August 2013 • Issue #434

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AUGUST 2013 • ISSUE #434

Amstat News welcomes news items and letters from readers on matters of interest to the association and the profession. Address correspondence to Managing Editor, *Amstat News,* American Statistical Association, 732 North Washington Street, Alexandria VA 22314-1943 USA, or email *amstat@amstat.org*. Items must be received by the first day of the preceding month to ensure appearance in the next issue (for example, June 1 for the July issue). Material can be sent as a Microsoft Word document, PDF, or within an email. Articles will be edited for space. Accompanying artwork will be accepted in graphics file formats only (.jpg, etc.), minimum 300 dpi. No material in WordPerfect will be accepted.

Amstat News (ISSN 0163-9617) is published monthly by the American Statistical Association, 732 North Washington Street, Alexandria VA 22314-1943 USA. **Periodicals postage paid** at Alexandria, Virginia, and additional mailing offices. POSTMASTER: Send address changes to *Amstat News,* 732 North Washington Street, Alexandria VA 22314-1943 USA. Send Canadian address changes to APC, PO Box 503, RPO West Beaver Creek, Rich Hill, ON L4B 4R6. Annual subscriptions are $50 per year for nonmembers. *Amstat News* is the member publication of the ASA. For annual membership rates, see *www.amstat.org/join* or contact ASA Member Services at (888) 231-3473.

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The American Statistical Association is the world's largest community of statisticians. The ASA supports excellence in the development, application, and dissemination of statistical science through meetings, publications, membership services, education, accreditation, and advocacy. Our members serve in industry, government, and academia in more than 90 countries, advancing research and promoting sound statistical practice to inform public policy and improve human welfare.

features

columns

This column is written for statisticians with master's degrees and highlights areas of employment that will benefit statisticians at the master's level. Comments and suggestions should be sent to Megan Murphy, *Amstat News* managing editor, at *megan@amstat.org*.

Hoegh

Contributing Editor

Andy Hoegh is a graduate student at Virginia Tech, researching predictive fusion methods for big, messy data sets. He is also a statistical collaborator in Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis (LISA) and the network outreach coordinator for StatCom.

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*.

Pulkstenis

Contributing Editor

Andy Pulkstenis is a program director of analytics for State Farm Insurance in Bloomington, Illinois. In this role, he leads a team of advanced analytics professionals providing statistical analysis and predictive modeling support for the enterprise across a variety of business units.

Online Articles

The following articles in this issue can be found online at *http://magazine.amstat.org*.

The Jeanne E. Griffith 2013 Mentoring Award Winner is Brian Harris-Kojetin, a senior statistician in the Statistical and Science Policy office at the U.S. Office of Management and Budget. Harris-Kojetin, in conveying his thanks, talked about how the ceremony was a wonderful opportunity to celebrate the legacy of Jeanne Griffith each year and that he was deeply honored to have been selected for this year's award. Read about the award and ceremony at *http://magazine.amstat.org*.

Make the most of your ASA membership
Visit the ASA Members Only site: *www.amstat.org/membersonly*.

Visit the **ASA Calendar of Events**, an online database of statistical happenings across the globe. Announcements are accepted from educational and not-for-profit organizations. To view the complete list of statistics meetings and workshops, visit *www.amstat.org/dateline*.

Many of the **sections and committees** sponsor events and host workshops and meetings. For details about these events and other news, make sure you visit our section, chapter, and committee pages online at *http://magazine.amstat.org*.

columns

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.

O'Neill

Contributing Editor
Robert T. O'Neill is the senior statistical advisor for the Office of Translational Sciences in the Center for Drug Evaluation and Research at the Food and Drug Administration. He is a Fellow of the American Statistical Association and Society for Clinical Trials.

departments

member news

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ASA Delegation to Cuba

In 2010, People to People Ambassador Programs (*www.peopletopeople.com*), an organization that has been facilitating trips expanding global awareness since 1956, approached the ASA about the possibility of taking a delegation abroad. After careful consideration, the ASA leadership decided this would be a unique outreach opportunity. And so was born the tradition of ASA presidents leading a delegation of ASA members to a different country every year.

In 2010, then President Sastry Pantula chose China (*http://bit.ly/15HnL31*) and led a delegation on a 12-day exploration of the country's culture and its statistical training programs, infrastructure, and literacy. 2011 President Nancy Geller followed with a People to People trip to Israel (*http://bit.ly/18jitP2*), and, last year, current Past-President Bob Rodriguez led a delegation to Russia (*http://bit.ly/18gmQqF*).

In mid-2012, it was my turn to choose a country to visit this year.

For some time, I have heard from European and South-American colleagues about the long tradition of scholarship in mathematics and statistics in Cuba. From 2006 to 2011, Geert Molenberghs coordinated a Cuban-Flemish outreach program through the Center for Statistics (CenStat) at Hasselt University (*www.uhasselt.be/censtat*) in Belgium focused on introducing biostatistics training and research at the University of Havana (*www.uh.cu*) in collaboration with biotechnology institutes in the Havana region. This project resulted in the creation of a master's program in biostatistics administered by the university's faculty of mathematics and computer science (*www.matcom.uh.cu*), which has already graduated a number of students. Geert and several of his colleagues have visited Cuba more than 20 times, working with students and presenting short courses, and they have reported the strong interest among Cuban statisticians in promoting the role of statistics in research and government and in expanding interaction with statisticians abroad, as has Clarice Demétrio, 2012–2013 president of the International Biometric Society (*www.biometricsociety.org*), who has also given short courses there.

The delegation at the University of Havana with Luis Ramiro Pineiro, dean of the faculty of mathematics and computer science (first row, far right)

Because of the political situation between the U.S. and Cuba, I knew that an ASA delegation to Cuba might be controversial. However, given all I had heard and with the 2011 easing of restrictions on Americans' travel to Cuba (*http://nyti.ms/1bgblmJ*) I decided to explore the possibility. Outreach to a statistical community keen to initiate more global collaboration seemed consistent with the spirit of the International Year of Statistics (*www.statistics2013.org*).

ASA Executive Director Ron Wasserstein and I contacted many people across the profession, and, overall, the reaction was supportive. So I decided to make Cuba my choice, accepting that there would be some ASA members who would not agree. Because People to People was not yet licensed for travel to Cuba, we switched to Professionals Abroad, a division of Academic Travel Abroad (ATA), a company with more than 50 years of experience arranging educational travel.

When the trip was announced last October, some ASA members expressed disapproval of an ASA delegation to a communist country, but otherwise the response was overwhelmingly positive. The main concern was the cost. As with all delegations, it is high because it includes almost everything—travel, accommodations, most meals, transportation within the country, English-speaking

Marie Davidian

The delegation and Cuban colleagues

guides, and all necessary visas and licenses. No ASA funds are used for any delegation; each participant is responsible for his/her own costs.

ATA began working with Amistur (*www.amistur.cu/home.php?lang=en*), the Cuban people-to-people agency responsible for coordinating the program and providing a guide/translator and bus. Shortly thereafter, I began to receive emails from Cuban statisticians, who put together a committee to work with Amistur to arrange the scientific agenda.

Soon, I was in regular communication with Luis Ramiro Piñeiro, dean of the faculty of mathematics and computer science at the university; his colleague Carlos Bouza, in charge of the group on probability and statistics; and Pedro Valdés-Sosa, vice director for research at the Cuban Neuroscience Center and internationally known in statistical modeling of neuroimaging data. I also heard from ASA members signed up for the trip, requesting exposure to how statisticians are trained; their research; how they are involved in government, public health, and health care; and opportunities for collaboration. I conveyed this to the Cubans, wondering how they could possibly assemble a program exposing us to all of this in a meaningful way.

They did. A few weeks before the trip, I received the tentative agenda from ATA. I was floored—four days of systematic presentations, meetings, and tours covering not only everything we had requested, but things we didn't even know to request.

On May 19, the 18-member delegation departed Miami for Havana. Among us were academicians; statisticians from the Food and Drug Administration (FDA), National Institutes of Health, Google, and the U.S. Census Bureau (retired); and even a PhD student. We were met by our outstanding Amistur guide, Amircal, outside of customs, where he stood holding a sign reading "American Statistical Association," which subsequently was displayed on the windshield of our bus. The rest of the day included an orientation and review of the agenda, sightseeing (Plaza de la Revolución, El Capitolio), and dinner in Old Havana.

The next day, our immersion into statistics in Cuba began at Casa de la Amistad, a center for scientific exchange in the heart of Havana. The morning featured presentations by Luis Ramiro, Carlos, and colleagues (adeptly translated by Amircal when required) on statistical education and methodological research at the university, including the master's programs in biostatistics and statistics and the PhD program, and on biostatistics training for health professionals. I gave an overview of the ASA and International Year, followed by brief presentations of background and interests by each delegation member. That afternoon, we visited the university and the mathematics and statistics facilities. The quality of the academic programs and research is high, in spite of (to us) limited computational resources and access to scholarly publications.

On Tuesday we were back at Casa de la Amistad for presentations on the diversity of statistical

activity in public health. Overviews of the role of statisticians in general and specifically in the Institute for Tropical Medicine; the Animal Sciences Institute and other agricultural centers; the Institute for Cybernetics, Mathematics, and Physics; the Center for Medical Genetics; and the clinical research programs at Havana's enormous Hermanos Ameijeiras General Hospital were fascinating. The level of sophistication and range of research projects were impressive. We learned of the work of statisticians maintaining and analyzing data from the National Cancer Registry, which longitudinally follows every cancer patient in the country. National registries for twins, birth defects, and familial disorders support robust research programs in genetics and genetic epidemiology.

The third day, we traveled to the so-called "Scientific Pole" in the western part of Havana, home to a cluster of biomedical and biotechnological research institutes. At the Center for Molecular Immunology (CIM) (*www.cim.co.cu/index_en.php*), we heard presentations about clinical and bioinformatics research from statisticians at the CIM, the Genetic and Biologic Engineering Center, the Neuroscience Center, and the National Coordinating Center of Clinical Trials. The latter is effectively a contract research organization that coordinates pharmaceutical, biologic, and device trials for major companies worldwide, as well as for the government organization devoted to commercialization of CIM-derived biopharmaceutical products (*www.cimab-sa.com/index.php?&idm=2*) and administers a network of clinical sites throughout the country (an FDA site visit was, in fact, upcoming).

That afternoon, we visited the University's Center of the Study of Demography (CEDEM) (*www.cedem.uh.cu*) and the National Statistical Information Office (*www.one.cu*) and were provided statistical reports on Cuba's population and resources.

U.S. and Cuban colleagues discuss possible collaborations on the final day of the visit at Casa de la Amistad.

Thursday had us back at Casa de la Amistad for a full morning of unstructured interchange with virtually all statisticians we met during the previous three days. Groups of Cubans and Americans with common interests formed spontaneously, and we discussed in-depth possibilities for future collaboration. My group, comprising biostatisticians involved in clinical research, identified a concrete first step: We will collaborate on substantive research projects centered on CIM studies of lung cancer and psoriasis, which will undoubtedly lead not only to joint publications, but also to identification of needed research and eventually what we hope will be an ongoing relationship. The country's remarkable health data resources are a potential treasure trove that can drive both substantive advances and methodological research.

Other groups discussed possible joint educational initiatives, and several of us agreed to return to Cuba next year to teach short courses on topics such as survival analysis and causal inference.

Of course, we did take time during the week to explore the city and culture. Amircal (a former English professor with an impressive command of American colloquialisms) was an expert not only at translation, but also on the history of the city, country, and people. He regaled us with background on Old Havana and its architecture and suggested "non-tourist" restaurants and salsa clubs.

We left Cuba with tremendous respect for our new colleagues. We all admitted amazement at our prior lack of knowledge about the vitality and breadth of activity of the Cuban statistical community. Their goal is to enhance the quality of their methods and domain science research and practice through interaction with statisticians in the United States, whom they regard as being at the forefront of the field. We have set up a Google site through which we can share materials and resources. In saying farewell, we agreed that while our governments might disagree, that should not stop our communities from forging a fruitful statistical partnership.

Marie Davidian

New Year Brings Changes

Michelle Everson, *JSE* Editor

Twenty years ago, in July, the *Journal of Statistics Education* (*JSE*, *www.amstat.org/publications/jse*) was launched under the leadership of E. Jacquelin Dietz from Meredith College. To commemorate the 20th anniversary, the July 2013 issue (*www.amstat.org/publications/jse/contents_2013.html*) takes a look back at some of the first articles to be published in *JSE*. We also take a look forward as we think about the future of *JSE*.

JSE is branching out in different ways. It now has a presence on both Facebook and Twitter, and it is hoped that social media will be a way for *JSE* readers to share and discuss articles and issues related to statistics education. Those who want to join the Facebook group can either search for "Journal of Statistics Education" when logged on to Facebook or go directly to *www.facebook.com/groups/486553198048126/?fref=ts*. The Twitter handle for *JSE* is #JStatEd.

A new department was announced in the March 2013 issue called Research on K–12 Statistics Education. Tim Jacobbe, from the University of Florida, will serve as the editor, and you can find a description and call for papers at *www.amstat.org/publications/jse/v21n1/jacobbe_K12.pdf*. Papers for this new department can be submitted at *jse@umn.edu* or sent to Jacobbe at *jacobbe@coe.ufl.edu*.

Most exciting is a new webinar series affiliated with the Consortium for the Advancement of Undergraduate Statistics Education (CAUSE, *www.causeweb.org*). Each month, the authors of one or two papers from *JSE* will share their work during a live web presentation. These presentations are then recorded and posted at *www.causeweb.org/webinar/jse*.

The first *JSE* webinar took place June 18 and featured presentations by Amy S. Nowacki from the Cleveland Clinic and Todd Schwartz from The University of North Carolina at Chapel Hill. The second *JSE* webinar took place on July 16 and featured Kirsten Doehler and Laura Taylor, both from Elon University. A third is scheduled to take place August 20 and will feature Lawrence Lesser from The University of Texas at El Paso, Robert Carver from Stonehill College, and Patricia Erickson from Taylor University. The August webinar will focus on a March 2013 *JSE* article titled "Using Fun in the Statistics Classroom: An Exploratory Study of College Instructors' Hesitations and Motivations."

JSE maintains a mailing list for those who want to receive alerts when new issues are published and announcements about upcoming webinars. If you wish to be part of this email list or you have questions or comments about *JSE*, contact *JSE*'s editorial assistant, Jean Scott, at *jse@umn.edu*. ■

Honor Colleagues, Give to ASA

Memorial funds provide an opportunity to honor departed colleagues while promoting the careers of promising statisticians. ASA members have opened several funds in the names of family members and friends, and most need donations to make them viable.

Lingzi Lu Memorial – An award is being created by the ASA in partnership with the International Chinese Statistical Association in remembrance of Lingzi Lu. The first-year student in the master's program in statistics at Boston University lost her life in the bombing at the Boston Marathon in April 2013. The award will support a master's degree student or recent master's graduate by providing support for travel to the ASA's annual Conference on Statistical Practice.

Martha Aliaga Memorial – An award to support statistical educators is being created by the family and friends of Martha Aliaga, former University of Michigan faculty member and ASA staff member who passed away in 2011. Her memorial award will promote the careers of those who share her passion for education.

Bernie Harris Memorial – Family and friends of longtime ASA member and faculty member at the University of Wisconsin-Madison are establishing an award in honor of Bernie Harris, who passed away in 2011. The Harris award will promote the careers of young statisticians.

Lester R. (Randy) Curtin Memorial Award – Details of this award in honor of Randy Curtin, who passed away last year, can be found in the July 2013 issue (*http://bit.ly/1apQtqk*).

To contribute to any of these awards, you may do the following:

1. Send a check made out to the American Statistical Association, with a notation indicating the memorial fund you wish to support. Address your mail to the ASA at 732 N. Washington St., Alexandria, VA 22314, attention Steve Porzio.
2. Donate online by going to *http://bit.ly/1490WGy*, checking the third bullet, and typing in the name of the award.

Tune in to Podcasts from Biopharmaceutical Section

Rima Izem and Richard C. Zink

Imagine radio statistics, a radio station that would allow you to tune in to a pitch for the latest statistics paper or book; hear a book review; or hear about upcoming conferences, training, or workshops. Tuning in will help you stay abreast of what is new in the statistical sciences whenever convenient—on your morning jog, on your commute to work, or while you are waiting for your statistics program to compile. The podcasts by the Biopharmaceutical Section are a step toward making radio statistics a reality.

