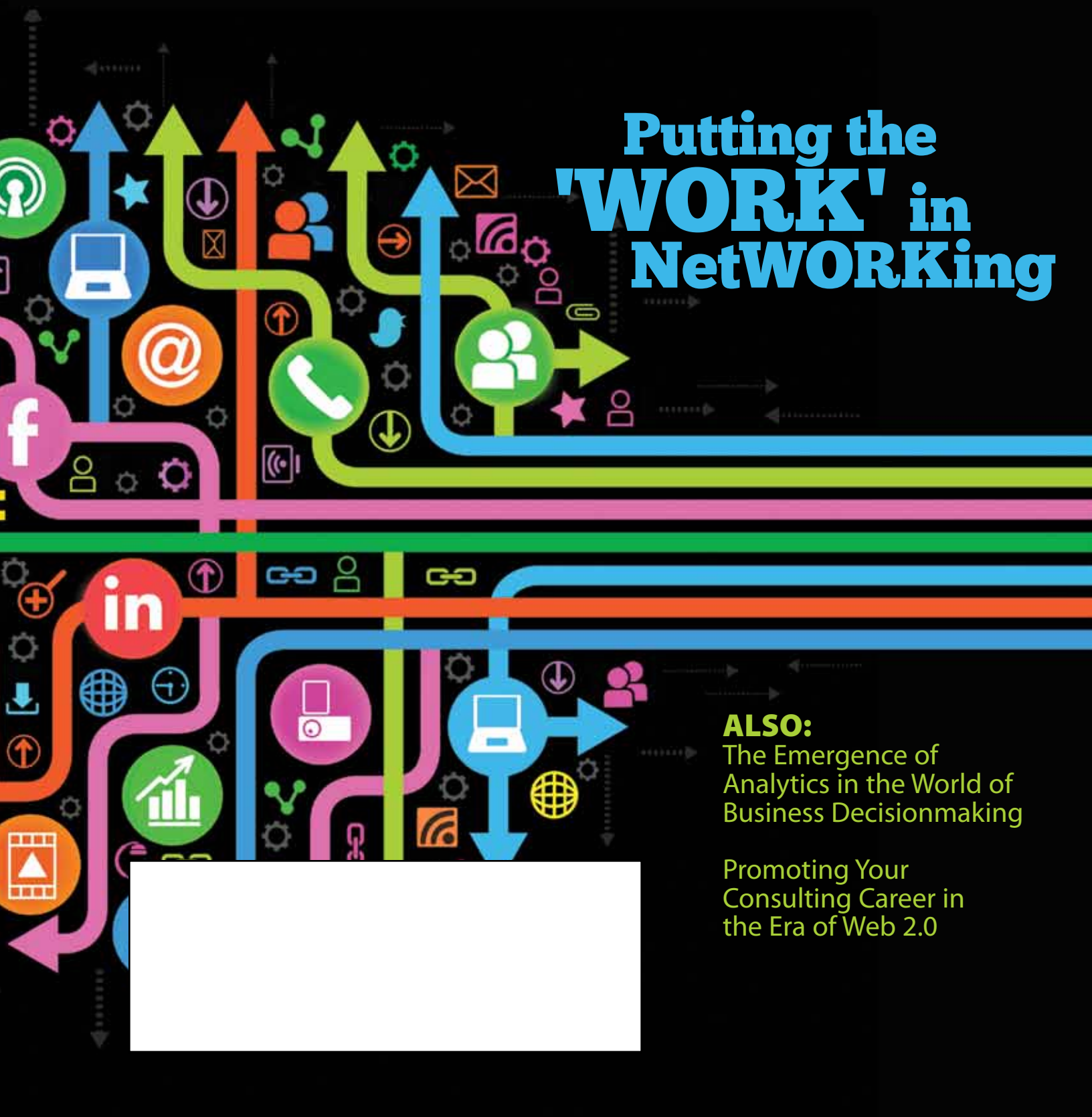
September 2012 • Issue #423

AMSTATNEWS

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



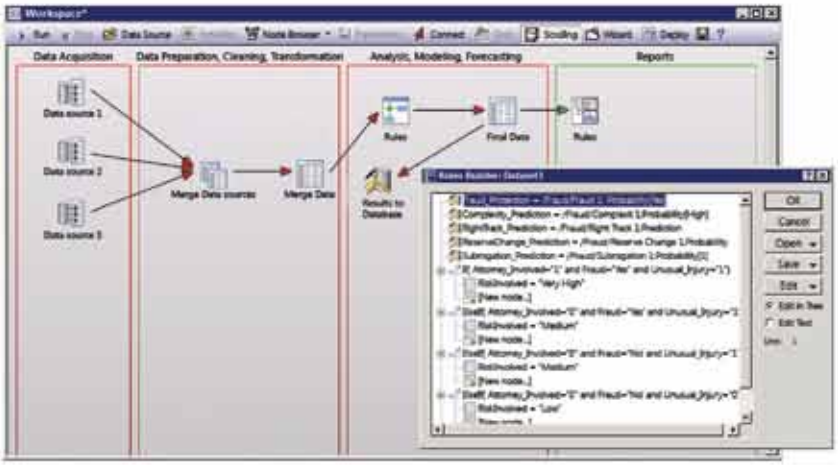
Putting the 'WORK' in NetWORKing

ALSO:

The Emergence of Analytics in the World of Business Decisionmaking

Promoting Your Consulting Career in the Era of Web 2.0

STATISTICA Decisioning Platform™



Just because data analysis can reveal interesting trends doesn't make those trends useful to *your* enterprise.

Good data and sophisticated analysis only get you so far. For your best decisions, you must be empowered to interpret and act upon your data trends in a manner relevant to *your* business goals, customized for *your* organization, in *your* industry, in *your* town, with *your* government policies and *your* business rules.

When decisions matter, *STATISTICA* Rules.

STATISTICA Rules Builder features:

- Conditional expressions and scoring (if/elseif/else)
- Execution of models (e.g. PMML) managed and versioned in *STATISTICA Enterprise Server*
- General spreadsheet transforms
- Creation of temporary variables for model development (data preparation)
- Other segmentation and business rules saved in *STATISTICA Enterprise Server*
- Version control of all rules, models, and Decisioning flows through *Enterprise*

