical Sciences Institute (SAMSI) is pleased to announce the appointments of three new members of the directorate.

Sujit Ghosh, professor of statistics at North Carolina State University (NCSU) and program director in the National Science Foundation Division of Mathematical Sciences, will become deputy director of SAMSI beginning September 8. Ghosh's research interests are in Bayesian statistical methods for analyzing biomedical, econometrics, and environmental models. He previously participated in several SAMSI programs, including as faculty fellow representing NCSU in the 2011/12 program on uncertainty quantification.

Ghosh earned his PhD in statistics from the University of Connecticut in 1996 and is actively involved in teaching, supervising, and mentoring graduate students at the doctoral and master's levels. He has supervised more than 30 doctoral graduate students and three postdoctoral fellows. He also served as a statistical investigator and consultant for more than 40 research projects funded by leading private industries and federal agencies.

In addition to his time at NCSU, Ghosh has been a visiting professor at Thammasat University in Thailand, Bocconi University in Italy, Middle East Technical University in Turkey, Technical University of Crete in Greece, and National University in Singapore. He is a Fellow of the American Statistical Association and the recipient of the 2008 International Indian Statistical Association Young Investigator Award. He also was elected president of the ASA's North Carolina Chapter in 2013 and served as the co-director of graduate programs in statistics at NCSU, managing more than 150 students annually from 2010–2013, and project director for a training program for undergraduates funded by the NSF from 2007–2013.

"Sujit brings to SAMSI a mature understanding of SAMSI's research mission, as well as administrative and grant management experience that will be invaluable as we plan for our next funding cycle," noted Richard Smith, director of SAMSI.

Witelski

Thomas Witelski, professor of mathematics at Duke University who specializes in nonlinear partial differential equations and fluid dynamics, will become associate director of SAMSI for a three-year term beginning July 1. His expertise will be valuable on the applied mathematics side of SAMSI's activities, and he will act as SAMSI's liaison with Duke University during this period.

Witelski earned his PhD in applied mathematics from California Institute of Technology in 1995. Before working at Duke, he was an NSF postdoctoral fellow and an applied mathematics instructor at the Massachusetts Institute of Technology (MIT). He is a member of the Society of Industrial and Applied Mathematics, American Mathematical Society, and Tau Beta Pi. He also is co-editor of the *Journal of Engineering Mathematics* and division editor of the *Journal of Mathematical Analysis and Applications.* Additionally, he serves on the editorial board for the *European Journal of Applied Mathematics and Discrete and Continuous Dynamical Systems Series B.*

Ghosh and Witelski will replace Snehalata Huzurbazar from the University of Wyoming and Ezra Miller from Duke University.

To fill the gap between Huzurbazar and Ghosh, SAMSI will welcome back **Pierre Gremaud**, professor of mathematics at NCSU, as interim deputy director for July and August. Gremaud will be primarily responsible for the education and outreach side of SAMSI's activities. He previously served as associate director of SAMSI from July 2008 through December 2009 and as deputy director from January 2009 through June 2012. ■

Julia Ingrid Lane, senior managing economist and institute fellow at the American Institutes for Research (AIR), was selected recently to receive the 2014 Julius Shiskin Memorial Award for Economic Statistics. The award recognizes unusually original and important contributions to the development of economic statistics or in the use of statistics to interpret the economy. Lane is recognized for her contributions to the development of a new U.S. Census Bureau program that has significantly advanced research on employment dynamics.

Lane initiated the Longitudinal Employer Household Dynamics (LEHD) program to fill a major gap in the information on employment dynamics. Although researchers had information about how much employment had changed in a given time period, they could not determine how many new jobs had been created (job creations) or how many jobs had been lost (job destructions). Similarly, they did not know the number of employees who left their jobs between one period and the next (separations), or the number who acquired new jobs in that period (hires). The Census Bureau tried to provide information on the gross flows by integrating its business and household data, but had made only limited progress—and collecting the information by a survey would have been too costly.

Her proposal was to create a linked employer-employee data set for the United States by obtaining access from states to their UI wage records, because they include both the firm's identification number and the employee's Social Security number and cover almost all employees. This information would be used to link these records to each other and then to Census Bureau records. Lane's linked data set would provide information about jobs at minimal cost and with no increase in respondent burden. For the first time, information would be available for detailed industries and small geographic areas and provide businesses, researchers, and policymakers at all levels of government with information about how the economy is functioning. In fact, these groups have extensively used the LEHD to study the underlying employment dynamics of the U.S. economy and other topics.

Converting the proposal into a permanent Census Bureau program would not be easy. Lane first had to demonstrate the need for a linked data set. She raised the funds for, and organized, a two-day international symposium on linked employer-employee data in May 1998. More than 200 researchers from 20 countries participated and the presentations convinced the senior staff of the Census Bureau that they should continue supporting Lane's concept. In 1999, they named her a senior research fellow.