Podcasting is a continuing education tool of our time. What is a podcast? The online Oxford Dictionary defines it as "a multimedia digital file made available on the Internet for downloading to a portable media player or computer." Our goal with the podcasting initiative is to contribute audio content for our members that is free and convenient and will enhance everyone's continuing education experience in statistics.

Our initial podcasts are interviews addressing a variety of topics. Jingyee Kou and Alan Hartford, 2012 Biopharmaceutical Section FDA-Industry Workshop co-chairs, discuss the goals of the workshop, the special way sessions are included in the program, and events that were introduced in 2012 and how they were received by workshop participants. Stan Altan and Tim Schofield describe the motivation behind the special nonclinical issue of *Statistics in Biopharmaceutical Research*. They also define nonclinical statistics and discuss the unique challenges for statisticians working in this area.

A recent podcast is an interview with Stephen Senn at the 2013 Statisticians in the Pharmaceutical Industry (PSI) Annual Meeting. We briefly discussed his recent *Statistics in Medicine* paper, "Seven Myths of Randomisation in Clinical Trials," and he shared his thoughts about his participation in the plenary session titled "This House Believes That Drug Development and Regulation Should Become Fully Bayesian." The last podcast is an interview with Biopharmaceutical Section chair Amit Bhattacharyya. He introduces the section and describes his long-term volunteering roles and goals for the section in 2013. To access these and other podcasts, visit *http://community.amstat.org/BioP/Podcast*.

We need to hear from our best sources of future content: You! Is there a special topic, such as nonclinical statistics, you would like to share with a wider audience? Is there a particularly interesting or timely panel session coming up at the Biopharmaceutical Section FDA-Industry Workshop or Joint Statistical Meetings you would like to highlight? Have something to get off your chest? Let us know! We can record interviews in-person or over the phone, or even tutor you on how to record your comments. Of course, we are happy to have volunteers, should you be interested in developing content. Contact Rima Izem at *rima.izem@fda.hhs.gov* or Richard Zink at *richard.zink@jmp.com* to share your ideas. ■

Pioneers of Industrial Statistics: An Interview with Stu Hunter

Lynne Hare

Hunter

Did you ever wonder how the use of statistical thinking and methods began in companies such as General Electric, DuPont, and General Motors? We are better statisticians and better as a statistical community when we know more about our statistical roots.

With this in mind, a small group of statisticians launched a series of interviews with J. Stuart Hunter—emeritus professor at Princeton University, first editor of *Technometrics*, past president of the ASA, co-author of *BH*^{2}, and honorary member of ASQ—to hear about who he thinks did much to expand the creation, knowledge, and application of statistical thinking and methods to the betterment of industry and society.

The interviews are impromptu and brief, each lasting no more than 12 minutes. They are intended for those who:

- Teach statistics and believe, as we do, that student familiarity with development context aids understanding
- Wish to know more about the origins of the methods they use
- Enjoy Hunter's easy, affable style of presentation

As Brian Joiner put it so well, "Stu is the Johnny Appleseed of statistics." Wouldn't we all do well to learn from his examples and methods? Interviews may be seen at *http://bit.ly/1anVgse*.

University at Buffalo Biostatistics Department Celebrates 10 Years

Alan David Hutson

In 2002, Alan Hutson joined the University at Buffalo (UB) from the University of Florida. He found there was just one faculty member and one lecturer left in the division from the old department of statistics and no active graduate program. A key development in the history of the department was that a new school of public health and health professions was formed in 2003 at UB through the merger of the department of social and preventive medicine and the school of health professions. The division of biostatistics was moved into the new school as part of this merger.

With the support of the upper administration, the department of biostatistics was officially created in 2003. A critical agenda item for Hutson was to re-establish a graduate presence at UB for the newly formed department. A key to moving this process forward was the recruitment of Randolph Carter from the University of Florida.

Carter and Hutson were the primary architects of new MA and PhD programs in biostatistics. The actual degree programs were a merger of the old MA and PhD programs in statistics with a newer set of biostatistical courses integrated. Also during this time, an MPH degree with an emphasis in biostatistics was established.

In 2005, Hutson agreed to chair both the UB and Roswell Park Cancer Institute (RPCI) department of biostatistics (now biostatistics and bioinformatics at RPCI), such that the department of biostatistics essentially spans two institutions and has 21 primary faculty members and several affiliated faculty members. Also in 2005, Carter took over as director of the Population Health Observatory, a key research center in the school with a mission similar to the original Bureau of Business and Social Research, established in the 1920s. The department also has strong participation within the Gynecology Oncology Group (GOG) with service on several GOG committees. The GOG statistics office is headed by John Blessing (UB graduate) and located in Buffalo.

In 2006, the first four MA degrees in biostatistics were awarded. The department celebrates the annual Richard Schmidt Award for Outstanding PhD Student. In addition, the department established the Sidney Addelman Award for Outstanding MA Student and the M. Mahamunulu Desu Outstanding Student Paper Award. In 2007, the first graduate PhD degree in biostatistics was awarded to Antara Majumbdar. One highlight of that day is that C.R. Rao served as an honorary dissertation committee member. Rao now has a faculty appointment in the department.

The department has been in continual motion since 2002. In 2012–2013, there were 55 graduate students in the program and more than 2,000 undergraduates were taught through service teaching. We anticipate 50 new graduate master's and PhD students to arrive for Fall 2013.

We developed an undergraduate minor in statistics, with the first new students enrolling in Fall 2010. We also established a new MS degree program in bioinformatics and biostatistics that started in Fall 2010, joint with RPCI. One of our most recent high-profile hires, Marianthi Markatou, is associate editor of *JASA*. ■

Biopharmaceutical Symposium to Offer Tutorials, Short Courses

The 20th anniversary meeting of the Biopharmaceutical Applied Statistics Symposium (BASS XX) will be held November 4–7 at the DoubleTree (by Hilton) Hotel in downtown Orlando, Florida.

At least 16 one-hour tutorials on diverse topics pertinent to the research, clinical development, and regulation of pharmaceuticals will be presented by speakers from academia, the pharmaceutical industry, and the U.S. Food and Drug Administration (FDA).

Two parallel one-day short courses will be presented November 6–7, and the keynote address will take place on November 5, with a reception following. The FDA biometrics session will be the morning of November 6.

BASS is a nonprofit entity, sponsored by the department of biostatistics at Virginia Commonwealth University and the Jiann-Ping Hsu College of Public Health at Georgia Southern University. Its purpose is to raise funds for graduate fellowships in biostatistics.

To date, 50 graduate students have been supported by funds raised by BASS.

For more information, visit *www.bassconference.org,* contact the BASS registrar at *rewhitworth@georgiasouthern.edu,* or contact Karl E. Peace at (912) 478-7905 or *peacekarl@frontier.com*.

Toward a Vision: Official Statistics and Big Data

Cavan Capps and Tommy Wright, U.S. Census Bureau

Every day of our lives, each of us is bombarded with data. More recently, there has been an explosion of data, and it is nearly impossible to ignore the increasing volume of and potential use for Big Data.

For example, a paper published on the High-Level Group for the Modernisation of Statistical Production and Services' website (*www1.unece.org/stat/platform/display/hlgbas*) in March 2013 notes the following:

> The sentiment in Dutch social media messages was found to be highly correlated with Dutch consumer confidence; in particular with the sentiment towards the economic situation. The latter relation was stable on a monthly and on a weekly basis. …
>
> In the Netherlands, approximately 80 million traffic loop detection records are generated a day. These data can be used as a source of information for traffic and transport statistics and potentially also for statistics on other economic phenomena.

The New York Times reported in February 2012 that, "In economic forecasting, research has shown that trends in increasing or decreasing volumes of housing-related search queries in Google are a more accurate predictor of house sales in the next quarter than the forecasts of real estate economists."

Federal statistical agencies produce official statistics. While Big Data are generally not official, we believe there are opportunities where they can enhance official statistics. Here, we share our thoughts about this topic to further a conversation, with attention given to official statistics provided by the U.S. Census Bureau.

With a great deal of our work integrally linked with the roots of our nation's democracy, the Census Bureau does much more than the constitutionally required census every 10 years to redistribute the seats in the U.S. House of Representatives among the states. In addition to drawing boundaries for representation at all levels of government, our data assist in the allocation of hundreds of billions of dollars per year in state and federal funding to local, state, and tribal governments. Our data also are used to plan economic development and assess the need for schools, hospitals, job training, etc.; to plan communities and predict future needs; to plan the location of roads and public facilities; and to analyze social and economic activity and trends. In brief, our data products and those of other statistical agencies provide information about our people: who we are, how many we are, what we do, where we live, and how we live.

How the Census Bureau Collects, Provides Data

At a very high level, our data products result primarily from the implementation of censuses, sample surveys, administrative records, and statistical modeling. We conduct a census every 10 years that primarily provides counts of people (including limited demographics) and counts of all habitable dwellings in the United States. Every five years, we also conduct a census of the economy, measuring counts of different types of businesses and some characteristics of their activities, as well as a census of governments.

While censuses are our primary source of counts and some characteristics, sample surveys are conducted more frequently (e.g., monthly, quarterly, and annually) of people, housing, businesses, and governments to provide current estimates of their characteristics. Measures produced by our demographic sample surveys (many operated in partnership with other federal agencies) include unemployment and other labor force characteristics, income, government program participation and eligibility data, purchases of specific goods and services, time use, education characteristics, illnesses, disability, health, types and incidence of crime, science/engineering work force, housing, poverty, and health insurance coverage. Measures produced by our economic sample surveys include dollar value of retail sales, inventory, wholesale trade activities, receipts and revenues for service industries, manufacturing, construction, finances, state and local tax revenues, state and local government employment, imports, exports, transportation, communications, and utilities.

The use of administrative records is increasing. One example is our Population Estimates Program, which develops and disseminates annually estimated population counts of the population and associated characteristics for the nation, state, counties, and functioning governmental units. Records from the Internal

Cavan Capps is the Census Bureau lead on Big Data, and Tommy Wright is chief of the Center for Statistical Research and Methodology. This article is released to encourage discussion. The views expressed are those of the authors, and not necessarily those of the U. S. Census Bureau.

Revenue Service help with our estimates of internal migration. This program also develops and disseminates estimated counts of state- and county-level housing units. National and state-level population projections also are produced. We also make use of statistical methods (e.g., modeling) to increasingly provide estimates for small domains such as subpopulations and low levels of geography.

To conduct censuses and sample surveys, we send questionnaires via the postal service and Internet, administer questionnaires using the telephone, and knock on doors to conduct face-to-face interviews. Quality control and assurance efforts are in place to ensure high-quality data products. Providing important social and economic indicators for more than two centuries also has yielded major advances and improvements in data collection methodology (including many by others) that are noteworthy:

1. Probability sampling theory and methodology help us generalize from samples to populations
2. Assessment of nonsampling errors (e.g., inaccurate or inconsistent responses) is possible, and we can compensate for many of them, including nonresponse
3. Dissemination of data and access to data by users has improved and increased
4. Significant progress has been made in protecting privacy and confidentiality of our respondents

Official statistics in the United States are grounded in the scientific method and constantly subject to scientific review; they are understood, they are authoritative, and they are credible. However, they are not perfect, and they are not free.

Changes, Changes, Changes

As has been noted by many, our society is increasing in complexity. We are highly mobile, technological advances are rapidly changing how we live, data users want more data in more detail, and data collection costs are increasing while data collection and processing budgets are not. As a result, questions abound. What to measure? How to measure? What can we measure? How frequently should we measure? What resources do we have to measure?

And There Is Big Data …

Digital transaction data are ubiquitous and growing. Financial transactions previously done with paper checks or cash are now done with credit or debit cards, or increasingly with smart-phones. Online news and blogs replace newspapers, search engines record the trends of people's interests, and social media provides trends on what people are discussing. Smart phone GPS data provide traffic congestion data for Google maps. E-commerce transactions provide signals as to what items cost and which demographics are buying them. Local governments are making data available via Internet APIs for public access. Internet use is growing; there are more devices connected to the Internet in the U.S. than people. Smart phone use continues to grow, and the trends are not expected to reverse.

Can we ignore this growing ocean of digital data? Avoiding a formal definition of Big Data, we present a few comparisons reflecting our impressions between official statistics that result from censuses, sample surveys, administrative records, and statistical modeling on the one hand and Big Data on the other:

1. The size of databases for official statistics tend to be no more than hundreds of millions (10^8) of records, while Big Data come in big volumes and make use of galaxy-type prefixes to describe their sizes (e.g., tera-10^{12}, peta-10^{15}, exa-10^{18}, zetta-10^{21}, and yotta-10^{24}).
2. Official statistics are disseminated every decade, every five years, annually, quarterly, and monthly, while Big Data can be disseminated practically instantaneously or just about every second as is the case, for example, with financial data.
3. Official statistics are obtained largely by asking, and response assumes permission to use, while Big Data come as byproducts of other primary activities and without asking explicitly.
4. Official statistics tend to be labor intensive, subject to human error and costly, while Big Data are mainly digitally captured and available and seem to be relatively cheap.
5. Official statistics are the result of careful data collection design with clearly defined uses, while Big Data come with unknowns (e.g., uses are less clear, data are less understood, data are of unknown quality, and representativeness is largely unknown).

Complementary Roles for Official Statistics and Big Data

Big data come with great promise for official statistics, as they can enhance and strengthen official statistics. Leading potential complementary roles for Big Data include the following:

1. Providing variables to help us stratify better for our sample surveys

2. Improving sample survey estimates provided by methods (weighting, ratio, regression estimation, unequal probability sampling, balanced sampling, adaptive methods, imputation, modeling, calibration, post-stratification, etc.) calling for auxiliary variables that do not need to be perfect; these auxiliary variables just need to be correlated with our primary variables of interest
3. Helping us compensate for nonresponse
4. Helping us check our estimates
5. Helping us improve the frequency and timeliness of our data releases
6. Helping us improve and provide more small-area estimates

Sources of Big Data

- Administrative data that arise from the administration of a program, be it governmental or not (e.g., electronic medical records, hospital visits, insurance records, bank records, and food banks)
- Commercial or transactional digital data that arise from the transaction between two entities (e.g., credit card transactions, online transactions—including from mobile devices
- Sensor data (e.g., satellite imaging, road sensors, and climate sensors)
- GPS tracking devices (e.g., tracking data from mobile telephones)
- Behavioral data (e.g., online searches about a product, service, or any other type of information and online page views)
- Opinion data (e.g., comments on social media)

Big Data are generally not the result of careful design to provide reliable measures. For example, sample surveys show that Twitter users are younger than the general public, and hence results from Twitter cannot represent the general population. When news reports cover a topic, Twitter feeds increase on that topic. Big data are signals or proxies for economic and social behavior. To compensate for inherent biases, Big Data are in need of evaluation and baselining with data of known quality.

Can Big Data reliably supply the social, demographic, health behavior, and business activity information required for a 21st-century society? Our current answer to this question is, "Not yet." Given the growing concern over privacy and confidentiality related to Big Data, our nation may not ever want or trust Big Data to serve as a source for official statistics. However, statistical agency infrastructures are in place to critique and address the accuracy, consistency, and interpretability of the results produced from Big Data. With this infrastructure, the Census Bureau is in position to incorporate relevant Big Data sources while ensuring the consistency of official statistics, providing interpretation of them, and improving their relevance and timeliness.

Integrating official statistics and Big Data require statistical and computational methods capable of producing unbiased and reliable estimates of social and economic indicators. Increased judicious blending of design-based and model-based sampling methods offer real options, especially if we view Big Data as a source of auxiliary variables. Such efforts may require new computational techniques and software/hardware architectures.

Two recent events are worth noting. In June 2011, the McKinsey Global Institute released the highly cited report *Big Data: The Next Frontier for Innovation, Competition, and Productivity*, which defines Big Data and provides seven key insights and opportunities. On March 29, 2012, the White House announced a $200 million Big Data research and development initiative to help the United States make the most of this opportunity.

Opportunities with Big Data for Small-Area Estimation

Nearly all monthly statistics and economic indicators are only released for the national level. However, many analysts need timely estimates at a sub-county level, because most cities are contained in counties. The property, crime, education, transportation, and other economic development data are different for the inner cities and outer suburbs within the same county. Some investment occurs at a metropolitan level, and other commercial or social investment occurs on a neighborhood level. Good business thrives on good data. Producing timely and reliable small-area data based only on sample surveys cannot be done in the current environment of limited budgets.