STATISTICA Decisioning Platform, StatSoft's newest easy-to-use analytic solution, incorporates the innovative *Rules Builder,* enabling you to apply both business rules and analytic models to your organization's decisions. Forecast, plan, and anticipate risk like never before. Score customers, suppliers, and strategic options with unmatched business relevance. All with defined user roles across the enterprise.

StatSoft®

Scan for more information about *STATISTICA Decisioning Platform* and the powerful *Rules Builder*

2300 East 14th Street • Tulsa, OK 74104 • USA • (918) 749-1119 • info@statsoft.com • www.statsoft.com

Australia: StatSoft Pacific Pty Ltd.
Brazil: StatSoft South America Ltda.
Bulgaria: StatSoft Bulgaria Ltd.
Chile: StatSoft South America Ltda.
China: StatSoft China
Czech Rep.: StatSoft Czech Rep. s.r.o.
Egypt: StatSoft Middle East
France: StatSoft France
Germany: StatSoft GmbH
Hungary: StatSoft Hungary Ltd.
India: StatSoft India Pvt. Ltd.
Israel: StatSoft Israel Ltd.
Italy: StatSoft Italia srl
Japan: StatSoft Japan Inc.
Netherlands: StatSoft Benelux
Norway: StatSoft Norway AS
Poland: StatSoft Polska Sp. z o.o.
Portugal: StatSoft Iberica Lda
Russia: StatSoft Russia
S. Africa: StatSoft S. Africa (Pty) Ltd.
Spain: StatSoft Iberica Lda
Sweden: StatSoft Scandinavia AB
Taiwan: StatSoft Taiwan
United Kingdom: StatSoft Ltd.
USA: StatSoft, Inc.