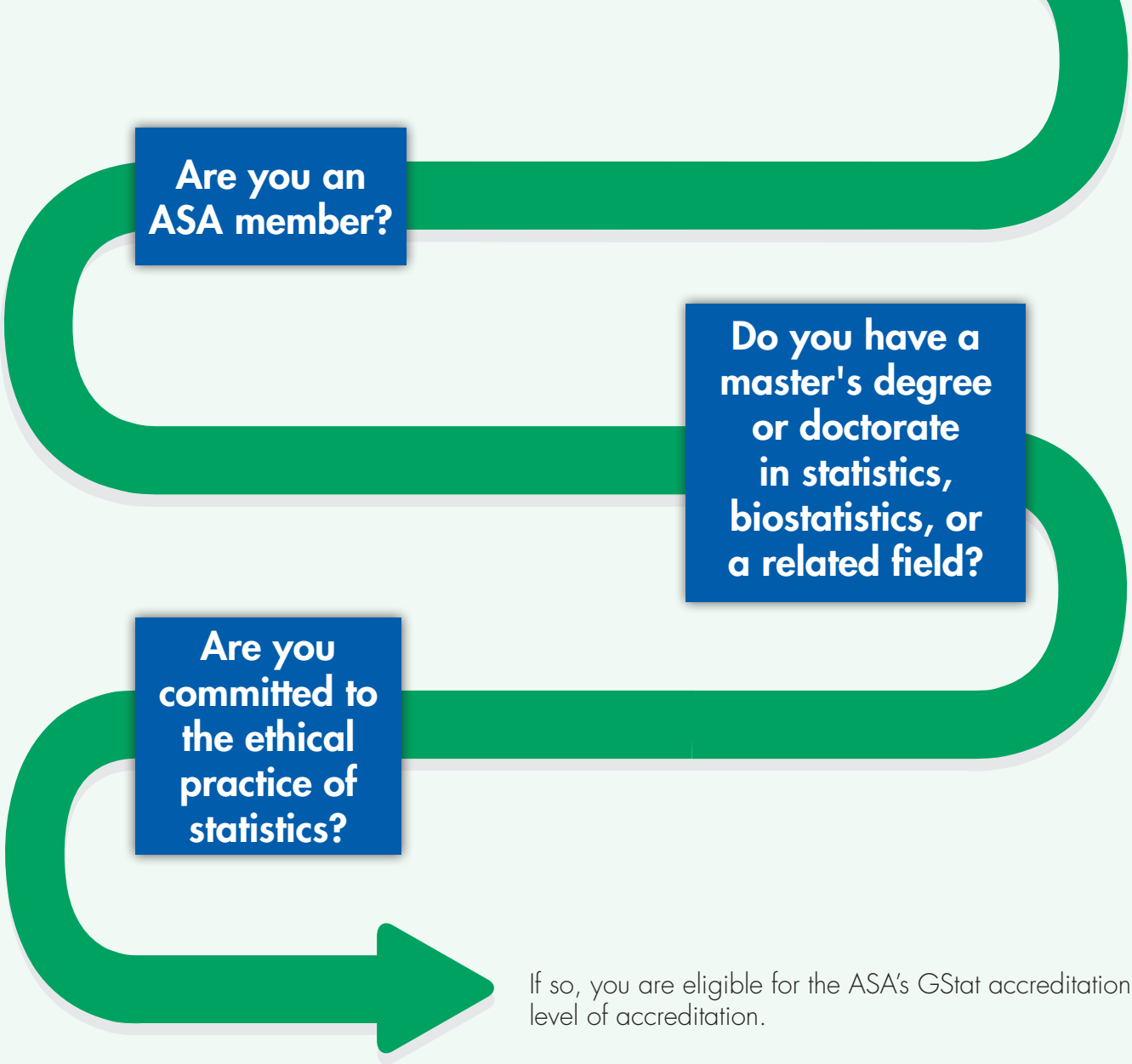
Working with John Abowd of Cornell University and John Haltiwanger, Lane sought outside funding to supplement the resources available from the Census Bureau and the Bureau of Labor Statistics. She was successful in obtaining grants and contracts from the National Institute on Aging, NSF, Alfred P. Sloan Foundation,

Department of Health and Human Services, Russell Sage Foundation, and Eurostat. Of particular importance was that the Census Bureau also provided funds to allow John Abowd to join the project to deal with the difficult technical issues related to the LEHD.

Next, she had to persuade states to provide the Census Bureau with their UI records. Lane personally met with the state labor market information agencies, governors' offices, and the state work force investment boards to convince them to be partners on the project, explaining how their state would gain as a partner with the Census Bureau. She worked with the states to resolve the legal obstacles they encountered when seeking permission to provide their UI wage records to the Census Bureau. By 2004, Lane had convinced more than 25 states to collaborate with the Census Bureau.

Once these data became available to the Census Bureau, it was necessary to develop methodologies to validate the linking of the employee and employer state UI records and then link those records to Census Bureau business records. Abowd, working with Lane and a team of LEHD researchers, provided the specifications for editing, linking, and imputing missing items in the UI records, and Haltiwanger assisted in the linking to the Census Bureau's records. Abowd's work also included the development of statistical matching techniques to associate employees with their place of work and to make identifiers longitudinally consistent. He also developed disclosure avoidance techniques that would allow the Census Bureau to release the detailed data in the LEHD without compromising the confidentiality of individuals and firms. His proposal, developed with assistance of the LEHD team, would use the idea of "adding noise" to protect the confidentiality of the records—a technique that had been proposed some years earlier.

The linked LEHD data set designed by Lane also was to be used as the basis for producing two other reports. The Quarterly Workforce Indicators (QWI) reports, released in 2003, include data on firms' total employment and change in employment, average monthly earnings, average monthly earnings for new hires, and characteristics of firms and their employees. The OnTheMap program, released in 2006, is an



If so, you are eligible for the ASA's GStat accreditation—an entry level of accreditation.

The GStat application is quick! Simply provide the following:

- Contact information
- Résumé or CV
- A list of degrees and courses
- Demographic information (optional)

GStat holders are granted access to the same benefits as PStat® holders:

- Free access to LearnSTAT OnDemand (online professional development courses)
- Reduced registration fees for ASA conferences, including JSM and CSP
- Special recognition at JSM, including a ribbon designation and exclusive reception

Also, GStat holders can request the ASA Accreditation Committee to review their progress toward meeting PStat® requirements.

gstat
Graduate Statistician

www.amstat.org/accreditation

BIGTENT statistics

online mapping and reporting application that shows where people work and where workers live based on annual worker origin and destination data and QWI data files. The majority of LEHD data starts in the 1990s and continues to this day.

Lane became a senior managing economist and institute fellow at AIR in 2010. She holds several honorary positions and received the Vladimir Chavrid Award of the National Association of State Workforce Agencies in 2004. She was named a Fellow of the American Statistical Association in 2009.