Small-area estimates rely on statistical models that require predictor variables, often either for low levels of geography or for small subpopulations. The supply of good predictor variables for use in small-area estimation is limited. Currently, sufficient official statistics do not exist for small areas, and Big Data might just be able to supply a variety of variables (within budget) that only need to be correlated with our primary variables of interest to improve estimates.

Another of the obstacles to releasing small-area estimates for demographic characteristics or business characteristics is the need to ensure the confidentiality of all released data. The U.S. Census Bureau is required to ensure that individual people or companies cannot be identified from Census Bureau data. Estimates modeled from sample survey data and Big Data integration may provide a way to make increasingly detailed small-area estimates available while decreasing the risk of identification.

There are many examples of statistics users have requested at small geographic levels that might be improved with Big Data. These include requests for small-area housing and construction data, including housing permits, housing sales, foreclosures, housing values, property taxes, construction starts, and commercial construction values. There are also requests for business activity data, including retail sales, durable goods sales, data on business clusters and supply chains, interests in small business start-ups, local government sales, and shipping activity (e.g., barge, shipping, rail, trucking, FedEx, and UPS). Finally, there are many requests for small-area estimates for health and other social data, including educational participation, crime, health behavior, and disease spread (e.g., flu, heart disease, ADHD, cancer).

Business analysts argue that data made available close to certain events (or the period of measurement) are valuable. In response to Hurricane Katrina and Hurricane Sandy, users requested timely information about economic activity impact and reconstruction costs. Additionally, timely data on small areas regarding occupational and business activity during the recent recession might have been useful in targeting stimulus funds.

Current Efforts in Producing Small-Area Estimates

The Census Bureau uses statistical models to integrate data from different sample surveys and administrative data sources to create modeled small-area estimates. Some of these include estimates that are produced by the Small Area Income and Poverty Estimates (SAIPE) Program (*www.census.gov/did/www/saipe*), Small Area Health and Income Estimates (SAHIE) Program (*www.census.gov/did/www/sahie*), and Longitudinal Estimates for Household Dynamics (LEHD) Program (*http://lehd.did.census.gov*). These programs have released successful data products for some time, and they are accepted by both the scientific and data user communities.

Other Opportunities for Big Data

The Census Bureau traditionally processes massive data sets like the Decennial Census. It also continually updates the Topologically Integrated Geographic Encoding and Referencing (TIGER) (*www.census.gov/geo/maps-data/data/tiger.html*) geographic information system (GIS) files. Today, the Census Bureau processes and manages massive administrative files like these routinely.

Construction statistics have used commercial administrative data sources to establish the sampling frames for construction activities.

Using Big Data, the Census Bureau might be able to release preliminary data estimates much closer to the time of an event. These estimates would need revision after being base-lined with designed sample survey data. Some data estimates that might be released this way include potential preliminary estimates for county business patterns, minority or women-owned small business start-ups, housing sales and foreclosures, and transportation data such as mass transit and bicycle traffic that would reflect seasonal changes in transportation patterns.

Other estimates might include personal discretionary income, consumer confidence, Internet usage, health insurance participation and use, disability, child care, educational issues, and college or professional school enrollment.

Current Activities (Research, Testing, Experimentation …)

In addition to the recent move to use the Internet as one of several modes to collect data in the American Community Survey and the extensive testing and planning to do the same for the 2020 Census, the Census Bureau is sponsoring active research administered by the National Science Foundation to improve measurement of economic and demographic characteristics with statistics based on administrative data, social media streams, web-based data, and geospatial

data. The research objective is to improve estimates while reducing costs and respondent burden.

The Census Bureau is continuing to experiment internally with web scraping. There may be useful Internet data available for residential housing permits and sales, crime incidence, state and local government sales, and property taxes. Corporate finance data also might be available. State and local government web application program interfaces (APIs) exist to download available state and local data.

We are continuing to explore the quality of commercial e-transaction data to track aggregate retail sales and wholesale transactions, perhaps to provide lower-level geography estimates and housing foreclosure data. To reduce escalating survey costs, we are exploring more administrative and commercial data for accurate housing addressing and commercial cell phone numbers for more cost-effective telephone surveying.

Specifically, the Census Bureau is exploring how it can use local records to more seamlessly and continually update the 2020 Census address lists and maps, rather than waiting to receive such information as part of a one-time decennial update. Local records may be helpful in targeting decennial operations to hard-to-count groups or those in certain geographic areas.

Research for the 2020 Census also is exploring the use of paradata (additional data describing what happens as data are being collected), along with administrative and longitudinal data to improve the cost and effectiveness of "responsive/adaptive design" (*https://fedcasic.dsd.census.gov/fc2013/program.php?id=22*) methods for census and sample survey data processing.

Anonymous cell phone GPS data may be integrated with other demographic data to provide more accurate and less costly estimates of the Census Bureau transportation data packages, but privacy and confidentiality concerns must be addressed.

Challenges and Issues

Arguably of utmost importance is the protection of privacy and confidentially. There is growing public concern over privacy issues in the online data space. Recently, there has been increasing attention in the press to publish concerns about Big Data intrusions on privacy. This concern has grown to be so important that, in February 2012, the White House developed a framework for data privacy titled *Consumer Data Privacy in a Networked World: A Framework for Protecting Privacy and Promoting innovation in the Global Digital Economy* (*www.whitehouse.gov/sites/default/files/privacy-final.pdf*). The basic principles of this framework include the following:

(a) Individual Control

(b) Transparency

(c) Respect for Context

(d) Security

(e) Access and Accuracy

(f) Focused Collection

(g) Accountability

Knowing that the accuracy and validity of our data directly depend on our protection of privacy and confidentiality, the Census Bureau continues to work to improve procedures that take into account new data sources to prevent identification and actively address public concerns about privacy. The use of modeling strengthens the confidentiality of small-area estimates.

The Census Bureau needs to continue to educate the public about the processes in place to ensure confidentiality and privacy, as well as the laws that enforce them.

Other Issues

How will the scientific establishment react to official statistics, especially small-area estimates, that rely on Big Data? What will be the public perception of these estimates? Will the costs associated with Big Data prove to be unacceptable relative to the benefits? Can we understand and describe what Big Data represent; can we understand and quantify the quality of Big Data?

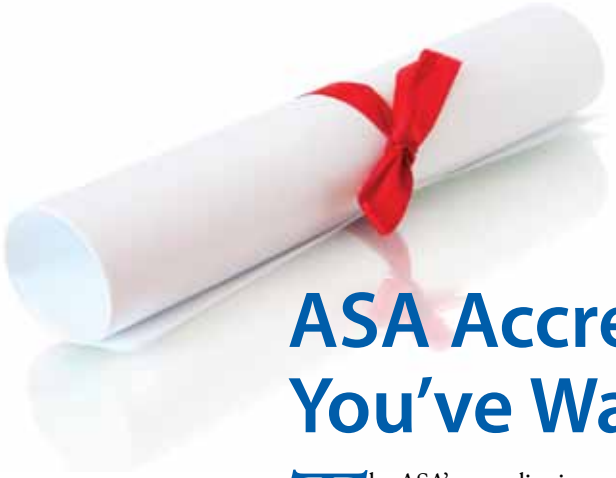
Throughout this process, the Census Bureau must maintain its tradition of keeping its complete estimation processes transparent and reproducible.

Looking to the Future

The Census has a long history of innovation. Herman Hollerith invented the punch card for the 1890 Census (*http://1.usa.gov/U54zpn*); the first civilian computer was used for the 1950 Census. The first official sample survey (*http://1.usa.gov/13KrwXE*) was used by the Census Bureau to measure unemployment in 1937. Some of the basic technology for GIS was developed in the Dual Independent Map Encoding/Graphic Base Files (*http://1.usa.gov/15fEh8d*) efforts for the 1970 Census and TIGER for the 1990 Census.

Each of these innovations was done to reduce escalating cost and to preserve official statistical integrity. For these same reasons, the Census Bureau will continue to explore the possibility of using the explosion of Big Data to reduce cost, reduce reporting burden, and increase the effectiveness of national statistical estimation.

These benefits will accrue only if the Census Bureau can continue to preserve individual and corporate confidentiality, working to earn and preserve the public's trust. ■



ASA Accreditation: *Everything* You've Wanted to Know

The ASA's accreditation program is entering the second half of its first five-year cycle. ASA Executive Director Ron Wasserstein answers some common questions about the program.

Where do I find information about ASA accreditation (PStat®)?

The details about the accreditation program are at *www.amstat.org/accreditation*. At this web page, you will find the ASA's *Guidelines for Voluntary Professional Accreditation*, which lay out the requirements to receive accreditation by the ASA. Information about how to apply, who already has been accredited, and more can be found there as well. If you don't find the answers you need, write me at *ron@amstat.org* or call me at (703) 684-1221. Teri Utlaut, chair of the ASA's Accreditation Committee, also is available to answer your questions. Teri's contact information and a list of all the members of the Accreditation Committee is available on the accreditation website.

Do I qualify to be accredited?

ASA members with an advanced degree in statistics, biostatistics, or a related quantitative field with sufficient concentration in statistics and five years of qualified work experience are eligible to apply. To be accredited, applicants must demonstrate that they meet those two criteria, that they are competent practitioners of statistics at a level commensurate with those criteria, that they have good communication skills, and that they are committed to ongoing professional development. Also, accredited statisticians agree to abide by the ASA's Ethical Guidelines for Statistical Practice (*http://bit.ly/1qCBP2*).

Do I take a test?

No. The ASA's accreditation program, like similar programs in Australia, Canada, and the United Kingdom, are portfolio-based, rather than examination-based. By the way, the ASA is the new kid on the accreditation block. These three other countries have been offering accreditation for much longer (20 years in the UK, for example). But other countries are developing similar programs. As one example, I recently have had the privilege of working with our colleagues in Sweden, who are considering a program very similar to the ASA's.

How do I apply?

The ASA's Accreditation Committee recommends the following steps:

- Read through the *Guidelines for Voluntary Professional Accreditation*
- Take a look at the sample application form, available at *http://bit.ly/1497FjK*
- Indicate your interest by filling out the "Request an Online Application" form. You'll find a button to take you to the form on the accreditation homepage (*www.amstat.org/accreditation*).
- Within a few days (often within a few hours), you will receive an email message telling you how to access your individual online application.

What materials do I need when I apply?

Your application must include a CV or résumé, a cover letter outlining for the Accreditation Committee how you meet the requirements for accreditation, a list of degrees earned, a detailed list of relevant work experience, examples of statistical work you have done, a list of professional development activities you have recently undertaken, and contact information for two people who will serve as references.

What if I am unable to supply examples?

Some statisticians work on materials that are proprietary and therefore may not have the right or authority to share such work with the Accreditation Committee. If that's the case, contact me and we will explore options.

Who should my references be, and what will they be asked?

Your references should be people who are familiar with your statistical work. At least one of them should be a professional statistician, someone who is accredited or who has the qualifications to be accredited. When you submit your application, your references will receive a link to an online reference form. The form is brief and asks the reference to speak to your professional competence, communications skills, and commitment to professional development and ethical statistical practice.

Why so many hoops?

I am frequently asked this question, sometimes in roughly the following way: "I have a PhD in statistics and have been practicing statistics for more than 20 years. Why do I have to go to all this trouble, and for crying out loud, why do I need references?" The short answer is that it is a matter of fairness. The ASA Board requires the Accreditation Committee to carefully and consistently evaluate each applicant, whether the applicant just meets the requirements (i.e., has the minimum education and experience) or far exceeds them. So, we ask all applicants to supply the same kind of background information to document their qualifications.

How is my application reviewed?

Each application is reviewed by at least three members of the Accreditation Committee (which has 18 members). Reviewers have been trained on the accreditation guidelines and how to evaluate applications against the criteria for accreditation. Reviews are handled confidentially, and committee members recuse themselves from any applications for which they have a conflict of interest. In addition, applicants may ask for specific committee members to *not* review their application.

What if my application is unsuccessful?

The long-term goal of the Accreditation Committee is to accredit statisticians, not to exclude them. However, it is the responsibility of each applicant to demonstrate that she or he meets the criteria. If an applicant is unsuccessful in doing so, the applicant receives a letter from the committee indicating what will be needed to achieve success in a future attempt. Reapplying is easy, in the sense that an applicant does not have to start from scratch, and the cost is minimal. However, unsuccessful applicants should carefully consider and fully address the information the committee has provided in the letter before reapplying.

How much does it cost?

There is a $120 charge to apply for accreditation and an annual fee of $85 to maintain accreditation. However, this annual fee is easily recouped through savings available to accredited members, who receive a 20% discount on Continuing Education registration at JSM and a 20% discount on registration fees for the Conference on Statistical Practice. In addition, accredited members have free access to all LearnStat OnDemand materials (*http://bit.ly/1dCdIx3*).

Isn't accreditation just a money-maker for the ASA?

As your executive director, I must point out that it is highly desirable for the ASA to have money-making activities. Those type of activities help pay for the ASA's other mission-related activities (education and advocacy, for example) that don't make money, but are critical to who we are as a society and what we do to promote the practice and profession of statistics. So it would be great if accreditation was a source of positive net revenue for the ASA, but it is not. Accreditation is, however, an important service to members.

Why should I apply for accreditation?

This might be the most important question of all. The question addresses the value of accreditation to the individual and to the profession. The title of the document laying out the criteria for accreditation reveals important aspects of the ASA's program: *Guidelines for Voluntary Professional Accreditation* by the American Statistical Association. Foremost is that the program is voluntary. Accreditation is not licensure. That is, one does not have to have accreditation to practice statistics the way one must be licensed to practice law, for example.

But the important word after "voluntary" is "professional." Accreditation brings value to both members of the profession and those who benefit from the work of professional statisticians.

Viewed from the profession, accreditation testifies that there is a body of knowledge known as "statistics," that accredited practitioners must be well versed in that knowledge at an advanced level, and must have applied it competently and ethically through practice for several years to be considered a professional. And, as rapidly as the theory and practice of statistics evolves, so must professional statisticians continually stay abreast of new developments in their areas of expertise.

Of course, one does not have to be accredited to have these qualities, but accreditation is one witness to the wider world that statisticians are professionals, akin to architects, doctors, engineers, and lawyers.

Why is this important? Many issues that have an effect on our daily lives—our health and safety, work, standard of living, and the policies of our governments—are crucially influenced by statistics. Sound statistical practice informs sound decisions, leading to better policymaking and better outcomes. Incorrect or unethical use of statistics can produce misleading results, poor advice, and bad choices.

That is, the practice of statistics is a job for skilled professionals. Accredited statisticians are recognized by their peers as combining education, experience, competence, and commitment to ethics at a level that labels them as professionals. In addition, accreditation provides a measure of assurance to employers, contractors, and collaborators of statisticians and is a mark of accomplishment to society at large.

Who has been accredited so far?

On the accreditation website is an up-to-date list of accredited members. The Accreditation Committee invites all qualified statisticians to become accredited and join this growing list. ■

TECHNOMETRICS HIGHLIGHTS

Dimensional Analysis Featured in August Issue

Hugh A. Chipman, *Technometrics* Editor

Dimensional Analysis (DA) is a fundamental method in the engineering and physical sciences for analytically reducing the number of experimental variables affecting a given phenomenon prior to experimentation. Two powerful advantages associated with the method, relative to standard design of experiment approaches are (1) a priori dimension reduction and (2) scalability of results. The latter advantage permits the experimenter to effectively extrapolate results to similar experimental systems of differing scale.

Unfortunately, DA experiments are underused because few statisticians are familiar with them. In "Experimental Design for Engineering Dimensional Analysis," **Mark C. Albrecht**, **Christopher J. Nachtsheim**, **Thomas A. Albrecht**, and **R. Dennis Cook** provide an overview of DA and give basic recommendations for designing DA experiments. They also consider various risks associated with the DA approach, the foremost among them being the possibility that the analyst might omit a key explanatory variable, leading to an incorrect DA model. When this happens, the DA model will fail and experimentation will be largely wasted. To protect against this possibility, they develop a robust-DA design approach that integrates the best of standard empirical DOE with the suggested design strategy. Results are illustrated with straightforward applications of DA. This article features discussion by **Tim Davis**, **Daniel D. Frey**, **Bradley Jones**, **V. Roshan Joseph**, **Dennis K.J. Lin**, **Greg F. Piepel**, **Matthew Plumlee**, **Weijie Shen**, and **C. F. Jeff Wu** and a rejoinder by the authors.