© Copyright StatSoft, Inc. 1984-2010. StatSoft, STATISTICA and Decisioning Platform are trademarks of StatSoft, Inc.

AMSTATNEWS

SEPTEMBER 2012 • ISSUE #423

Executive Director
Ron Wasserstein: *ron@amstat.org*

Associate Executive Director and Director of Operations
Stephen Porzio: *steve@amstat.org*

Director of Science Policy
Steve Pierson: *pierson@amstat.org*

Director of Education
Rebecca Nichols *rebecca@amstat.orgw*

Managing Editor
Megan Murphy: *megan@amstat.org*

Production Coordinators/Graphic Designers
Melissa Muko: *melissa@amstat.org*
Kathryn Wright: *kathryn@amstat.org*

Publications Coordinator
Val Nirala: *val@amstat.org*

Advertising Manager
Claudine Donovan: *claudine@amstat.org*

Contributing Staff Members
Melissa Muko • Rebecca Nichols

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.

American Statistical Association
732 North Washington Street
Alexandria, VA 22314–1943 USA
(703) 684-1221 • FAX: (703) 684-2037

ASA GENERAL: *asainfo@amstat.org*

ADDRESS CHANGES: *addresschange@amstat.org*

AMSTAT EDITORIAL: *amstat@amstat.org*

ADVERTISING: *advertise@amstat.org*

WEBSITE: *http://magazine.amstat.org*

Printed in USA © 2012
American Statistical Association

ASA
AMERICAN STATISTICAL ASSOCIATION
Promoting the Practice and Profession of Statistics

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.

special issue

member services

3 President's Corner

41 Professional Opportunities

statisticians in history

Stephen Fienberg

Applying Statistics to Make a Difference *p. 6*

Judith Tanur

A Woman of Many Hats *p. 9*

Joe Ward

A Champion for Statistics Education *p. 12*

new career paths in statistics

15 The Emergence of Analytics in the World of Business Decisionmaking

17 Master's Degrees in Analytics

statistics 2.0

22 Promoting Your Consulting Career in the Era of Web 2.0

25 Benefits and Opportunities Associated with the ASA's Accredited Professional Statistician Program

26 Consulting Best Practices

28 Putting the 'Work' in Networking

a day in the life

32 On Being a Statistics Educator and Loving It

columns

34 **STAT*tr@k***
Questions for Recruiters: My First Job Interview, How Do I Prepare?

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*.

We found three recruiters from three industries and asked them to tell us how to prepare for a job interview with them.

38 **175**
Statistics in Business and Industry: The Path Forward

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.

Hahn

Contributing Editors

Gerald (Gerry) Hahn is a retired manager of statistics at the (current) GE Global Research Center, where he worked for 46 years. He is a co-author of four books and many articles, recipient of numerous awards, and Fellow of the ASA and American Society for Quality. He holds a doctorate from Rensselaer Polytechnic Institute.

Doganaksoy

Necip Doganaksoy is a principal technologist at the GE Global Research Center and an adjunct professor at the Union Graduate College School of Management in Schenectady, New York. He is a co-author of two books and a Fellow of the ASA and American Society for Quality. He holds a doctorate from Union College.

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*.

Corrections
In the July issue, the Korean International Statistical Society was incorrectly listed as the Korean Statistical Society.

In the August issue, C. R. Rao's photo was incorrectly labeled. The photo was that of J. N. K. Rao, instead.

We apologize for these errors.

Follow us on Twitter @AmstatNews

Join the ASA Community
http://community.amstat.org/Home

Like us on Facebook

Nine of the leaders at the 2012 AP Statistics reading in Kansas City, Missouri. From left: Al Reiff, Laura Schultz, Peter Valerio, Libby Lerner, Allan Rossman, Roxy Peck, Jim Freeman, Tim Bator, and Ann Cannon

More Than 1 Million and Counting: The Growth of Advanced Placement Statistics

Last month, I noted that the number of high-school students taking Advanced Placement (AP) Statistics has grown dramatically, contributing to an increase in the number of undergraduate statistics majors. This column takes you to the reading for the AP Statistics exam, introduces you to some extraordinary educators, and explains how you can contribute in the classroom.