Lane is the 42nd recipient of the award; she will be honored at events hosted by the Washington Statistical Society, National Association for Business Economics, and the Business and Economics Section of the American Statistical Association. ■

The Washington Statistical Society (WSS) and RTI International are pleased to announce that **Jerome (Jerry) P. Reiter**, Mrs. Alexander Hehmeyer Professor of Statistical Science at Duke University, has been chosen as this year's recipient of the Gertrude M. Cox Award. Since earning his PhD from Harvard University in 1999, Reiter has made many noteworthy contributions to survey methodology—specifically data confidentiality, Bayesian approaches, and multiple imputation—all contributing to new insights in the field.

Reiter gave a seminar titled "Sharing Confidential Data in an Era with No Privacy" June 24 at the RTI International offices in Washington, DC, and was formally awarded at the WSS annual dinner held later the same day.

The award, established in 2003 through a joint agreement between WSS and RTI International, recognizes statisticians in early to mid-career who have made significant contributions to statistical practice. The award is in memory of Gertrude M. Cox (1900–1978), who, in the 1950s, played a key role in establishing mathematical statistics and biostatistics departments at The University of North Carolina at Chapel Hill and a statistical division at the then newly founded RTI International.

This award is made possible by funding from RTI International. The recipient is chosen by a six-person committee—three each from RTI International and WSS. The award consists of a $1,000 honorarium, travel expenses to attend the WSS dinner, and a WSS plaque. ■

On May 7, the George Mason University (GMU) Board of Visitors approved the appointment of **William F. Rosenberger**, chair of the department of statistics, as a university professor with the following citation:

William F. Rosenberger, Volgenau School of Engineering, whose theoretical contributions to statistics are in the areas of experimental design and sequential analysis; he has been recognized locally, nationally, and internationally for his research and scholarship.

As printed in GMU's faculty handbook: "From time to time, the university will encounter opportunities to recognize current members of the faculty or appoint to its faculty women and men of great national or international reputation. The rank of university professor is reserved for such eminent individuals." ■

The Quality and Productivity Section recently awarded two Mary G. and Joseph Natrella Scholarships at the 2014 Joint Research Conference on Statistics in Quality, Industry, and Technology, which was held June 24–26 in Seattle, Washington. Each Natrella scholarship recipient gave a research presentation at the conference and received a $3,500 scholarship, plus $500 for travel expenses and complimentary registration for the conference and pre-conference short course.

The recipients for 2014 are **Erica Goodrich**, an MS candidate in the biostatistics program at Grand Valley State University in Allendale, Michigan, and **Nathaniel Stevens**, a PhD candidate in the department of statistics and actuarial sciences at the University of Waterloo in Waterloo, Ontario, Canada.

Goodrich

Goodrich was recommended for the award by Robert Downer and Jason Gillikin of Priority Health. Her presentation at the conference was titled "Exploration of Repeated Measures Logistic Regression for Medication Adherence."

Stevens was recommended for the award by Stefan Steiner

Stevens

and Jock MacKay. The title of his presentation was "Design and Analysis of Measurement System Comparison Studies."

The winners were chosen for their outstanding teaching, community service, mentoring, leadership, scholarship, and commitment to the pursuit of quality improvement through the use of statistical methods. ■

Four ASA members recently were elected to the National Academy of Sciences (NAS), a private, nonprofit institution established by congressional charter. NAS recognizes achievement in science by election to membership and—with other organizations—provides science, technology, and health policy advice to the federal government and other organizations. ASA members honored include **Emery N. Brown** of Massachusetts General Hospital, **Emmanuel J. Candès** of Stanford University, **Judea Pearl** of the University of California, Los Angeles (emeritus), and **Bin Yu** of the University of California, Berkeley. More information can be found at *http://bit.ly/SVrlUT.* ■

sectionnews

Statistical Programmers and Analysts

The Section for Statistical Programmers and Analysts (SSPA) will participate in JSM 2014 in Boston with Continuing Education courses, roundtable discussions, and various oral and poster presentations of interest to statistical programmers and the general statistical community. This year, the section also will feature multiple presentations about the global impact of statistics and programming.

Continuing Education Short Course

Take Your R Skills to the Next Level

Invited Panel

Global Impact of Statistics in Biological Sciences

Topic-Contributed Sessions

Hot Topics in Reproducibility and Replication: Impact on Statisticians and Statistical Programmers

The World of Statistical Analysis Professionals

Roundtable Discussions

Inconsistencies in Estimating Propensity Scores

Infrastructure for Growth

What Can Statisticians Learn from Software Engineers?

Real-World Evidence and Clinical Databases: Merging the Information

And more …

A contributed session that contains seven oral presentations focusing on longitudinal analyses and business analytics

A two-part speed poster session about biopharmaceutical research and statistical programming and analysis

Six contributed posters highlighting various statistical models

SSPA business meeting and mixer on Tuesday, August 5, from 5:00 p.m. – 6:30 p.m. in Room S-Constitution

During the business meeting and mixer, you will have the opportunity to network and enjoy food, drinks, door prizes, and fun. Come celebrate our growing group and learn about our newly developed programs and opportunities for travel grants. Also, let us know what you would like SSPA to accomplish in the years to come.

Are you a student? We have a student travel award to pay the registration fees for students and recent graduates who want to attend an ASA conference. Details and an application are available at *http://goo.gl/JMrQD*. Also, we encourage you to attend the JSM Student Mixer on Monday, August 4, from 6:00 p.m. – 8:00 p.m. It is an easy way to meet other students., and one of our officers will be there to answer questions about SSPA and the role of statistical programmers in early-career jobs.

The SSPA information table will be back at JSM 2014 and better than ever. Drop by to say hello and pick up information about upcoming webinars, travel grants, and officer openings. Our table will be near JSM registration.