Radiation detection systems are deployed at U.S. borders to guard against entry of illicit radioactive material. Each vehicle slowly passes by a set of fixed radiation sensors, resulting in a 'vehicle profile' consisting of a time-series of counts. In "Moving Neutron Source Detection in Radiation Portal Monitoring," **Tom Burr** and **Michael S. Hamada** evaluate the efficacy of six detection methods under different vehicle and illicit material scenarios. One of these methods, a novel estimated matched filter that estimates the shape of a neutron count vehicle profile, is shown to be especially effective at signaling illicit profiles.

The goal of multivariate receptor modeling is to estimate the profiles of major pollution sources and quantify their effects based on ambient measurements of pollutants. Despite the growing availability of multipollutant data collected from multiple monitoring sites, there has not yet been any attempt to incorporate spatial dependence

that may exist in such data. In "Multivariate Receptor Models for Spatially Correlated Multi-Pollutant Data," **Mikyoung Jun** and **Eun Sug Park** propose a spatial statistics extension of multivariate receptor models. The proposed method yields more precise estimates of source profiles. More importantly, it enables predictions of source contributions at unmonitored sites as well as when there are missing values at monitoring sites.

In many areas of science, one aims to estimate latent subpopulation mean curves based only on observations of aggregated population curves. For example, in near-infrared spectroscopy, a single spectral profile is the aggregate for a complex mixture of several constituents. Disentangling such signals is the subject of "A Hierarchical Model for Aggregated Functional Data," by **Ronaldo Dias**, **Nancy L. Garcia**, and **Alexandra M. Schmidt**." A Gaussian process approach using B-spline basis functions to model the covariance function, combined with a full Bayes hierarchical model, provides full inference and assessment of uncertainty. Two real examples illustrate the method: NIR spectroscopy and an analysis of distribution of energy among different types of consumers.

In manufacturing, a binary measurement system may need to provide 100% inspection to protect customers from receiving nonconforming product. In "Assessing a Binary Measurement System with Varying Misclassification Rates When a Gold Standard Is Available," **Oana Danila**, **Stefan H. Steiner**, and **R. Jock MacKay** consider assessment plans and their analysis when an available gold standard system is too expensive for everyday use. New random effects models allow for variation in the misclassification rates within the populations of conforming and nonconforming parts. For high-capability processes with low misclassification rates, the standard plan of randomly sampling parts requires a large number of measurements. An alternate design, where random sampling is from the sets of previously passed and failed parts, can precisely estimate the parameters of interest with many fewer measurements.

The problem of choosing a design that is representative of a finite candidate set is an important problem in computer experiments. The minimax criterion measures the degree of representativeness via the maximum distance of a candidate point to the design. A significant stumbling block in the use of such designs is the availability of good construction algorithms. **Matthias H.Y. Tan**, in "Minimax Designs for Finite Design Regions," makes a useful connection between minimax designs and the classical set covering location problem in operations research, which is a binary linear program. These results are employed to design an efficient procedure for finding minimax designs for small candidate sets. A heuristic procedure is proposed to generate near-minimax designs for large candidate sets.

The issue concludes with "A Bayesian Approach for Model Selection in Fractionated Split Plot Experiments with Applications in Robust Parameter Design." In the paper, **Matthias H.Y. Tan** and **C.F. Jeff Wu** extend Bayesian variable selection techniques to split plot experiments. The approach accounts for split plot error structure, resulting in an appropriate analysis. A novel algorithm efficiently explores model space, identifying models with high posterior probabilities and providing estimates of these probabilities. Robust parameter design represents a natural application for split-plot experiments, with hard-to-change (e.g., control) factors corresponding to whole plots. Two real robust parameter design examples demonstrate the advantages of the method. ■

Rice University to Host StatFest 2013

Rice University is hosting StatFest 2013, a one-day conference aimed at encouraging undergraduate students from historically under-represented groups to consider careers and graduate studies in the statistical sciences. The conference will take place October 12.

The conference is an ongoing initiative of the ASA through its Committee on Minorities in Statistics. It includes presentations from established professionals, academic leaders, and current graduate students that will help attendees understand the opportunities and routes for success in the field. Panel forums include information and tips for a rewarding graduate student experience, achieving success as an academic statistician, and opportunities in the private and government arenas.

Attendance at the conference is free, though registration is required. To register and obtain more information, visit *http://statfest.com*.

MASTER'S NOTEBOOK

Where Does a Statistician Fit in the Big Data Era?

Andy Hoegh

In an era with a plethora of cheap, vast data in which buzzwords such as Big Data, data analytics, and data mining have been integrated into the common vernacular, it is worth asking where the statistician fits in. Several years ago, I described statistics as the "science of data." Now, with a more comprehensive understanding of the field and data science referring to something seemingly different from statistics taught in the traditional classroom, I'd like to revisit what statistics is. Specifically, I'll address the ideal skillset necessary for a modern statistician to be an integral part of this Big Data era.

ASA President Marie Davidian's article, "Doctoral Training in Statistics and Biostatistics: Where Are We Headed?" (*http://magazine.amstat.org/blog/2013/03/01/prescornermar13*) reflects on what statistics is through the lens of graduate school training. It's worth reading. Considering this article and the master's core curriculum in the statistics department at Virginia Tech provided me with the motivation to understand and describe the ideal tools for a 21st-century statistician.

Ralph O'Brien's talk on the Completely Sufficient Statistician (*http://stattrak.amstat.org/2010/10/01/csspart1*) provides a useful framework for describing the skills and talents of a statistician. O'Brien describes the ideal statistical scientist as one that develops and maintains a broad range of technical skills and personal quality in the following four domains:

1. Numeracy in mathematics and numerical computing
2. Articulacy and people skills
3. Literacy in technical writing and programming
4. Graphicacy

Using the structure of O'Brien's argument, I will describe essential skills residing in the four domains of the ideal modern statistician.

Numeracy

Traditional statistical training on methodology and computing resides in the numeracy component. O'Brien states that the ideal statistician must be sufficiently mature in using mathematics and numerical computing to define and solve real problems. Science and designed experiments/statistics often go hand-in-hand, and a thorough understanding of statistics as it relates to the scientific method is still essential.

However, a majority of the data necessary to solve novel problems doesn't come from the realm of carefully designed experiments these days. Information often is multimodal, messy, and of a form that is naturally characterized numerically—genetic information, images, or text. These challenges require development of methodology and computing tools to make inferences and predictions. Bayesian methods and the associated Markov Chain Monte Carlo (MCMC) methods are fruitful for specifying and estimating complicated hierarchical models. Additionally, exposure to non-probabilistic machine learning techniques such as classification trees provides tools that are useful in solving real problems.

Articulacy

Articulacy is not a requirement unique for statisticians, as it is a valuable skill in all occupations and social situations. However, our profession has a stereotype for a dearth of aptitude in this discipline, so extra attention is warranted here. Requisite in the articulacy component is the ability to efficiently work in a team environment and communicate with statistical peers and non-technical audiences alike. Defining and solving real problems rarely allows a statistician to retreat and work in isolation. The problem-solving process begins with input from team members, which often include scientists from other disciplines. Understanding their discipline and the scientific question is imperative before constructing a statistical model.

Next, the statistician must be able to explain clearly the methods used to address the problem to both a technical and non-technical audience—often simultaneously.

The final step is communicating the findings with an engaging presentation. The skills of the articulate statistician may not come as naturally as those in the numeracy component or be as heavily stressed in a classical education, but they can be learned. Most graduate programs have some sort of statistical consulting component, such as Virginia Tech's Laboratory

for Interdisciplinary Statistical Analysis (LISA), that provides training and access to relevant problems. Pro-bono statistical groups such as StatCom or Statistics without Borders also are great ways to gain experience and hone articulacy skills.

Literacy

O'Brien states that literacy includes technical writing and programming. In a basic sense, literacy is defined as the ability to read and write. So, within the context of the statistician, literacy refers to the ability to read and write technical documents and computer code. Hence, when faced with an unknown problem, an ideal statistician would be able to read academic literature to understand existing solutions.

After understanding existing methods, it may be necessary to use numeracy skills to develop improved techniques. Once a technique has been formulated and the model can be written down, computations need to be carried out. Literacy in programming implies the ability to implement calculations using existing software packages and develop new code when necessary.

Technical writing, sharing newly created knowledge via published papers, is the final task. Much like articulacy, literacy is not the main focus of graduate education, particularly for master's students. Nonetheless, these skills can be learned, and advanced prowess proves extremely beneficial.

As an aside about programming, having worked with computer scientists in a few interdisciplinary projects, the difference in programming skills is striking. Statisticians often start the process with a neatly ordered CSV file in which each row represents a single observation and the columns correspond to variables. While not a requirement in many statistical settings, the ability to efficiently scrape, sort, and manage data is a liberating skill that the ideal modern statistician possesses.

Graphicacy

The final component is graphicacy, which focuses on effective displays of data. Having taught courses on statistical graphics, I find it important to understand the distinction between traditional statistical graphics and data visualization. Statistical graphics are often exploratory and used to inform statistical models. Statistical graphics also can be the endgame, displaying important findings, but typically statistical machinery underlies these displays.

Data visualization, another of those en vogue buzzwords, includes infographics and displays of data that are often more artistic than typical statistical graphics. Data visualization is focused on telling a story without the principles of statistical inference. The modern statistician has expertise in statistical graphics and competence in statistical visualization.

The most valuable contribution of a statistician is the ability to contribute to solving real problems. With vast data sources available and numerous complex, interesting, and relevant problems to focus statistical machinery on, it is an exciting time to be a statistician.

This article has explored the components of an ideal modern statistician through the lens of O'Brien's "completely sufficient statistician." Using the statistical definition of sufficient, this clever play on words suggests a modern statistician contains all the necessary information (knowledge) to successfully address and answer pressing questions of our era. ■

STAT*tr@k*

A Statistician in an Insurance Agency

Andy Pulkstenis

So you've made the decision to pursue a career in statistics, but what now? Generally speaking, there are four primary employment avenues:

- Academia
- Government
- Biostatistics
- Business

Multiple articles could be written about each of those areas, but I want to speak specifically to those who are contemplating an applied statistics career in a business setting.

Why Should I Consider Business?

Security: Whether you call it business analytics, data mining, predictive modeling, or applied statistics (at State Farm, we call it "advanced analytics"), growth in this area has been explosive over the past 10 years, and the outlook appears even more outstanding.

Various companies (and even entire industries) are realizing the importance of proper analytics and the value tools like predictive modeling, experimental design, and regression-based business analysis add to a firm. When they make a successful movie starring Brad Pitt about baseball teams using statistical analysis to direct player acquisition strategies, it's safe to declare that analytics has gone mainstream. The emergence of Big Data concepts continues to force the issue, requiring old school, Excel-based MBA approaches to be replaced with more powerful statistically based methods.

As demonstrated by "Moneyball," better analysis leads to better strategic insight, which in turn leads to better decisions and a direct positive impact on the metrics that matter to an organization. The statistician's toolbox comes loaded with methodology and approaches well suited to the problems encountered in a business setting, and quite frankly the demand continues to dramatically outpace supply. It was an issue when I entered the work force nearly 20 years ago, and it's even worse today. If you are a well-trained statistician, that's what we call a "buyer's market." At State Farm, we're always on the lookout for quality graduate-level statisticians.

Variety: People often comment that you get to play in everybody else's sandbox as a statistician, and that is true in business settings as well. Throughout my career I've worked on problems involving credit cards, loans, marketing, the Internet, greeting cards, grocery stores, airlines, tire manufacturers, auto manufacturers, theme parks, chemical manufacturers, and pharmaceutical companies. In my current role at State Farm, my analytic project partners have included actuaries, our banking business, marketing, our Internet group, insurance agents, claims, IT….It's tough to get bored when you are always exposed to new parts of the business.

Variety (Part II): So the business areas are varied, but what about the methodology? Many people have the mistaken idea that applied statistics in a business setting is basically straightforward logistic regression, linear regression, confidence intervals, rinse and repeat, but that couldn't be further from the truth. Sure, those techniques are widely used and applicable to a broad number of business problems, but I've also been involved with projects using advanced time series methodology, cluster analysis, PCA, nonlinear regression, experimental design,

What gets you the job?

- Master's degree or above (statistics)
- Internships/applied experience
- Communication of technical concepts, especially the ability to map a business problem into the statistical world and map the stat solution back into business terminology
- Problemsolving
- Technical ability (know "why" vs. just knowing "how")
- Logistic regression with Big Data
- GLM/regression theory
- Breadth and depth beyond logistic and GLM
- Useful "niche" skills like DOE, time series, survival analysis, or multivariate methods

Deal breakers?

- Poor communication
- Technical *inability*
- Being wrong, but convinced you are right
- Lack of problemsolving ability
- Faking it (know what's on your résumé)

machine learning, multivariate outlier detection, decision trees, and survival analysis over the past year. One thing I love about business analytics is how often and deeply we reach into the corners of the stat toolkit.

Challenge: The complexity of the problems we face in business is primarily driven by the following:

1. The size and inherent bias of internal observational data sources
2. Regulatory or organizational constraints around any solution we'd like to implement
3. An environment in which many conditions theoretically required for clean methodology are violated in one way or another

The combination of all three often leads to challenging situations in which we are trying to find the most helpful yet "least wrong" approach to the problem versus finding the theoretically correct answer. And because business is competitive, there is not usually a ton of published research to draw from. It may require pulling analysis ideas from biostatistics to apply to a small sample problem in auto research, or applying manufacturing quality control ideas to some non-manufacturing business process. Recently, my team had to find a way to apply predictive modeling concepts in a useful way to a situation in which we didn't have a single instance of a target variable! It can be quite challenging, but incredibly rewarding, when successfully solving some previously "unsolvable" problem that doesn't quite fit into anything we learned in our books.

Academia, government, and biostatistics tend to get more promotion at the university level, but don't neglect this growing and rewarding field of "advanced analytics" in a business setting. The security, variety, and challenge are off the charts, and the breadth of techniques you'll encounter present a great environment for continuing to develop technically throughout your career while you grow as a professional. ■

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Promoting the Science of Regulatory Statistics in Support of Regulatory Decisionmaking

Reflecting on an exciting career and accepting the challenge

Robert T. O'Neill

I began my career at the Food and Drug Administration (FDA) in July of 1971 as a new PhD with a theoretical background in mathematical statistics and biometry. However, my undergraduate training was in mathematics and the liberal arts, which has been critical to the development of my skill mix and I still believe is relevant to the modern statistician operating in a multidisciplinary world. Six years of Latin, languages, philosophy, history, the sciences, and the Jesuits will do that to you.

I came to FDA largely because of Chuck Anello, who recruited me. Chuck had recently assumed leadership of the statistics program and was building capacity of PhD-level statisticians to support the FDA after new regulations laid the framework for substantial evidence of efficacy for new drugs to enter the marketplace. This was new to everyone. There was no guidance, no process, and little history to build on, yet there was a lot of passion for doing something that would contribute to public health by using statistics.

Many thought there were no interesting statistical problems at FDA. I thought otherwise, and despite the fluctuating challenges, frustrations, and constraints placed on a government program throughout a 40-year period, it was one of the best places for a biostatistician to work and one that afforded any statistician willing to invest the effort with opportunities.

For me, it has been an exciting and challenging ride, as it has been for numerous statistical colleagues who have contributed to the accomplishments and statistical program that now exists to support the FDA's Center for Drug Evaluation and Research. It also has been satisfying to see how my statistical colleagues developed and led the growth of regulatory statistical programs in other FDA centers responsible for the public health areas of biologics, medical devices, foods, and veterinary medicine. Review science is different from most other fields, few know about it until they experience it, and it is different from the other major areas of government-sponsored statistical programs that have survey sampling at their core.

The growth of the biostatistical program in the pharmaceutical area was fueled by a combination of public health crises that occurred over the years, the recognition that the science of statistics and applied statistics could help solve and/or address some of these regulatory issues, and the FDA's willingness to provide human resources to support and build a program of professional statisticians that were strong in methodology, consulting, and negotiating and affecting drug regulatory decisions. The FDA regulatory environment is unique for statisticians in that the job entails quantitative and personal skills in planning, evaluation, data analysis, professional speaking, and interaction with the industry and academic statisticians and other scientists.

My recollection of the growth of the statistical program begins with the 10 or so PhD-level statisticians recruited by Anello in the early 1970s and continues with its expansion to about 160 statisticians today. This growth came about in response to a variety of regulatory needs in clinical trial design and evaluation, preclinical safety testing, and pharmaceutical manufacturing quality control and testing; observational study design analysis supporting epidemiological programs; and quantitative safety, post-approval life-cycle evaluation of drug safety, adverse event monitoring and surveillance, and active surveillance under the congressionally mandated Sentinel System.