SSPA was established on January 1, 2009, and has more than 900 members. Our section provides a venue for statistical programmers and analysts to discuss common interests, formulate strategies, share experiences and challenges, offer support, and gain increased awareness of the broader statistical community. We offer a variety of webinars throughout the year targeted to improving your skills. If your work involves programming or managing programmers, SSPA is the place for you.

Visit the JSM 2014 online program at *www.amstat.org/meetings/jsm/2014/onlineprogram* and search on SSPA to find all our activities at JSM. See you in Boston! ■

Statistics in Defense and National Security

Alyson G. Wilson, North Carolina State University

Save the date for the Conference on Applied Statistics in Defense (CASD). This year's conference will be held from October 20–24 in Washington, DC.

CASD, formerly the Army Conference on Applied Statistics, is a forum for the presentation and discussion of theoretical and applied papers relating to the use of probability and statistics for solving problems of national importance, with an emphasis on defense and national security.

This year's conference program will include invited talks by Antonio Possolo (National Institute of Standards and Technology), Richard Davis (Columbia University), David Hunter (Pennsylvania State University), David Marchette (Naval Surface Warfare Center), and Shane Reese (Brigham Young University). There will be a short course October 20–21 by William Meeker (Iowa State University) titled "Statistical Methods for Product Life Analysis and Accelerated Testing." This course will be a hands-on workshop in which participants will use JMP 11 software for analyzing reliability data and test planning.

To contribute a paper, send the following to Alyson Wilson, *alyson_wilson@ncsu.edu*, by September 5:

- Title
- Brief abstract
- Author names, affiliations, and contact information

You may propose a 30-minute technical paper or a clinical session, in which you make a 15-minute presentation of an unresolved statistics problem and receive 25 minutes of suggestions and discussion from a panel of experts.

For more information, visit *www.armyconference.org* or contact Wendy Martinez, Martinez.*Wendy@bls.gov*, with questions.

Nominations Sought

The Army Wilks Award is given periodically to an individual who has made a substantial contribution to statistical methodology and application affecting the practice of statistics in the Army through research or application of statistics in the solution of Army problems. The award was established to commemorate the career of Samuel S. Wilks and his service to the Army. To nominate an individual for the award, send a letter of nomination, up to three supporting letters, and the nominee's CV to Jock Grynovicki, *jock.o.grynovicki.civ@mail.mil,* by August 15. ■

Survey Research Methods

John Finamore, SRMS Publications Officer

The SRMS annual business meeting will be held at the Joint Statistical Meetings in Boston, Massachusetts, at 6 p.m. on August 6 at the Boston Convention and Exhibition Center in Room CC-157c. The meeting is open to everyone, but all SRMS members are encouraged to attend.

The meeting is shaping up to be an event you will not want to miss. For those of you who have attended past SRMS business meetings, you should expect the same jolly good time you have experienced in past years. For those first-time SRMS business meeting attendees, here are some topics you can expect to be included on the agenda:

- Introduction of current and incoming officers
- Update on current SRMS activities
- Announcement of student paper and student travel award winners
- Updates from SRMS officers, including the SRMS treasurer and education officer
- Overview of SRMS involvement at JSM 2014, including the sponsored sessions, roundtables, and Continuing Education courses
- Preliminary discussion of JSM 2015 plans
- Updates and requests for input from the Council of Sections representatives
- New business

Beverages and light refreshments will be provided. If you have any questions about the business meeting, contact SRMS Chair Phil Kott at *pkott@rti.org.*

JSM Sessions

SRMS is the main sponsor for nearly 40 sessions, including four invited sessions, 12 topic-contributed sessions, 20 contributed sessions, and two speed sessions. When you consider the sponsorship of all these sessions, it translates into one or two SRMS-sponsored sessions per time slot throughout the entire conference. Karol Krotki, SRMS program chair, has done a tremendous job coordinating a diverse set of sessions that should provide an enjoyable week for conference attendees.

The SRMS sponsored sessions, in their entirety, provide information on topics covering the full survey cycle, from sample design to variance estimation. For a full listing of all SRMS-sponsored sessions, visit the JSM 2014 online program at *http://amstat.org/meetings/jsm/2014/onlineprogram*. Go to the "search by sponsor" dropdown menu and click on "Survey Research Methods Section."

For those attendees interested in learning more about contact strategies, SRMS will sponsor a session on modeling response to tailor contact strategies in censuses and surveys. If you are interested

BASS XXI on Tap for November

The 21st meeting of the Biopharmaceutical Applied Statistics Symposium (BASS XXI) will be held November 3–7 at the Crowne Plaza Washington DC-Rockville. At least 16 one-hour tutorials on diverse topics pertinent to the research, clinical development, and regulation of pharmaceuticals will be presented November 3–5 by speakers from academia, the pharmaceutical industry, and the Food and Drug Administration (FDA). Two parallel two-day short courses will be presented November 6–7.

Popular features of BASS XXI are the keynote address on November 4, with reception following, and the November 5 FDA Biometrics session.

BASS is a nonprofit entity established for the purpose of fundraising to support graduate studies in biostatistics. To date, BASS has provided support to more than 50 master's or doctoral degree graduate students in biostatistics.

For further information, visit *www.bassconference.org* or contact the BASS registrar at *Rewhitworth@gmail.com*, Andreas Sashegyi at (317) 532-7414 or *aisasheg@lilly.com*, or Karl Peace at (912) 681-6980 or *peacekarl@frontier.com*.

more in imputation methodology, you should consider attending the session on recent advances in multiple imputation. If your area of interest centers on survey paradata or adaptive design techniques, you will have a few sessions competing for your attention, including a session on using paradata to examine multiple error sources simultaneously and a session on using adaptive design strategies to improve business surveys. Whereas, if you are more interested in disclosure avoidance techniques, the session on disclosure, confidentiality, and privacy is one you should try to attend.