The 1970s were mainly spent evaluating clinical trials and safety studies that were not usually well designed or analyzed. These evaluations led to developing written guidance for conducting

protocol and regulatory reviews of a new drug application, providing advice to industry, documenting what was done, and assuring the quality of the reviews conducted by an increasing number of statisticians. Currently, there are 17 medical divisions encompassing every drug disease area.

The 1980s saw the development of guidance for industry, initial discussions about the use of data-monitoring committees in industry-sponsored studies, the advent of the AIDS crisis that led to new paradigms such as accelerated approval based on surrogate markers, and much more participation by patient advocates in drug development. As new responsibilities were placed upon FDA, new resources were provided to most FDA disciplines, including statisticians. This required the scaling up of the statistical program to several divisions that required statistician managers and leaders in all areas—a challenging job for any statistician, but one that provided FDA senior statisticians with the opportunity to lead and contribute in many ways, both internal and external to FDA.

The 1990s began another increase in resources from the Prescription Drug User Fee acts, which were able to support the infusion of new statisticians to the statistical program approximately every five years. The new millennium saw a new emphasis on safety assessment and the need for quantitative safety assessment skills, all in response to congressionally mandated responsibilities placed on FDA and studies from the Institute of Medicine and National Academy of Sciences.

Finally, as the statistical program grew in number of statisticians, it required some statisticians to take on the role of management and leaders to coordinate standards that could be equitably applied over all medical areas. As this experience base increased and the collaborative research interest of these statisticians in regulatory research increased commensurate with their influence at FDA, the last 15 years or so have witnessed a remarkable increase in published regulatory statistical research by FDA statisticians who, in my opinion, have contributed to a new field of regulatory statistics.

This occurred with analogous growth and contributions from industry statisticians who developed white papers, supported the scientific positions taken by the PhRMA organization and other professional societies, and contributed to an explosion of literature and journals devoted in large part to biopharmaceutical statistics.

FDA became transparent in how it performed its work, and because of various freedom of information laws and public advisory committee initiatives, external statistical advisors to FDA have been a major source of additional advice and perspectives on the evaluation of drug safety and efficacy. The long list of academic and other government statisticians who have served on FDA advisory committees attests to these contributions, information on which is available on FDA's publically searchable website.

So, having begun in an era of poor prospectively planned study protocols, poorly designed paper case report forms, paper-based clinical trial reports and data sets and moving into an era with virtually everything electronically database oriented and connected, the modern statistician at FDA enjoys the best of all worlds, with access to data, tools, software, and intellectual power that is truly remarkable.

However, the job is no easier. The problems are more difficult, and the science and statistical design and analysis issues continually challenge, creating new opportunities for biostatisticians to lead. You might ask why I stayed for so long. Well, the answer is that there was never a dull moment, a lot of excitement from the daily statistical challenges, my decisions to accept increasing levels of responsibility, and the increasing satisfaction that what I was doing helped the entire biopharmaceutical statistical profession live up to the challenge and really contribute to the public health solutions. The path is set for at least another 40 years of exciting careers in regulatory statistics by those who are up to the challenge. ■

STATISTICIAN'S VIEW

Dear Editor,

It is disappointing to note that no one in "Members Reveal Why They Have Remained with ASA for Three Decades" (*Amstat News*, June 2013, *http://magazine.amstat.org/blog/2013/06/01/175june13*) mentioned what I think is the overriding motive for an individual to become a member of the American Statistical Association or any other professional organization. The reason must be the one Francis Bacon (1561–1626) epitomizes so well in the following quotation:

> I hold every man a debtor to his profession, from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to be a help and an ornament thereunto.

This passage appears on the inside cover of each issue of *The Mathematical Gazette*, a publication of the Mathematical Association in the United Kingdom.

This piece was pointed out to me many years ago by the late Professor George A. Barnard, University of Essex.

Yours sincerely,
Agnes M. Herzberg
Queen's University
Kingston, Canada

USCOTS 2013: Making Change Happen

Allan Rossman, USCOTS Program Chair, and Jean Scott, CAUSE Program Coordinator

The fifth biennial USCOTS took place May 16–18 at the Research Triangle Embassy Suites in Cary, North Carolina. The conference was hosted by CAUSE (Consortium for the Advancement of Undergraduate Statistics Education) and the North Carolina State University Department of Statistics. More than 400 participants—representing a wide range of institutions, departments, and countries—attended the conference.

The conference theme of "Making Change Happen" aimed to challenge participants to consider how to make productive changes to their own teaching, their department and institution's programs, and to statistics education more broadly across the country and around the world. The conference consisted of plenary sessions, breakout sessions, "posters and beyond" sessions, technology demonstrations, and pre-conference workshops.

One change in the conference program this year was to open and close the conference with a series of five-minute presentations with 10 slides displayed for 15 seconds each. The presenters were asked to talk about how they have affected change and how change has affected them. Presenters were further asked to make their presentations personal, fun, and inspiring. These presenters—Bob delMas, Chris Wild, Christine Franklin, Dalene Stangl, Danny Kaplan, Daren Starnes, Hollylynne Stohl Lee, Mary Parker, Nick Horton, Rob Gould, Robin Lock, and Shonda Kuiper—succeeded at surpassing these high goals, kicking off the conference with a rousing and thought-provoking start. Beth Chance, Dennis Pearl, George Cobb, Jessica Utts, Roger

Woodard, and Roxy Peck used the same five-minute format in the closing session to conclude the conference on a high note and inspire participants to make change happen when they returned home.

Plenary presentations energized conference participants to consider how the discipline of statistics is changing, how the enterprise of education is changing, and how technology tools available for both teaching and practicing statistics are changing. The first plenary session was presented by Nick Horton of Amherst College and Danny Kaplan of Macalester College. They challenged the audience to place more emphasis on helping students make decisions and draw conclusions from observational data and other data collected in less-than-ideal conditions.

Hollylynne Stohl Lee of North Carolina State University followed by urging participants to join her in envisioning the skills and knowledge, both statistical and pedagogical, that are desirable in a future K–12 teacher of statistics.

Xiao-Li Meng of Harvard University presented a case for achieving breadth and depth of knowledge by emphasizing not only interdisciplinary education, but also intergenerational education.

Chris Wild of the University of Auckland concluded the plenary presentations by presenting software tools that empower students at all levels to engage in data visualization explorations that can excite them about studying statistics.

Breakout sessions provided participants with the opportunity to engage with presenters on a wide range of topics, including online learning, flipped classrooms, interactive software tools, and teacher development.

"Posters and beyond" sessions enriched the program with even more opportunities for one-on-one discussions of topics of common interest. More than 50 poster presenters participated in the conference.

The conference banquet, generously hosted and sponsored by SAS, was held on Friday evening. Dennis Pearl, director of CAUSE, presented the CAUSE Lifetime Achievement Award to Christine Franklin of the University of Georgia for her tireless, extensive, and profound contributions to undergraduate education and her passionate advocacy for K–12 statistics education throughout the country. Kim Gilbert, Starnes, and Peck assisted with the presentation of this award by sharing personal and professional reflections on the lasting effects that Franklin has had on students and colleagues.

USCOTS participants also enjoyed entertainment at this year's conference. The opening session was followed with music by The Fifth Moment, a group of graduate students in the statistics department at North Carolina State University. Songs included "Advise Me Maybe," "Shrink It," and "I Think I'm a Bayesian." Larry Lesser of The University of Texas at El Paso provided entertainment at the conference banquet when he performed original compositions such as "Hit Me with Your Best Plot," "The Gambler," and "Y Hat Dance." And Michael Posner of Villanova University concluded the banquet entertainment by performing his A-μ-sing contest award-winning song, "Stats Can Be Cool You See."

A series of 10 pre- and post-conference workshops afforded many USCOTS participants a chance to experience more hands-on involvement with various topics related to teaching statistics. Workshops were conducted on topics such as implementing discovery projects, interactive probability instruction, learning statistics by playing games, teaching statistics with R, addressing difficult concepts, implementing a randomization-based curriculum, technology innovations with JMP, online teaching, and grant writing.

For links to presentation files, song lyrics, and more, visit *www.causeweb.org/uscots*. ■

Dennis Pearl (right), director of CAUSE, presents the CAUSE Lifetime Achievement Award to Christine Franklin of the University of Georgia.

Hollylynne Stohl Lee of North Carolina State University (one of the plenary speakers)

ASA 2013 Statistics Poster and Project Competition Winners

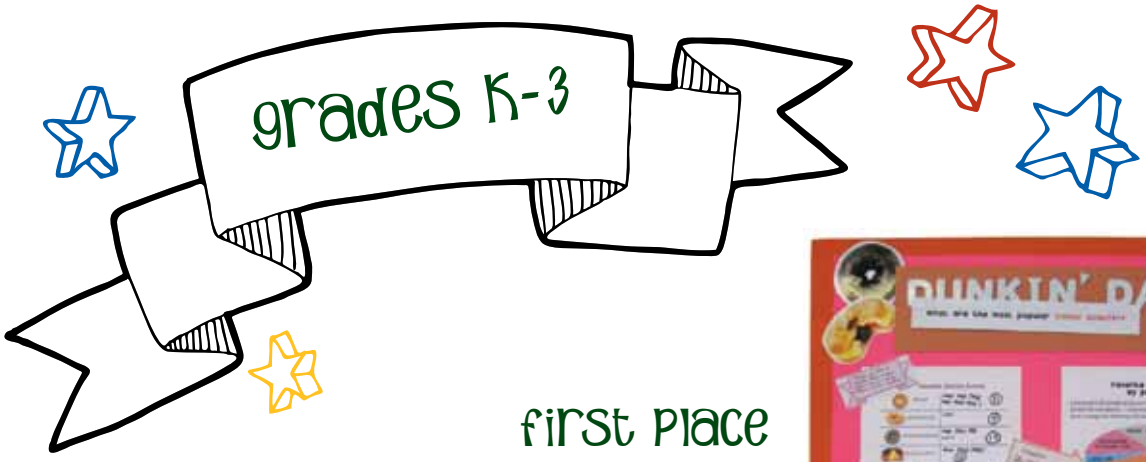
The American Statistical Association is pleased to announce the winners of the 2013 Poster Competition and Project Competition. First-place winners received $200, a plaque, a plaque for their school, and grade-appropriate graphing calculators for the students and advisors provided by Texas Instruments. Second-place winners received $100 and a plaque; third-place winners received $50 and a plaque; and honorable mentions received certificates.

The poster and project competitions are directed by the ASA/NCTM Joint Committee on Curriculum in Statistics and Probability, with Linda Quinn of Cleveland State University serving as the poster competition leader and Jamis Perrett of Monsanto Company serving as the project competition leader. K–12 posters are due every year on April 1. Projects (written reports) for grades 7–12 are due every year on June 1. Visit the competitions web page at *www.amstat.org/education/posterprojects* for information, including previous winners, entry forms, instructional webinars, and a rubric of how the posters and projects are judged.

2013 National Project Competition Winners

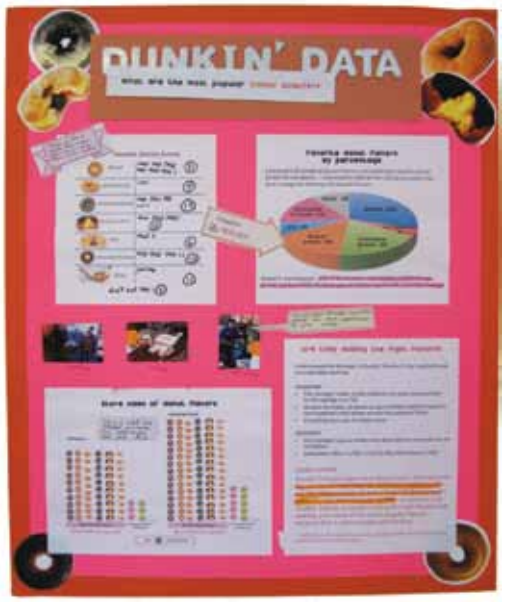
Each year, the statistical project competition attracts a wide variety of submissions in which students from grades 7–12 conduct creative studies. The submission deadline for the project competition was changed to June 1 to enable participation from high-school students who may have been preparing for the AP statistics exam administered mid-May. This deadline also made it possible for teachers who might otherwise be busy at the AP reading to assist with the competition judging. The statistical project competition was especially useful for these students because it provided them with opportunities to apply all the statistical skills they had acquired throughout the school year to solve real-world problems of interest to them. Motivation to participate in the competition included monetary awards, plaques, and new Texas Instruments calculators. Results of the project competition and a list of the judges can be found at *http://magazine.amstat.org/blog/2013/08/01/poster-and-project/*.

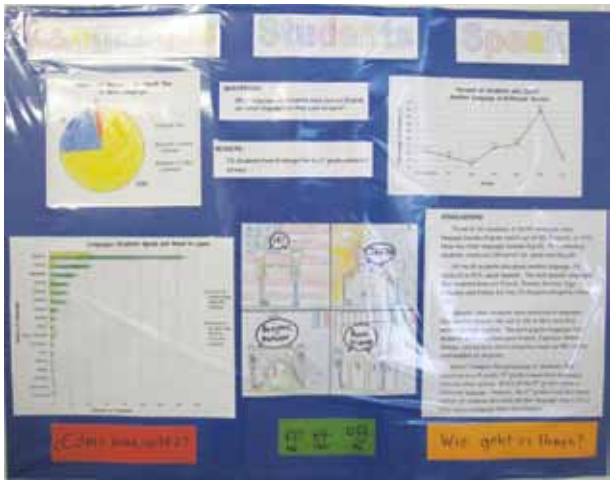
2013 National Poster Competition Winners



first place

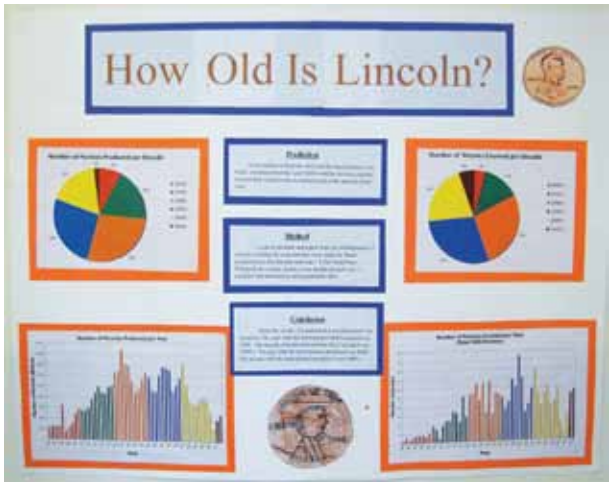
Carson McCue
Dunkin' Data
The Alexander Dawson School at Rainbow Mountain
Las Vegas, Nevada





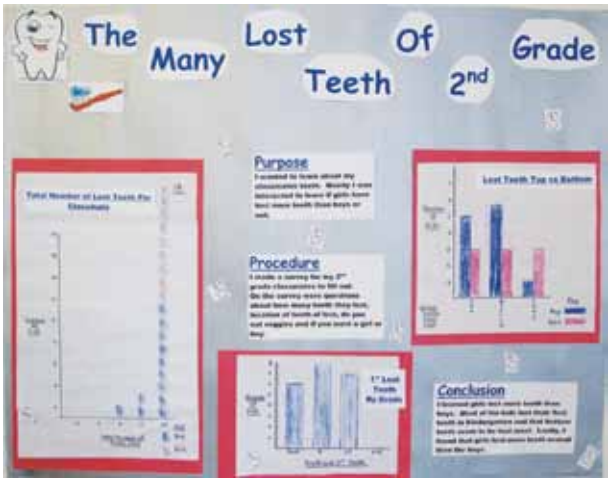
second place

Caden Fujii
Languages Students Speak
Roslyn Elementary School
Roslyn, Pennsylvania



third place

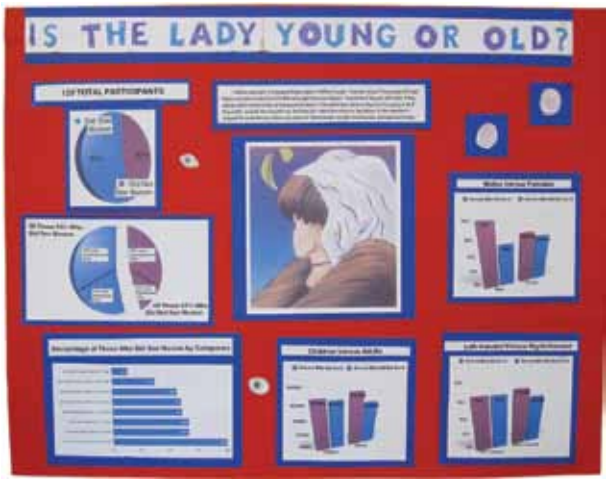
Talitha Cheng
How Old Is Lincoln?
Rydal Elementary
Huntingdon Valley, Pennsylvania



honorable mention

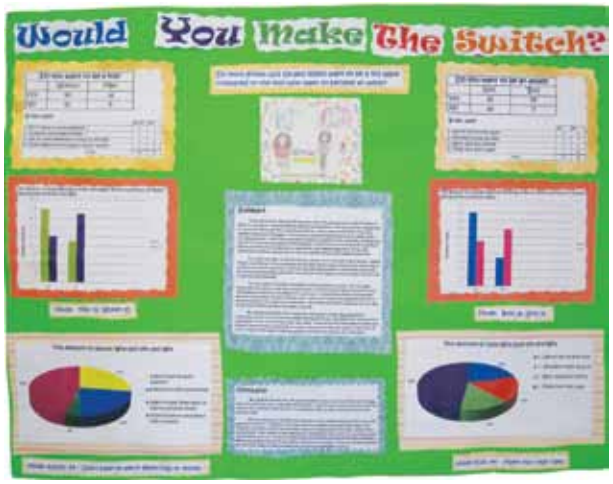
Calder Small
The Many Lost Teeth of 2nd Grade
Copper Beech Elementary School
Glenside, Pennsylvania

grades 4-6



first place

Brandon Waters
Is the Lady Young or Old?
Hyde Park Middle School
Las Vegas, Nevada



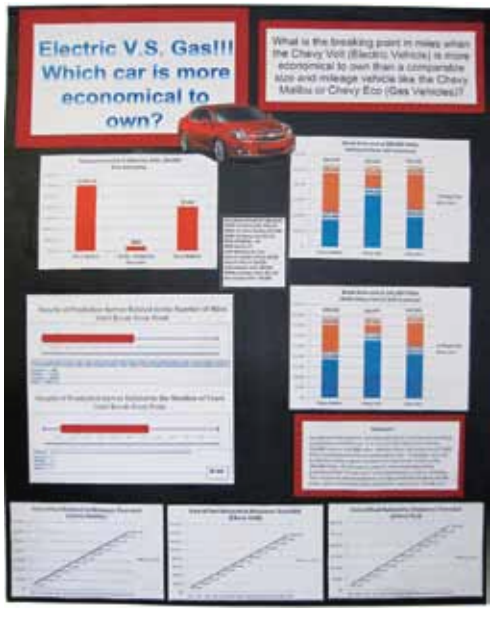
second place

Josephine Ruggieri
Would You Make the Switch?
Eileen Conners Elementary School
Las Vegas, Nevada

Statistics

third place

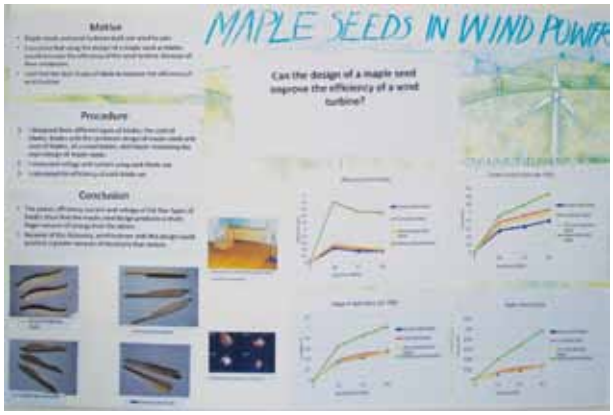
Jackson Debusschere
Olympic Success
Wallingford Elementary School
Wallingford, Pennsylvania



honorable mention

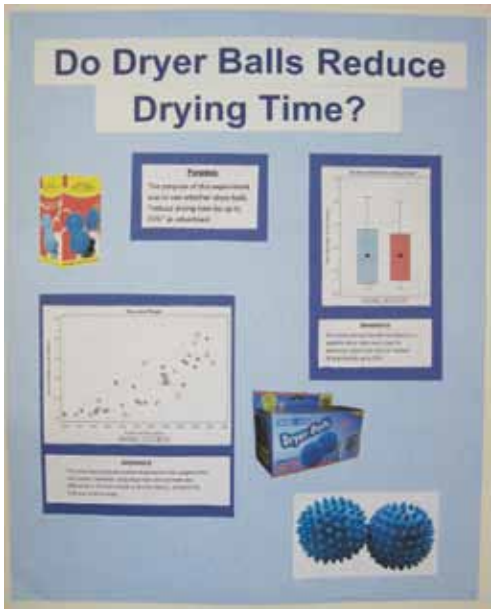
Grace Marshall, Robert Isacksen, and Daniel Lassila
Electric vs. Gas!! Which Car Is More Economical to Own?
Kazoo School
Kalamazoo, Michigan

grades 7-9



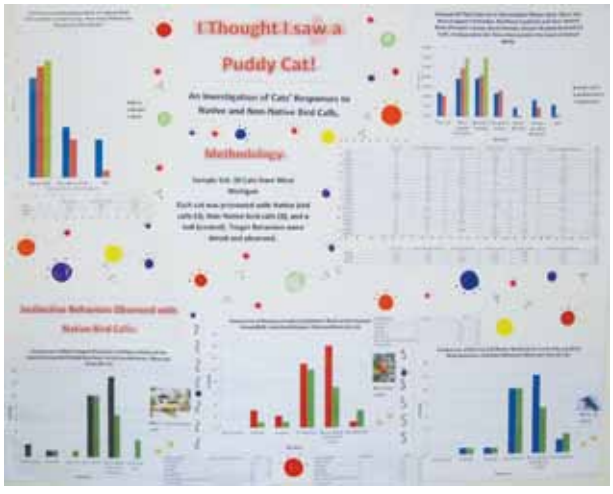
first place

Seungwon (Mei) Baek
Maple Seeds in Wind Power
Rachel Carson Middle School
Fairfax, Virginia



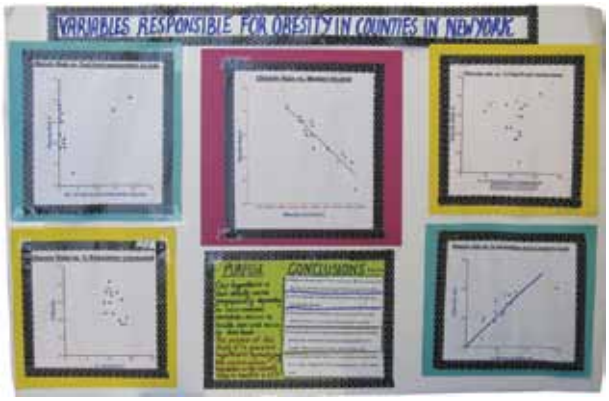
second place

David Wicklin
Do Dryer Balls Reduce Drying Time?
St. Michael the Archangel Catholic School
Cary, North Carolina



third place

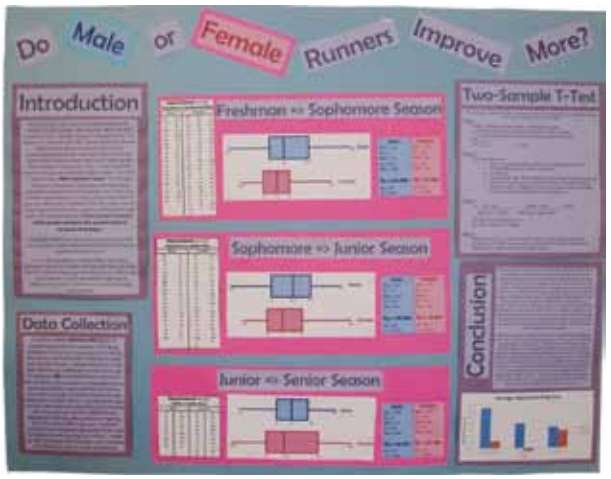
Brianne Siple
I Thought I Saw a Puddy Cat
St. John Lutheran
Grand Haven, Michigan



honorable mention

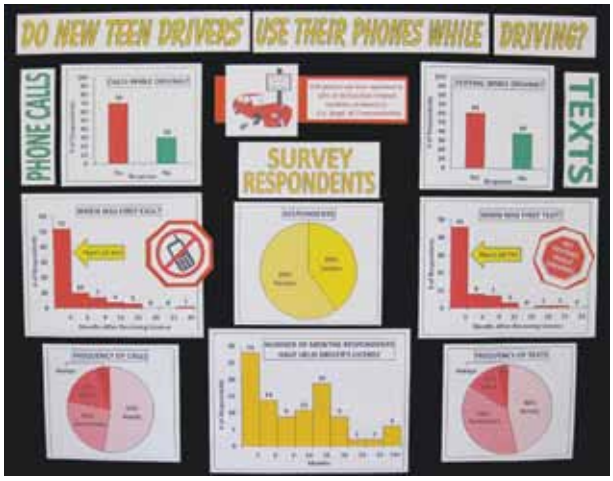
Sharon Marie Mathew and Christina Hanos
Variables Responsible for Obesity in Counties in NY
Clarkstown South High School
West Nyack, New York

grades 10-12



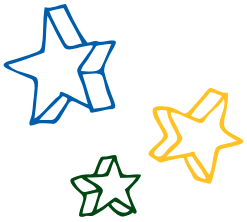
first place (tie)

Kelly Hall
Do Male or Female Runners Improve More?
Saline High School
Saline, Michigan



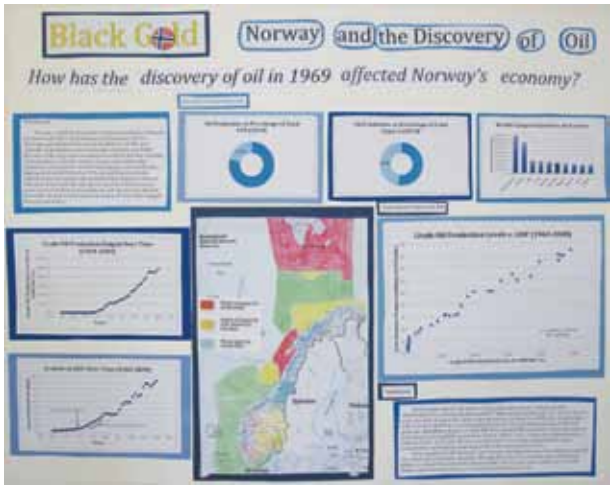
first place (tie)

Brianna Dombo
Do New Teen Drivers Use Their Phones While Driving?
Saint Joseph Academy
Cleveland, Ohio



second place

Owen Stewart
A Color-Full First Impression
Ed W. Clark High School
Las Vegas, Nevada

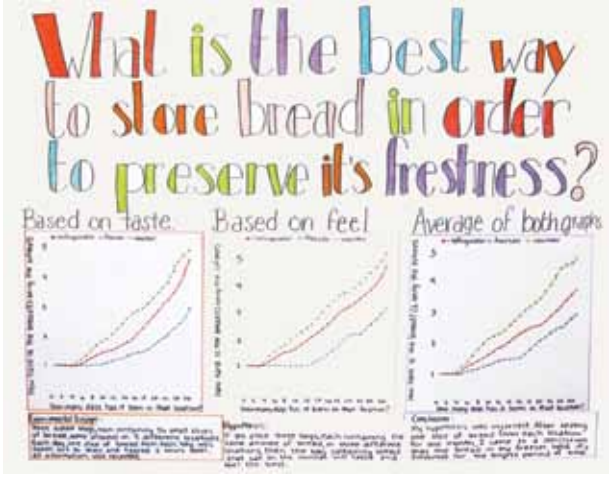


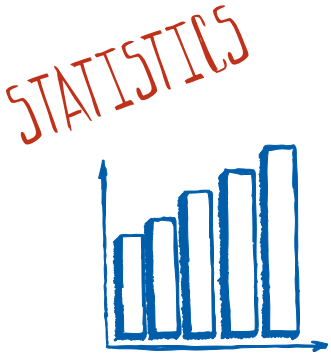
third place

Samuel Koffman
Black Gold
Phillips Academy
Andover, Massachusetts

honorable mention

Omotayo Agaja
What Is the Best Way to Store Bread in Order to Preserve Its Freshness?
Cleveland Heights High School
Cleveland Heights, Ohio





2013 Regional Poster Competition Leaders

Connecticut Chapter Statistical Poster Competition
Marianne E. Messina
Bristol-Myers Squibb, Global Biometric Sciences Oncology
www.amstat.org/chapters/Connecticut/home/Poster/poster_index.htm

Kansas/Western Missouri Statistics Poster Contest
Ananda Jayawardhana
Pittsburg State University
http://faculty.pittstate.edu/~ananda/PosterContest.html

Michigan Statistics Poster Competition
Dan Frobish
Department of Statistics, Grand Valley State University
www.gvsu.edu/stat/mspc-home-30.htm

Nevada K–12 Statistics Poster Competition
David Thiel
Clark County School District
www.amstat.org/chapters/nevada/k12postercompetition.html

Ohio Statistics Poster Competition
Jerry Moreno
John Carroll University
www.bio.ri.ccf.org/ASA/poster.html

Pennsylvania Statistics Poster Competition
Pete Skoner
Saint Francis University, Science Outreach Center
www.francis.edu/paposter.html

Washington Statistical Society Poster Competition
Barnali Das
Westat
www.amstat.org/education/posterprojects

Other Region/ASA National Poster Competition
Leader: Linda Quinn, Cleveland State University
Contact: Rebecca Nichols, ASA Director of Education, *rebecca@amstat.org*
www.amstat.org/education/posterprojects

Students outside the regional competition areas submit their posters directly to the ASA office, which are then separately judged by the Washington Statistical Society as part of the Other Region. The best posters from each region are sent to the national judging. Information about regional poster competitions and winners is available on the individual regional poster competition websites.

Get Involved

For information about how to start a regional poster competition or mentor students in your area, see the article in the July 2011 issue at *http://magazine.amstat.org/blog/2011/07/01/poster-comp-how-to*. You can download a flyer about the ASA poster and project competitions and other K–12 statistics education programs and resources to share with your local schools at the bottom of *www.amstat.org/education*. For additional information or questions regarding how to get involved in the poster or project competitions, contact Rebecca Nichols at *rebecca@amstat.org*. ■

Nominations Sought for Zelen Leadership Award

Zelen

The department of biostatistics at the Harvard School of Public Health named John J. Crowley the recipient of the 2013 Marvin Zelen Leadership Award in Statistical Science. Crowley, group statistician and director of the statistical center for the Southwest Oncology Group and president and CEO of Cancer Research and Biostatistics delivered a lecture titled "A Brief History of Survival Analysis" on May 24 at Harvard University.

Supported by Marvin Zelen's colleagues, friends, and family, the Marvin Zelen Leadership Award in Statistical Science was established to honor his role in shaping the biostatistics field. Individuals in government, industry, or academia who have influenced the theory and practice of statistical science by virtue of their outstanding leadership are eligible. While individual accomplishments are considered, the most distinguishing criterion is the nominee's contribution to the creation of an environment in which statistical science and its applications flourish. The award recipient delivers a public lecture on statistical science at the Harvard School of Public Health and is presented with a citation and honorarium.

Nominations for the 2014 award—to be given in May/June 2014—must be received by December 1 and should be sent to the Marvin Zelen Leadership Award Committee, Department of Biostatistics, Harvard School of Public Health, 655 Huntington Ave., Boston, MA 02115 or via email to *vbeaulie@hsph.harvard.edu*. Include a letter describing the contributions of the candidate, specifically highlighting the criteria for the award, and a curriculum vitae. Supporting letters and materials would be extremely helpful to the committee. ■

Causality in Statistics Education Prize Winners Announced

Last month, the American Statistical Association announced the first Causality in Statistics Education Prize, which was established to "encourage the teaching of basic causal inference methods in introductory statistics courses."

The prize this year goes to **Felix Elwert** of the department of sociology at the University of Wisconsin-Madison for his innovative two-day course, Causal Inference with Directed Acyclic Graphs. Elwert received $5,000 and a plaque at the 2013 Joint Statistical Meetings in Montréal, Québec, Canada.

Honorary mentions went to **Tyler VanderWeele** of the Harvard School of Public Health for his class notes on Methods for Mediation and Interaction and to **Richard Schienes** and (the late) **Steven Klepper** of Carnegie Mellon University for their course, Empirical Research Methods for the Social Sciences.