Finally, if you want to try something entirely new, you should attend a speed session that SRMS is sponsoring. Speed sessions consist of 20 oral presentations of approximately five minutes with a 10-minute break after the first set of 10 talks. These short oral presentations are followed by a poster session later the same day. ■

Physical and Engineering Sciences

Bryan Smucker, SPES Education Chair

The Section on Physical and Engineering Sciences (SPES) will sponsor the following two short courses at JSM 2014 in August:

Modern Design of Factorial Experiments, by Peter Goos and Bradley Jones
This course will be based on *Optimal Experimental Design: A Case-Study Approach*

The Design and Analysis of Experiments That Use Computer Simulators, by Thomas Santner and Brian Williams
This course will be based on *The Design and Analysis of Computer Experiments*

Descriptions of these courses can be found in the JSM 2014 online program (*www.amstat.org/meetings/jsm/2014/onlineprogram)* by searching for CE course numbers 21 and 17, respectively.

On October 1, in conjunction with the Fall Technical Conference, SPES will sponsor a short course by Heath Rushing, "Text Mining and Unstructured Data Analysis Methods." Other short courses at FTC include "Definitive Screening Designs," by Bradley Jones and Christopher Nachtsheim; "Effective Presentations for Statisticians," by Jennifer van Mullekom and Stephanie DeHart; and a course on reliability by William Meeker.

More information can be found at *http://asq.org/conferences/fall-technical/2014/short-courses.* ■

Quality and Productivity

Jin Xia

The 58th annual Fall Technical Conference (FTC) will be held October 2–3 in Richmond, Virginia. Prior to the conference, on October 1, Q&P will sponsor a short course, "Definitive Screening Designs: What, Why, and How," by Bradley Jones of JMP and Christopher Nachtsheim of the University of Minnesota.

Definitive screening designs (DSDs) are a new class of designs for factor screening in which screening is performed at three levels for quantitative factors and the designs project to highly efficient response surface designs in the active factors if just a few active effects are found, achieving screening and optimization in one step.

This course will introduce DSDs in their simplest form (where all the factors are quantitative), demonstrate their extra capabilities over standard two-level fractional factorial and Plackett-Burman screening designs, show how to generate DSDs when there are additional two-level categorical factors, and explain how to orthogonally block these designs. Practical examples including data and ideas for analysis on such designs will be provided. ■

Statistics in Epidemiology

The Statistics in Epidemiology Section will sponsor a number of invited sessions for JSM 2015, to be held August 8–13 in Seattle, Washington. Send your ideas and proposals to the section's program chair, Haitao Chu, at *chux0051@umn.edu* by September 4, including the following information:

1. Session title

2. Session description that should include the following information:

a. Short description of the session that explains why it would be of interest to statisticians interested in epidemiologic applications.

b. List of invited speakers/panelists (affiliation, email address for each participant, and tentative title for each presentation). Indicate if speakers have been confirmed and will attend the 2015 meetings.

c. Format of session (e.g., paper or panel, number of speakers/discussants/panelists as applicable).

d. Session organizer (affiliation, email address).

e. Session chair (affiliation, email address).

f. Discussant (if any) (affiliation, email address).

In previous years, sessions with more complete information have had a greater likelihood of acceptance.

For more information, contact the section's 2015 program chair, Haitao Chu, at *chux0051@umn.edu.* ■

Biometrics

Edited by Feifei Wei, Biometrics Section Publications Officer

Please join us at the Biometrics Section mixer and business meeting during JSM 2014 in Boston, Massachusetts. It will be held August 4 from 5:30 p.m. to 7:00 p.m. in Lighthouse II of the Seaport Boston Hotel.

In addition to it being a networking opportunity, the mixer will feature the presentation of the 2014 David P. Byar Young Investigator Award and section travel awards. The mixer is open to all JSM attendees.

For information about this year's CE courses and invited sessions sponsored by the Biometrics Section, visit *http://magazine.amstat.org/blog/2014/06/01/biometrics-news*.

JSM 2015

It's also time to start thinking about invited sessions for next year's Joint Statistical Meetings, which will be held August 8–13 in Seattle, Washington. Anyone interested in organizing an invited session

or who has ideas for one should contact the section's 2015 program chair, Rebecca Hubbard, at *hubbard.r@ghc.org*.

A typical invited session consists of three 30-minute talks followed by a 10-minute invited discussion and 10 minutes of floor discussion. However, other formats are possible. The 2014 program is a good source for examples.

The Biometrics Section will have at least four invited sessions, but will be able to compete for additional slots. The most mature ideas will have an advantage.

Also, submit ideas for short courses to the section's 2015–2016 Continuing Education chair, Andrea Troxel, at *atroxel@mail.med.upenn.edu*.

Biometrics Section Funds Travel Award

Applications are being accepted for a PhD-level biostatistician interested in conducting methodological or collaborative research in radiology/imaging clinical trials to attend a workshop in Scottsdale, Arizona, January 10–16, 2015. The workshop presents an opportunity for a biostatistician to learn the relevant methodology and gain experience collaborating with radiologists and imaging specialists. The award, funded by the Biometrics Section, will cover up to $3,000 in travel costs.

Each year, the Radiology Society of North America (RSNA) holds this workshop for faculty members and fellows in radiology, radiation oncology, and nuclear medicine academic departments. The workshop—which includes a curriculum infused with statistical and methodological concepts and examples—provides hands-on training in the design, conduct, analysis, and interpretation of clinical trials in radiology and imaging through didactic sessions, one-on-one mentoring, small discussion sessions, self-study, and protocol development workgroups.

A group of 20 MD and PhD faculty members (including five PhD biostatisticians) with extensive experience in radiology clinical trials will provide a student to faculty ratio close to 1:1. Attendees will shadow biostatistics faculty members to observe the collaborative process of developing clinical trials in radiology, in addition to learning the methodological aspects of this field.