Judea Pearl, who donated the prize and has served as co-chair of the prize selection committee, said the prize is aiming to close a growing gap between research and education in this field. "While researchers are swept in an unprecedented excitement over new causal inference tools that are unveiled before us almost daily, the excitement is hardly seen among statistics educators, and is totally absent from statistics textbooks."

In a recent interview (*http://magazine.amstat.org/blog/2012/11/01/pearl*), Pearl said to ASA Executive Director Ron Wasserstein, "I hope this prize will stimulate the generation of effective course material. … And would convince every statistics instructor that causation is easy (It is!) and that he/she too can teach it for fun and profit. The fun comes from showing students how simple mathematical tools can answer questions that Pearson-Fisher-Neyman could not begin to address (e.g., control of confounding, model diagnosis, Simpson's paradox, mediation analysis), and the profit comes because most customers of statistics ask causal, not associational, questions."

The following prize criteria set by the selection committee were pragmatic:

- The extent to which the material submitted equips students with skills needed for effective causal reasoning
- The extent to which the submitted material assists statistics instructors gain an understanding of the basics of causal inference and prepares them to teach these basics in undergraduate and lower-division graduate classes in statistics

Prize Committee Members

Dennis Pearl (OSU, CAUSE, co-chair)
Judea Pearl (UCLA, co-chair)
Daniel Kaplan (Macalester)
Maya Petersen (Berkeley)
Michael Posner (Villanova)
Larry Wasserman (CMU)

The skills listed were, likewise, problem oriented, and included the following:

- Ability to take a given causal problem and articulate in some mathematical language (e.g., counterfactuals, equations, or graphs) both the target causal quantity to be estimated and the assumptions one is prepared to make (and defend) to facilitate a solution
- Ability to determine, in simple cases, how the target causal quantity can be estimated using the observed data
- Ability to take a simple scenario (or a model), determine whether it has statistically testable implications, then apply data to test the assumed scenario

This year, the committee received 11 nominations. The selection was difficult, considering that a fine balance had to be struck between three competing objectives: mathematical rigor, breadth of topics, and accessibility to a large audience of students and instructors.

The course material submitted by the winner, Elwert, was deemed successful in meeting all three objectives. The course is aimed at graduate students and applied quantitative researchers in the behavioral and biomedical sciences. It covers a review of causal and counterfactual concepts; principles of directed acyclic graphs; nonparametric identification by conditioning; conceptual differences between confounding, over-control, and selection bias; examples; and exercises.

Slides covering about eight lecture hours of this short course and accompanying publications are available at *www.ssc.wisc.edu/~felwert/causality*.

The committee is happy to announce that a gift from Microsoft Research will enable the prize to double next year. A $10,000 award will be split between an advanced graduate-level course and elementary material geared toward undergraduate classes. ■

Read about your colleagues and friends in the news. Go to *www.amstat.org* and click on "Statisticians in the News."

Mathematics Olympiad Winner Honored

From left: Steve Pierson, ASA director of science policy; Ron Wasserstein, ASA executive director; Nat Schenker, ASA president-elect; and Lynn Palmer, ASA director of programs, flank Kaiwen (Kevin) Li and his father, Jingyin (Eric) Li. Kevin was one of 12 winners of the USA Mathematics Olympiad Award in June. The ceremony took place at the U.S. Department of State Diplomatic Reception Room.

ASA members **Bin Yu** of the University of California at Berkeley and **Lawrence D. Brown** of the University of Pennsylvania, Wharton School, recently were elected to the American Academy of Arts and Sciences in the Mathematics, Applied Mathematics, and Statistics section. The academy is an independent policy research center that conducts multidisciplinary studies of complex and emerging needs and problems, including geoglobal politics, population and the environment, and the welfare of children. The international learned society elects to its membership men and women of exceptional achievement drawn from science, scholarship, business, public affairs, and the arts. Its 4,600 fellows and 600 foreign honorary members bring a wide range of expertise to the academy's multidisciplinary analyses, projects, and studies. ■

Tom Fullerton has been named the Trade in the Americas Endowed Chair of the department of economics and finance at The University of Texas at El Paso.

At UTEP, Fullerton coordinates the master's economics program and directs the Border Region Modeling Project (BRMP). The BRMP research unit houses the 235-equation Borderplex Econometric Forecasting Model.

Fullerton formerly held the JPMorgan Chase and Wells Fargo endowed professorships at UTEP. ■

The Washington Statistical Society (WSS) and RTI International are pleased to announce that **Frauke Kreuter**, associate professor of the University of Maryland, has been chosen as this year's recipient of the 2013 Gertrude M. Cox Award.

Since earning her PhD from the University of Konstanz in 2001, Kreuter has made many noteworthy contributions in survey methodology—specifically survey nonresponse, measurement error, and statistical modeling—all contributing to new insights in the field. She received the award at the WSS Annual Dinner Meeting June 25 and gave the keynote address, "Big Data in Survey Research: Analyzing Process Information (Paradata)."

Established in 2003 through a joint agreement between WSS and RTI, the Gertrude M. Cox Award 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, when head of the department of experimental statistics at North Carolina State College, 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 not-for-profit RTI.

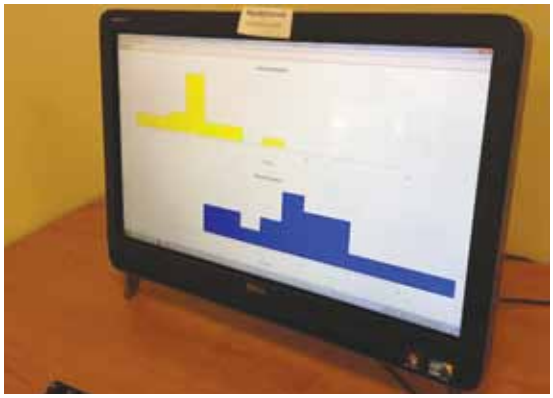
The award consists of a $1,000 honorarium, travel expenses to attend the WSS dinner, and a WSS plaque. Past recipients have been, in chronological order, Sharon Lohr, Alan Zaslavsky, Tom Belin, Vance Berger, Francesca Domenici, Thomas Lumley, Jean Opsomer, Michael Elliott, Nilanjan Chatterjee, and Amy Herring. ■

Flying High at the Howard County STEM Festival

Kids drop helicopters from the third floor of Howard Community College.

Helicopters drop to the floor below.

A boy records his flight time.



Data from the experiment

Howard County held its first Science, Technology, Engineering, and Math (STEM) Festival June 9 at Howard County Community College, half-way between Washington, DC, and Baltimore. What motivated four members of the Washington Statistical Society (WSS) to participate? **John Scott** of the U.S. Food and Drug Administration, **John Tillinghast** of the U.S. Census Bureau, **Mark Otto** of the U.S. Fish and Wildlife Service, and **Sylvia Tan** of Research Triangle Institute have helped with past WSS quantitative literacy projects. They all enjoy sharing their interests in science and math, especially when engaging young people.

Even though they were relegated to the third floor, they used their location to their advantage. Rebecca Nichols, ASA director of education, suggested a simple helicopter experiment—a hands-on demonstration that showed what statisticians do is more effective than complicated, but dizzying, displays.

The kids flew helicopters of different propeller lengths and recorded which stayed aloft the longest. The budding statisticians were much more excited to launch the whirly papers down the three flights of the atrium, and they attracted more attention down on the main floor. While Tan and Tillinghast took flight times on their cell phone stop watches and collected the copters, Scott downloaded R onto a college computer in the lobby, made histograms, and did a two-sample t-test. Kids who came early even came back to see how the experiment turned out.

Otto missed most of the fun, giving two career talks on seasonally adjusted economic numbers at the Census Bureau and how to survey ducks and bald eagles at the Fish and Wildlife Service. He pointed out that statisticians ranked 20th out of 200 in career satisfaction for 2013 (*www.careercast.com/jobs-rated/best-worst-jobs-2013*), but they needed statisticians to do the survey in the first place. ■

sectionnews

Biometrics

It is time to start thinking about invited sessions for next year's Joint Statistical Meetings, which will be held August 2–7 in Boston, Massachusetts. Anyone interested in organizing an invited session or who has ideas for one should contact the section's 2014 program chair, Jonathan Schildcrout, at *jonathan.schildcrout@vanderbilt.edu*.

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 2013 program is a good source for examples.

Remember, the most mature ideas will have an advantage in competing for the limited number of slots, so it's best to have your ideas in final form by the middle of June. The Biometrics Section will have at least four invited sessions, but will be able to compete for additional slots.

Finally, also submit ideas for short courses to the section's 2013–2014 Continuing Education chair, Donglin Zeng, at *dzeng@email.unc.edu*. ■

To view section news in its entirety, visit *http://magazine.amstat.org*.

Quality and Productivity

Are you interested in the future of industrial statistics or the interface between statistics and quality? Do you want to learn more about innovative statistical methods that can be used in product and process improvement and quality? If so, you should attend the 57th Annual Fall Technical Conference this October 17–18 at the Hyatt Regency in San Antonio, Texas.

The theme this year is "Statistics and Quality: Spurring Innovation." This conference is a great venue to build your network, learn about innovations in statistical methodologies, and further the dialog that leads to more effective use of statistics to improve quality.

There is a strong program covering diverse topics such as big data, innovation, DOE, reliability, case studies, health care quality, and statistical engineering. There will be special tributes to Stu Hunter and George Box, and we'll hear from experts in the field. We'll also have the opportunity to hear from John Sall from JMP and the current ASA president, Marie Davidian. In addition, there are short courses on text mining, mixture experiments, DOE, and reliability. See the conference website at *http://cba.ua.edu/ftc2013* for program details and registration information.

2013 Natrella Scholarship Awards

The section recently awarded two Mary G. and Joseph Natrella Scholarships during the 2013 Quality and Productivity Research Conference, which was held June 4–7 in Niskayuna, New York.

The recipients for 2013 are **Salah Haridy**, a PhD candidate in the division of systems and engineering management at Nanyang Technological University in Singapore, and **Matthew Plumlee**, a PhD candidate in the department of industrial and systems engineering at the Georgia Institute of Technology.

Haridy was recommended for the award by Zhang Wu and Philippe Castagliola (LUNAM Université / Université de Nantes). His presentation at the conference was titled "An Application of Curtailment in Control Charts." Plumlee was recommended for the award by Jianjun Shi and V. Roshan Joseph. The title of his presentation was "Building Accurate Emulators for Stochastic Simulations."

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. Each 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 the pre-conference short course.

The scholarships are funded from the ASA Natrella Scholarship Fund and the Quality and Productivity Research Conference.

Visit the section website at *http://community.amstat.org/QP/Home* for additional section news and announcements. ■

Physical and Engineering Sciences

Robert Wilkinson, FTC SPES Representative; Jeff Luner, FTC Steering Committee Representative; Bryan Smucker, SPES Education Chair; and Jim Wendelberger, SPES Program Chair-elect

Don't forget to put the Fall Technical Conference, "Statistics and Quality: Spurring Innovation," on your calendar for October 17–18 in San Antonio, Texas. This conference is the premier forum to discuss topics at the interface of statistics and quality. The goal is to engage researchers and practitioners in a dialogue that leads to more effective use of statistics to improve quality.

There is a strong program covering diverse topics such as big data, innovation, DOE, reliability, case studies, health care quality, and statistical engineering. There will be special tributes to Stu Hunter and George Box. In addition to hearing from experts in the field, we also will have the opportunity to hear from John Sall of JMP and the current ASA

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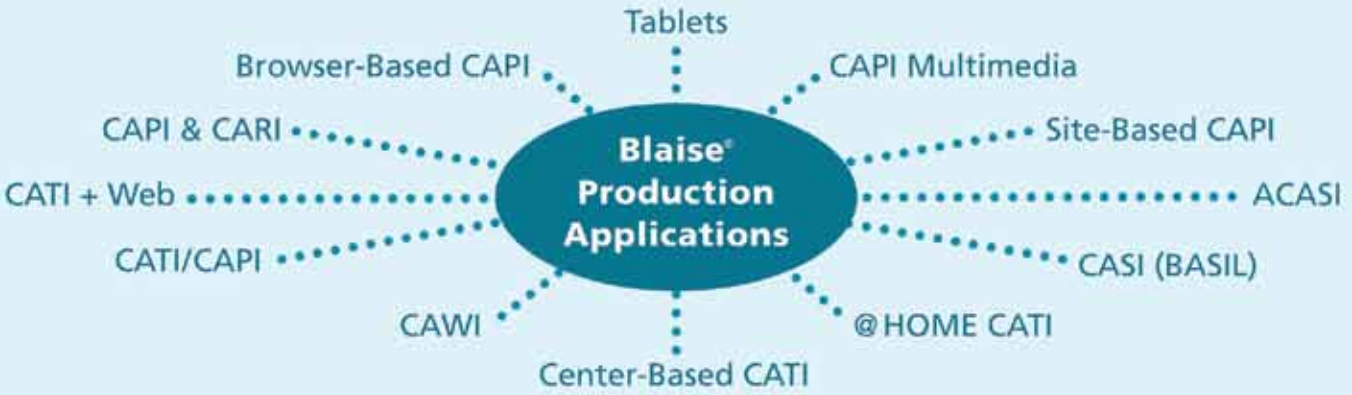

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A data collection system developed by Statistics Netherlands

president, Marie Davidian. In addition, there are short courses on text mining, mixture experiments, DOE, and reliability. See the conference website at *http://cba.ua.edu/ftc2013* for program details and registration information.

SPES-Sponsored Short Course

SPES is pleased to sponsor "Methods for Designing and Analyzing Mixture Experiments," a short course by John Cornell and Greg Piepel to be held October 16 in advance of the Fall Technical Conference. For more information and to register, see the conference website (*http://cba.ua.edu/ftc2013*) and click on "Short Courses" and "Fall Technical Conference Registration." Contact Byran Smucker at *smuckerb@miamioh.edu* with any questions.

SPES JSM 2013 Roundtable Student Awards

SPES would like to congratulate the following students for earning the SPES JSM 2013 roundtable awards:

- Weijie Shen, The Pennsylvania State University
- Dilinuer Kuerban, Simon Fraser University
- Jiangyen Wang, Soochow University
- Pratheepa Jeganathan, Texas Tech University
- Cheng Liu, Purdue University
- Barbara Wendelberger, University of Wisconsin-Madison

This award provides six statistics graduate students with participation at a SPES roundtable. ■

chapternews

Arizona

Jeffrey R. Wilson, ASA Chapter Representative

More than 1,500 high-school students from 70 countries presented science projects at the Intel International Science and Engineering Fair in Phoenix, Arizona, from May 12–17. The Arizona Chapter of the American Statistical Association sponsored the special awards for the best use of statistics and a large team of local statisticians reviewed the projects for statistical content.

During the first day, judges narrowed the field to approximately 75 projects that showed a sophisticated level of statistical analysis. From there, eight were selected for final interviews. Each finalist was interviewed by multiple teams of judges, and three winners and five honorable mentions were selected.

The first-place award of $1,500 went to Uttara Chakraborty of Chesterfield, Missouri, for "A New Stochastic Optimization Algorithm with Adaptive Penalty and Its Markov Chain Analysis." She developed a stochastic heuristic algorithm for computational optimization in hard problems that is applicable to discrete and continuous optimization.

The second-place award of $500 went to Shreya Mathur from Oxford High School in Oxford, Mississippi, for "Identification of Biomarkers for the Early Detection of Lung Cancer Using a Novel Statistical Test." She proposed a test with high power and a low type I error rate and is able to accurately detect biomarkers in a given data set.

A third-place award of $250 went to Andrew Jin of the Harker School in San Jose, California, for "Breast Cancer Prognosis Through Gene Expression Profiling and Tumor Morphology." He developed a support vector machine prognostic model that accurately predicts whether a breast cancer patient is likely to experience a recurrence after treatment.

Honorable mentions were awarded to the following:

- Heeyoon Kim, Rockdale Magnet School for Science and Technology in Conyers, Georgia, for "Applying Matrix Theory to Model Global Social Dynamics"
- Shashwat Kishore, Unionville High School in Kennett Square, Pennsylvania, for "Analysis of Novel Clustering Algorithms for Gene Expression Patterns"
- Kamran Jamil, Bishop's School in La Jolla, California, for "Autism and Gut Microblome: Is There a Link?"
- Jessica Xu, High Technology High School in Lincoln, New Jersey, for "The Threshold of CO2 Fertilization Effect on the Growth of *Triticum aestivum*"
- Jordan Cadle, Paoli Junior/Senior High School in Paoli, Indiana, for "Reprocessing Components of Milk from Foliar Application to Augment Protein Synthesis in *Triticum aestivum*"

Chapter President Guillermo Mendez presented the awards to the winners. All winners and honorable mentions also received one-year subscriptions to *Significance* and *CHANCE*. In addition, prizes were provided by JMP SAS, John Wiley and Sons, STATA, Pearson, and Cengage Learning.