Eligible applicants will hold a PhD in biostatistics or a related field (e.g., statistics) and have an interest in the design, conduct, and analysis of imaging clinical trials. Interested applicants should email a one-page letter of interest, CV, and letter of support from their department head to Diana Miglioretti (*dmiglioretti@ucdavis.edu*) with "RSNA CTMW Biostatistics" in the subject line. The deadline for receipt of applications is August 15, and announcement of the award will be made by October 1. ■

Professional Opportunity listings may not exceed 65 words, plus equal opportunity information. The deadline for their receipt is the 20th of the month two months prior to when the ad is to be published (e.g., May 20 for the July issue). Ads will be published in the next available issue following receipt.

Listings are shown alphabetically by state, followed by international listings. Vacancy listings may include the institutional name and address or be identified by number, as desired.

Professional Opportunities vacancies also will be published on the ASA's website (*www.amstat.org*). Vacancy listings will appear on the website for the entire calendar month. Ads may not be placed for publication in the magazine only; all ads will be published both electronically and in print.

Rates: $320 for nonprofit organizations (with proof of nonprofit status), $475 for all others. Member discounts are not given. For display and online advertising rates, go to *www.amstat.org/ads*.

Listings will be invoiced following publication. All payments should be made to the American Statistical Association. All material should be sent to *Amstat News*, 732 North Washington Street, Alexandria, VA 22314-1943; fax (703) 684-2036; email *advertise@amstat.org*.

Employers are expected to acknowledge all responses resulting from publication of their ads. Personnel advertising is accepted with the understanding that the advertiser does not discriminate among applicants on the basis of race, sex, religion, age, color, national origin, handicap, or sexual orientation.

Also, look for job ads on the ASA website at *www.amstat.org/jobweb*.

California

■ Research Biostatistician III. Cedars-Sinai Medical Center in Los Angeles, CA seeks an experienced research biostatistician to provide statistical support to researchers at the cancer institute and to other departments at the medical center. Master's degree in biostatistics or a statistics-related discipline and 5+ years of experience as a biostatistician is required. Visit *cedars-sinai.edu/careers* and refer to position #16777 to apply. EOE.

■ Principal Biostatistician—the principal biostatistician will play a lead role in providing biostatistics support to clinical operations department regarding preparation of clinical study designs and conducting statistical analyses of clinical data in compliance with applicable regulations. Go to *http://bit.ly/1kFLeH1* for full description and to apply. EOE.

■ The successful candidate will be appointed 50% in statistics and 50% in school of medicine at the UC, Riverside. Must have a PhD in statistics or biostatistics or a similar discipline and qualify for tenure. An accomplished research scientist, strong teaching record, doctoral student mentoring, and collaborative research is desired. The position is open until filled. For details see: *https://aprecruit.ucr.edu/apply/JPF00127*. EOE.

District of Columbia

■ Small, DC, biostatistical firm (*www.statcollab.com*) involved in medical research and consulting seeks several programmer/biostatistician to perform project coordination, data analysis, SAS programming, and report writing. Send cover letter (include Ref: ASA-SPB-1405), résumé, writing sample, program sample, and unofficial transcripts (graduate and undergraduate) by email (*office@statcollab.com*), fax (202)247-9701

or by snail mail: Statistics Collaborative, Inc., 1625 Massachusetts Ave., NW, Suite 600, Washington, DC 20036. *www.statcollab.com* EOE.

Maryland

■ Loyola University Maryland invites applications for a one year visiting assistant professor in statistics beginning in fall 2014. A master's degree in statistics is required, a PhD in statistics or a related field is preferred. Applicants must demonstrate potential for excellence in teaching. Previous experience in a college/university setting is a plus. Teaching responsibilities include introductory statistics/mathematics courses and advanced undergraduate statistics courses. *http://careers.loyola.edu:80/postings/174.* EOE.

■ The Division of Biostatistics's Vaccine Evaluation Branch at the Food and Drug Administration's Center for Biologics Evaluation and Research is soliciting applications from statisticians with knowledge of biological applications. The position will offer the opportunity for research and statistical collaboration in the development and evaluation of preventive vaccines. For details and to apply, please go to: *http://jobs.amstat.org/jobs/6225395.32*. The Department of Health and Human Services is an equal opportunity employer with a smoke free environment.

■ Seeking PhD/experienced master's statisticians for Center for Devices and Radiological Health, FDA, HHS in Silver Spring, MD. Grapple with rich array of statistical issues in clinical trials for new technologies, from LASIK and artificial hearts to genetic tests and robotic surgery. Review statistical design/analysis issues in medical devices from invention to postmarket. Email CV to Greg Campbell, *greg.campbell@fda.hhs.gov*. Identify residency/visa status in application. FDA is a smoke-free environment and an Equal Opportunity Employer.

Continued on Page 47.

VIRGINIA COMMONWEALTH UNIVERSITY

Department of Biostatistics
Assistant Professor
Position #F36830

Description: The Department of Biostatistics at the Virginia Commonwealth University (VCU) School of Medicine is seeking to fill a tenure-track faculty position at the assistant professor level. This position features collaborations with researchers in the VCU Department of Internal Medicine, focusing on topics such as HIV/AIDS, sexually transmitted diseases, behavioral sciences, ophthalmology, physical therapy and orthopedics. We are seeking applicants with graduate training and research interest in longitudinal, clustered and multiple outcome data analyses, causal inference, and observational studies. Responsibilities will include consultation and collaboration with multi-disciplinary research teams from the Department of Internal Medicine, providing assistance with study design and power analysis, protocol and grant submission, data analysis, and manuscript preparation. It is expected that these efforts will eventually be funded through extramural grants. This collaborative work will be conducted with faculty researchers in fields such as HIV/AIDS, sexually transmitted diseases, behavioral sciences, ophthalmology, physical therapy, and orthopedics. Additional responsibilities within the Department of Biostatistics include teaching theoretical or applied courses, advising and mentoring graduate students, and providing departmental service. The successful candidate will be expected to supplement these activities with extramural grant support, which can be obtained through independent initiatives or through collaborations with researchers in the Department of Internal Medicine and the Department of Biostatistics or in related fields.

Qualifications: The candidate must have: (i) a Ph.D. in biostatistics, statistics, or a related field, (ii) demonstrated methodological and applied expertise (or clear evidence of potential) in longitudinal, clustered and multiple outcome data analyses, causal inference, and observational studies, (iii) experience and/or interest in teaching theoretical and applied biostatistics courses, (iv) excellent oral and written skills, and (v) an established ability to work in multidisciplinary research groups. In addition, the candidate must demonstrate experience working in and fostering a diverse faculty, staff, and student environment or make a commitment to do so as a faculty member at VCU.

History: The VCU Department of Biostatistics has been an integral part of the VCU School of Medicine for over 40 years, and is committed to excellence in developing biostatistical methodology, collaborative research, and graduate education. The department offers M.S. and Ph.D. degrees in both Biostatistics and Genomic Biostatistics, a M.S. degree in Clinical Research in Biostatistics, and a Master's degree in Public Health. Our faculty, students and staff actively collaborate with clinical investigators throughout the Medical College of Virginia community, which includes the Schools of Medicine, Dentistry, Pharmacy, Nursing and Allied Health.

The overarching mission of the Department of Internal Medicine is the pursuit of excellence in each facet of its tripartite mission: to educate the physicians and health care professionals of tomorrow, the physicians and health care professionals of today and the community-at-large; to provide superior, compassionate and innovative clinical care to our patients using state-of-the-art knowledge and resources; and to conduct and disseminate cutting-edge biomedical research and scholarship, with a focus on translational research that can be quickly applied to the care of patients.

Instructions: Interested candidates should submit a curriculum vita, research statement, teaching philosophy, and three letters of support to: Yvonne Hargrove, Administrative Office Manager (via email: yfhargro@vcu.edu; via post: Department of Biostatistics, Virginia Commonwealth University, P.O. Box 980032, Richmond, VA 23298-0032).

VCU is an urban, research intensive institution with a diverse university community and a commitment to multicultural opportunities. VCU is an equal opportunity/affirmative action employer. Women, minorities and persons with disabilities are encouraged to apply.

SAS has proudly helped our customers solve complex business issues with our world class analytics for more than 38 years. SAS employees around the world provide unparalleled technical acumen and domain expertise, and collectively contribute to SAS' acclaimed culture of innovation. We have a workplace like no other. We believe in stimulating work, an empowering management philosophy where you are encouraged to take risks and an inspiring workplace where creativity thrives.

We are seeking an innovative and dedicated individual to join our JMP division as a Statistical Writer. Come join our team and find out why SAS is a great place to work!

As a **JMP Statistical Writer**, you will document new features and refactor existing documentation to describe JMP functionality in printed books, help, e-books, and in-product PDF documents. This role will allow you to work closely with development staff and with the software itself to write original documentation for a broad audience of users on a variety of statistical features.

We value the collaboration and face-to-face interaction within our technical staff. This position is located in our Company Headquarters at Cary, NC – one of the best places to live in the US!

Are you a good fit? Do you have……

- A Bachelor's degree in statistics, math, or a quantitative field
- Four years of experience writing user documentation regarding analytical or mathematical processes and concepts
- -or- two years of relevant writing experience plus two years' professional experience in a field or technical or business domain related to the position.
- Excellent written and verbal communication skills

Apply Now!

For immediate consideration for this position and other opportunities with SAS please apply online by visiting www.SAS.com/jobs. To apply to the JMP Statistical Writer position, please select United States and then enter Job Number **20003343**.

SAS is an equal opportunity employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability status, protected veteran status or any other characteristic protected by law.

The ASA Community provides a place for like-minded statisticians to build and engage with their professional network and peers. Get involved and start sharing today!

community.amstat.org

North Carolina

■ The Wake Forest School of Medicine Department of Biostatistical Sciences, Winston-Salem, NC, is recruiting a senior faculty or senior staff to help lead a newly forming academic research organization (ARO). Experience with the design and analysis of industry sponsored clinical trials is required. Regulatory submission experience is preferred. MS/PhD required. Contact Ralph D'Agostino Jr. c/o Monica Kiger, *mkiger@wakehealth.edu* or apply at *www.wakehealth.edu/HR/Faculty/Current-Opportunities.htm*. AA/Equal Opportunity Employer.

■ Dickson Advanced Analytics at Carolinas Medical Center in Charlotte, NC, is seeking a director of biostatistics with PhD in biostatistics/statistics. Minimum 5 years of experience in medical research required. Duties include planning biomedical research, analyzing data, statistical consulting, supervising master level statisticians, & teaching. Knowledge of SAS, excellent verbal & written communication skills required. Applicant must apply at *http://careers.carolinashealthcare.org*. See us at JSM Career Placement. EOE.

■ Cooperative Studies Program Epidemiology Center, Durham Veterans Affairs Medical Center, is recruiting for a single biostatistician position. PhD or equivalent required, with 5 or more years of experience preferred. Experience in survey sampling methods is desirable. Applicants should be highly motivated and passionate about research quality, reproducibility, and the implementation of research findings. Send CV and cover letter to Becky McNeil, *rebecca.mcneil@va.gov.* EOE. ■