In general, chapter representatives were impressed with the quality and variety of the students' research and their poise and intellectual maturity during the interview process. They would put a high probability on seeing some of the above names in the ASA statistics community soon. ■

Cleveland

The Cleveland Chapter and department of statistics at the University of Akron will host a workshop and symposium in celebration of the International Year of Statistics.

The full-day workshop, "Introduction to Statistical Computing with R and Bioconductor," will be presented by Martin Morgan of the Fred Hutchinson Cancer Research Center October 4 at the University of Akron. R offers a computing platform that is easy to use and lends itself to a variety of statistical methodologies in all fields of application. For cutting-edge biomedical applications, a collection of packages called Bioconductor was introduced more than a decade ago and is now the toolbox of choice for people working in areas such as genomics, population genetics, proteomics, next-generation sequencing, and epigenetics. This workshop is a unique opportunity to learn the basics of both R and Bioconductor from members of the Bioconductor Core Development Group at the Fred Hutchinson Cancer Research Center. The maximum number of participants for this workshop is 35 (first come, first served).

The following day, a symposium titled "Statistics at the Crossroads: Its Multifaceted Impact on Society" will be held at the same location. Statistics is ubiquitous in today's world and is leaving its effect on every aspect of human society. The one-day symposium seeks to provide a compact overview of its all-pervasive and multifaceted impact. Recently elected 2015 ASA President David Morganstein will deliver the keynote address. The five invited sessions focus on the following:

- Bioinformatics (high-dimensional and high-throughput data)
- Survival analysis and epidemiology
- Clinical trials and observational studies
- Statistics in industry and finance
- Statistics education

The list of invited speakers will be updated at *www.bio.ri.ccf.org/ASA/cfall.html*.

Call for Abstracts

There will be contributed posters and contributed oral presentations in all of the above-mentioned areas, abstracts for which can be submitted to the contact persons listed on the symposium website. A limited number of slots is available, and the abstract submission deadline is August 25.

Registration

The advance registration (required for the workshop) deadline is September 24. For complete information about the workshop and symposium, visit *www.bio.ri.ccf.org/ASA/cfall.html*. ■

New Jersey

The New Jersey Chapter held its 34th annual symposium on June 7 at the University of Medicine and Dentistry of NJ (UMDNJ). The theme was "Big Data, Data Mining, and Data Visualization in the 21st Century: Evolution of Statistical Approaches."

More than 70 statisticians, representing disciplines from academia to industry, attended the symposium, which included the following talks:

- "From High-Dimensional Data to Big Data" by Han Liu of Princeton University
- "Are Observational Studies Any Good?" by David Madigan of Columbia University
- "Models for Millions" by Bob Stine from the University of Pennsylvania
- "Shaping Cities of the Future Using Mobile Data" by Chris Volinsky of AT&T Research Labs

To view photos of the event, visit *http://magazine.amstat.org/blog/2013/08/01/newjersey*. ■

To view chapter news in its entirety, visit *http://magazine.amstat.org*.

Orange County Long Beach

The Orange County Long Beach Chapter held its first high-school AP Statistics competition June 1 at the University of California, Irvine. The turnout included 146 students presenting 57 posters to the team of judges. The entries were thought provoking, and seven teams came away with a prize of $25.

Concurrent with the competition, the chapter held a tutorial session for those teachers who accompanied their students. The session was led by chapter members representing the special interest group in statistics education. Topics included data resources for teachers (Jessica Utts); technology for AP Statistics—JMP, Minitab, TI-Nspire (Lee Kucera-Capistrano); test development committee news (Paul Rodriguez); and what the chapter does to help AP Statistics teachers (local members).

The success of the competition was made possible by coordinators Utts and Kucera, logistics expert Rosemary Busta, Chapter President Bob Newcomb; and coordinator of judging and scoring Stacey Hancock.

Donations for the event were accepted from Texas Instruments, Allergan, Minitab, JMP, and Barrons.

To view photos, visit *http://magazine.amstat.org/blog/2013/08/01/oc-longbeach*. ■

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

■ California State University, Fresno. Assistant/associate professor-decision sciences-Craig School of Business. An earned doctorate (PhD or DBA) in business administration decision sciences, statistics, management sciences or related field from AACSB or ABET accredited institution or equivalent is preferred. For more information and to apply, visit *http://apptrkr.com/363222*. To ensure full consideration, apply by 10/1/13. Open Until Filled. EOE.

District of Columbia

■ Small DC biostatistical firm (*www.statcollab.com*) involved in medical research and consulting seeks a biostatistician I to perform project coordination, data analysis, SAS programming, and report writing. Send cover letter (include Ref: BIO-ASA-1307), rèsumè, 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.

Illinois

■ Elgin Community College is accepting applications for an institutional research analyst. This full-time position will gather, manipulate, analyze, interpret, and present data and research findings for use in federal accreditation, grants, government/private funding and enrollment. Bachelor's degree from four-year college or university; or equivalent combination of education and/or experience. A minimum of two years' experience in institutional research in a higher educational setting required. *https://jobs.elgin.edu/applicants/Central?quickFind=51520 jobs.elgin.edu/applicants/Central?quickFind=51520*. EOE.

Iowa

■ The Genesis Health System in Davenport, Iowa, would like to attract a biostatistical researcher I for their accountable care organization. This position would coordinate staff and perform study design, survey design, data management and statistical analysis. We are seeking an individual that has a master's degree in biostatistics or statistics, and experience with MINITAB, S-Plus, SAS, and R. Contact Mike Staab at *staabm@genesishealth.com*. EOE.

Maryland

■ The FDA's Center for Biologics Evaluation and Research is searching for a director for the office of biostatistics and epidemiology (OBE). The director of OBE leads a dynamic organization that provides statistical, epidemiological and risk science expertise critical to the review of safety and effectiveness of vaccines, allergenics, blood, tissues, and cell and gene therapies. For details and to apply: *www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CBER/ucm356466.htm*. The Department of Health and Human Services is an equal opportunity employer with a smoke-free environment.

Missouri

■ University of Missouri Department of Statistics is seeking at least one tenure-track assistant professor in statistics fall 2014. A PhD in statistics, biostatistics or related field by August 15, 2014, is required. Apply online at *http://hrs.missouri.edu/find-a-job/academic* with a cover letter, CV and transcripts required. Email three letters of reference to *umcstatfacsearch@missouri.edu*. Deadline is December 1, 2013. The University of Missouri is an Equal Opportunity/Affirmative Action/ADA Employer.

samsi

NSF Duke NCSU UNC NISS

SAMSI Seeks New Deputy Director

Position Summary: The Statistical and Applied Mathematical Sciences Institute (SAMSI) invites applications for the position of Deputy Director for a term of up to five years beginning July 1, 2014.

SAMSI is one of eight mathematical sciences institutes funded by the National Science Foundation (NSF). The Deputy Director will be a distinguished researcher who will provide scientific direction to the Institute and oversight of the SAMSI grant, and who will work closely with the Director on all aspects of the Institute's oversight and program activities. The Deputy Director will also be strongly encouraged to pursue his/her personal research in conjunction with the SAMSI programs or independently.

SAMSI is managed by a Directorate which comprises five members: the Director, the Deputy Director and three part time Associate Directors. The Director and Deputy Director form the executive side of the Directorate and are responsible for the administration of programs, human resources and personnel issues, financial operation and infrastructure. Together with the other members of the Directorate, they also share the responsibilities of the selection, development and implementation of SAMSI programs. More information on SAMSI is available via http://www.samsi.info/.

The appointment will be made as a member of the research faculty at North Carolina State University. Rank and salary will be commensurate with the candidate's experience and qualifications.

Education Requirements: Candidate must have a minimum of a Ph.D. in mathematics or statistics or equivalent.

Qualifications and Experience: Qualified candidates should be mathematicians or statisticians with excellent management skills and research record. Proven administrative experience is an asset. They should have a strong interest in developing the programs of the Institute.

Applicant Instructions: Interested candidates may apply by going to https://jobs.ncsu.edu. Select Search Jobs in left menu; a Keywords window will appear. Enter position number 00102319 and the position description will appear. Select "Apply to this Job," create an account if you do not have one and submit the application along with an up-to-date curriculum vitae, letter of application and names of three references. We seek candidates who would intend to stay for at least two years. Applications will be accepted at any time until the job is filled but we will begin reviewing applications around November 15, 2013. Informal inquiries may be addressed to Richard Smith, Director of SAMSI, rls@samsi.info.

AA/EOE. In addition, NC State welcomes all persons without regard to sexual orientation or genetic information. The College of Sciences welcomes the opportunity to work with candidates to identify suitable employment opportunities for spouses or partners. For persons with disabilities requiring accommodations, please contact Human Resources by email at employment@ncsu.edu or by calling (919) 515-3148.

FRED HUTCHINSON CANCER RESEARCH CENTER

Associate Member, Vaccine and Infectious Disease Division (25365)

About Us: Fred Hutchinson Cancer Research Center, home of three Nobel laureates, is an independent, nonprofit research institution dedicated to the development and advancement of biomedical research to eliminate cancer and other potentially fatal diseases. Recognized internationally for its pioneering work in bone-marrow transplantation, the Center's five scientific divisions collaborate to form a unique environment for conducting basic and applied science. The Hutchinson Center, in collaboration with its clinical and research partners, the University of Washington and Seattle Children's, is the only National Cancer Institute-designated comprehensive cancer center in the Pacific Northwest. Join us and make a difference!

Responsibilities: The Vaccine and Infectious Disease Division (VIDD) at the Fred Hutchinson Cancer Research Center is seeking a faculty member at the Associate Member rank to provide leadership for a large program that functions as a statistics and data center for multisite, international clinical trials in infectious disease research. The successful candidate will possess a proven track record of obtaining federal funding, and experience in leading multi-disciplinary research programs. He or she will have established a reputation for excellence in research design, statistical methods development, and implementation of complex, population-level biostatistical analyses. Candidates must hold a doctoral degree in statistics, biostatistics, mathematics, or related fields.

VIDD scientists integrate computational, laboratory and clinical research methods to advance the understanding of microbial pathogenesis and infectious disease processes. VIDD has collaborative programs with laboratory, clinical and field sites in Africa, Asia, South America, and Europe. The person selected will have the opportunity to expand collaborations within this global network and with scientists at local institutions such as the University of Washington.

Salary DOE+ excellent benefits

How to Apply: Interested candidates should submit a CV, a concise research plan (1-2 pages), and the names and email addresses of three (3) references to: Dr. Steve Self, viddfao@fhcrc.org.

Applications should be received by September 30, 2013 to assure consideration. Later applications may be considered if the position has not been filled.

The Fred Hutchinson Cancer Research Center and The Seattle Cancer Care Alliance are equal opportunity employers, committed to workforce diversity.

New York

■ Assistant Professor of Practice in Statistics. Syracuse University's Whitman School of Management is seeking an assistant professor of practice in statistics. The candidate is expected to demonstrate effective teaching for statistics, financial econometrics and related courses. For a complete position description and online application instructions for the assistant professor of practice in statistics, please visit *www.sujobopps.com* (Job #070507). AA/EOE.

North Carolina

■ New Hanover Regional Medical Center in Wilmington, NC, is seeking a PhD statistician to promote data-driven decisions for internal clinical quality improvement activities through the validation of clinical data and analysis of results. MBA statistics, or related field. PhD statistics, healthcare administration or business administration. 3+ years experience data management. Strong knowledge SPSS, Prefer SAS. Apply online today at *www.nhrmc.org*. EOE.

Utah

■ Clinical Biostatistician. Provide statistical support for phase 1–4 clinical trials. Support statistical strategies for all trials, develop programming code, and perform validation; provide sample size estimates, randomization schemes, and interim analyses; provide and interpret reports, tables, and data for submissions; write SAPs and sections of protocols and reports. PhD +1 year experience in pharmaceutical industry or master's +3 years' experience. Location: SLC, UT. Apply: *klangan@crilifetree.com*. EOE. ■

www.westat.com

Survey Sampling Statistician

EOE

Westat is an employee-owned corporation headquartered in the suburbs of Washington, DC (Rockville, Maryland). We provide statistical consulting and survey research to the agencies of the U.S. Government and to a broad range of business and institutional clients. With a strong technical and managerial staff and a long record of quality research, Westat has become one of the leading survey research and statistical consulting organizations in the United States.

Our company was founded in 1961 by three statisticians. The current staff of more than 2,000 includes over 60 statisticians, as well as research, technical, and administrative staff. In addition, our professional staff is supported by data collection and processing personnel situated locally and in field sites around the country. The work atmosphere is open, progressive, and highly conducive to professional growth.

Our statistical efforts continue to expand in areas such as the environment, energy, health, education, and human resources. Westat statisticians are actively involved in teaching graduate-level courses in statistical methods and survey methodology in collaborative arrangements with area colleges and universities.

We are currently recruiting for the following statistical position:

Survey Sampling Statistician

Responsibilities include: developing sample designs (determining stratification and allocation to strata; determine sample size based on differences and power; determine optimal clustering; and select sample); selecting and/or constructing appropriate sample frame; developing and documenting weighting plan which includes non-response adjustment and bench-marking; developing and conducting imputation for item nonresponse and estimating sampling errors using appropriate software; writing specifications for programmers; and preparing reports on sample design, weighting procedures and other methodological issues. Candidates would benefit from knowing SAS and other statistical software packages; although candidates are not required to do programming. A master's or doctoral degree in statistics is required with 3 or more years of relevant experience. Coursework in sample survey design is highly desirable.

Westat offers excellent growth opportunities and an outstanding benefits package including life and health insurance, an Employee Stock Ownership Plan (ESOP), a 401(k) plan, flexible spending accounts, professional development, and tuition assistance. To apply, go to **www.westat.com/careers**.

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NORC at the UNIVERSITY of CHICAGO

NORC at the University of Chicago is an independent research organization headquartered in downtown Chicago with additional offices on the University of Chicago's campus, in the D.C. Metro area, Atlanta, and Boston. With clients throughout the world, NORC collaborates with government agencies, foundations, educational institutions, nonprofit organizations, and businesses to provide data and analysis that support informed decision making in key areas including health, education, economics, crime, justice, energy, security, and the environment. Learn more about NORC's leadership and experience in data collection, analysis, and dissemination at:

www.norc.org.

NORC is actively seeking statisticians, survey methodologists, statistical programmers, data managers, survey directors, and social scientists with advanced training or experience in survey research or survey operations. New staff will be based in our Chicago, IL or Bethesda, MD offices. To apply for employment, please visit our website at:

http://norccareers.silkroad.com

NORC is an affirmative action, equal opportunity employer that values and actively seeks diversity in the workforce.

VCU Medical Center

Virginia Commonwealth University

Assistant Professor Position

Department of Biostatistics • Position #F35500

Description: The Department of Biostatistics at the Virginia Commonwealth University (VCU), School of Medicine is seeking to fill a non-tenure track faculty position at the assistant professor level. We are seeking applicants with graduate training and research interest in biostatistics or other closely related methodologies. Primary responsibilities will be to consult and collaborate with multi-disciplinary teams of researchers, and grant submission, data analysis, and manuscript preparation. Additional responsibilities include teaching theoretical or applied courses in the Department of Biostatistics, advising and mentoring graduate students, and providing departmental or university service. The successful candidate will be expected to supplement these activities with extramural grant support, which can be obtained through independent initiative or through collaborations with researchers in the department and the university.

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 model selection and estimation accounting for model uncertainty (iii) familiarity with the statistical programming environments commonly used in statistical analysis of patient rehabilitation programs (iv) experience and/or interest in teaching theoretical and applied biostatistics courses at all levels; (v) excellent oral and written skills; and (vi) 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 master's degree in Clinical Research and 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 Campus community, which includes the Schools of Medicine, Dentistry, Pharmacy, Nursing and Allied Health. VCU is an urban, research intensive institution with a diverse university community and a commitment to multicultural opportunities.

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.

Virginia Commonwealth University is an equal opportunity, affirmative action university providing access to education and employment without regard to age, race, color, national origin, gender, religion, sexual orientation, veteran's status, political affiliation or disability.

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