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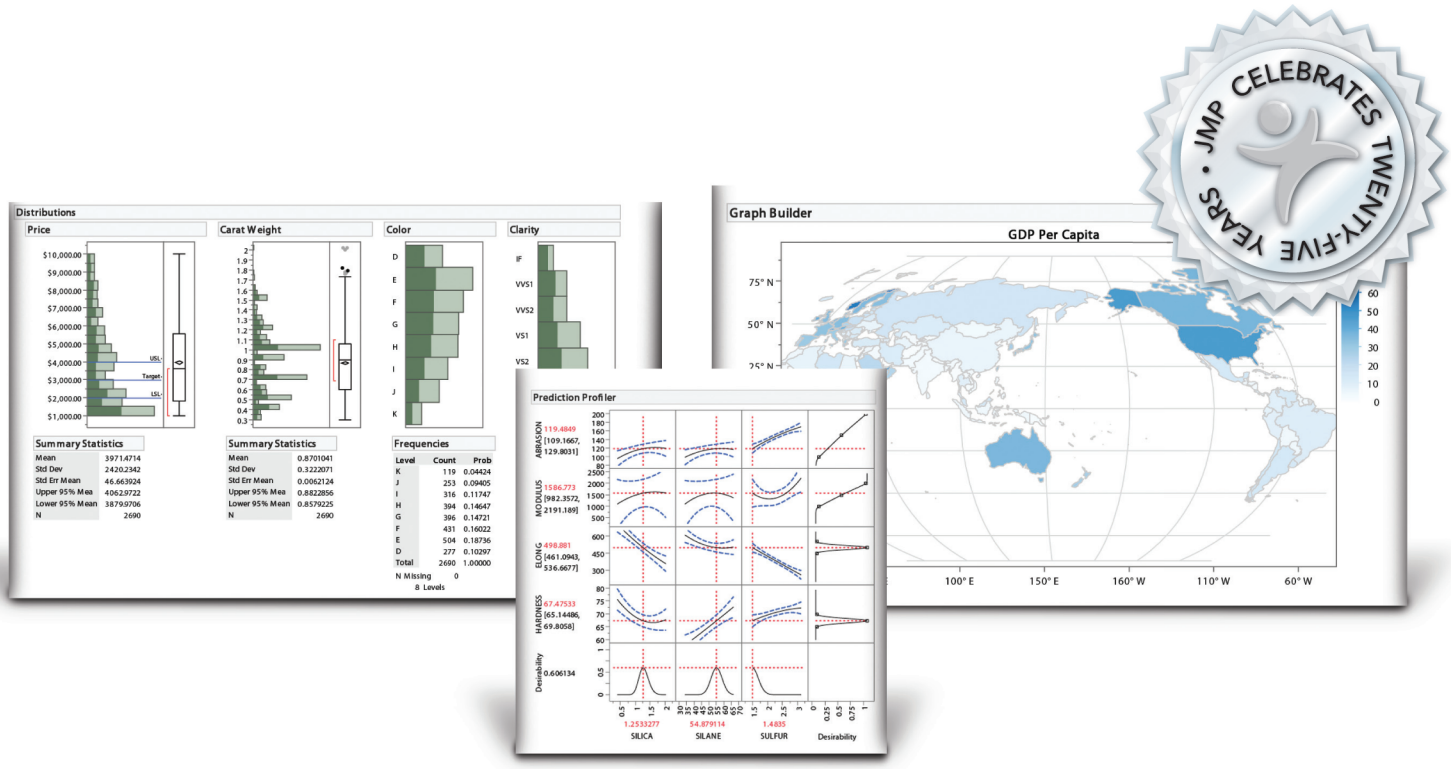

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- Data Mining Capabilities: Cross-Validation, Multi-Layer Neural Networks, Bootstrap Forests, Gradient-Boosted Decision Trees, Model Comparison*
- Nonlinear Modeling
- SAS,® R, MATLAB and Microsoft Excel Connections
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- Design of Experiments
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- Categorical Data Analysis
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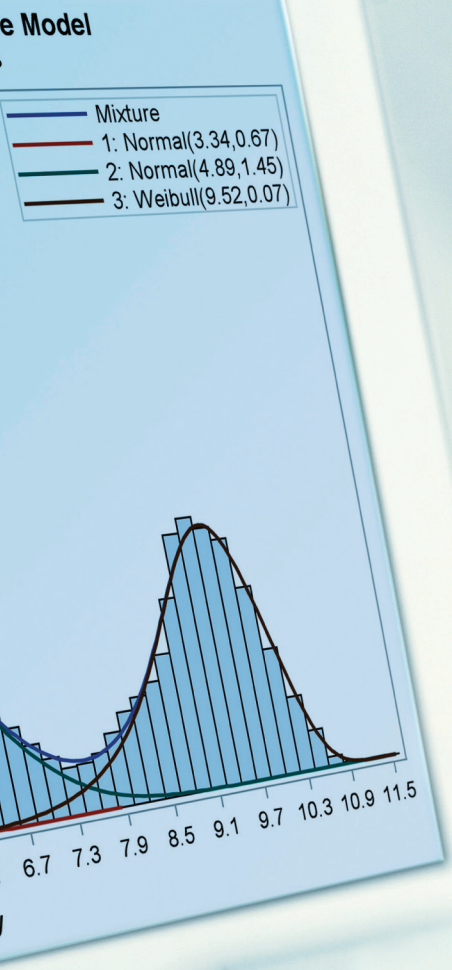

Statistics

Two releases of SAS/STAT® software this year means even more statistical capabilities. Highlights include:

SAS/STAT 13.2

Weighted GEE methods. Deal with drop-outs in longitudinal studies with a method that produces unbiased estimates under the missing-at-random (MAR) assumption.

Analysis for spatial point patterns. Understand locations of random events, such as crimes or lightning strikes, and how other spatial factors influence event intensity.

Proportional hazards regression models for interval-censored data. Apply Cox regression models when you have interval-censored data.

Nested multilevel nonlinear mixed models. Fit hierarchical models often used in the analysis of pharmacokinetics data.

SAS/STAT 13.1

Sensitivity analysis for multiple imputation. Assess sensitivity of multiple imputation to the missing at random assumption with pattern-mixture models.

Survival analysis for interval-censored data. Compute nonparametric estimates of the survival function for interval-censored data.

Bayesian choice models. Use Bayesian discrete choice analysis to model consumer decisions in choosing products or selecting from multiple alternatives.

Competing risk models. Analyze time-to-event data with competing risks using the method of Fine and Gray (1999).

Item response models. Use item response models to calibrate test items and evaluate respondents' abilities.

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