What Is So Exciting About Grading Exams?

That was my question when I first heard that 610 high-school teachers, college faculty, and other statisticians were traveling to Kansas City, Missouri, on June 9 to read AP Statistics exams for an entire week.

The answer—as I learned by visiting the reading—is that it provides such a rewarding professional development experience for teachers that they look forward to returning every summer. During the school year, these teachers are at the forefront of improving how statistics is taught at high schools across the country.

I thank Allan Rossman (Cal Poly, San Luis Obispo), chief reader for the exam, for inviting me to observe the reading. Two experienced readers, Jackie Dietz (Meredith College) and Tom Short (John Carroll University), served as my tour guides. I also am grateful to the many readers I met who shared their enthusiasm for teaching statistics.

Prior to my visit, Allan provided some facts about the exam. It covers a one-semester introductory college course in statistics. More than 1 million students have taken AP Statistics since it was first offered during the 1996–1997 school year. This spring, 152,750 students took the exam—a 7% increase over last year's number and 20 times the number that took the first exam in 1997. The 2012 exam consisted of 40 multiple-choice questions and six free-response questions (see *http://apcentral.collegeboard.com/apc/public/repository/ap2012_frq_statistics.pdf*).

Awaiting the readers was a Herculean task: scoring 916,500 free-response questions in one week. This requires such a high degree of coordination that the reading process is a story in itself.

Robert Rodriguez

Beginning with the Acorns

When I arrived in Kansas City on June 9, Jackie took me to the convention center, where the reading was to commence the next day. We sat in on a meeting for new readers—who are appreciatively known as acorns—and learned about the process.

Everyone has a reading partner, and eight people work together at a table. Acorns are paired with experienced readers, and they read the first 25 exams together. Scoring speed does not matter. Instead, the prime directive is "to score exams as consistently as possible according to the rubric."

Randall Miller (Plant City High School in Florida) has attended 15 out of the last 16 readings of the AP Statistics exam.

Punctuality is also essential. If everyone were to show up five minutes late at each stage, the setback would amount to losing 26 readers.

Acorns were told to expect a full range of professional development activities after 5 p.m. This year, the activities included a presentation by Sharon Bertsch McGrayne, author of *The Theory That Would Not Die.*

Becoming One with the Rubric

At general orientation the next morning, Allan told us more about the rubric. This is a set of scoring guidelines, with one set for each of the free-response questions. Rubrics are prepared by leaders who arrive four days in advance.

I wondered how the rubrics could be applied consistently by so many readers. Following orientation, the readers split into training groups for two of the questions. Leaders reviewed the scoring for each part of the question. Then, readers practiced by scoring sample responses, submitting their scores with clickers, and comparing the results to build consistency.

Readers were subsequently organized into 68 tables, each with a leader. Tom noted that these readers score the version of the exam that is taken by the majority of students. A smaller team scores alternate and overseas versions.

Teaching Statistics More Effectively

Throughout my visit, I met readers who described why the reading is such a valuable experience for statistics educators and how their students benefit from learning statistics.

Ann Cannon (Cornell College) pointed out that readers come from a variety of institutions, including public schools, private schools, colleges, and universities. All readers are deeply interested in learning how to teach statistics more effectively.

This learning happens in three ways, explained Daren Starnes (The Lawrenceville School). "First, by reflecting on statistical concepts while applying the scoring guidelines. Second, by networking with other enthusiastic professionals during the week. And third, by experiencing how a well-designed assessment promotes statistical thinking and clear communication."

Al Reiff (Taft School) added that teachers bond at the reading because the grading process requires collaboration to understand what students are trying to communicate.

Nathan Kidwell, an acorn from Holly, Michigan, told me what he gained: "The confidence and knowledge that I take back to my classroom will be invaluable. I can't wait to get back to school in the fall to relate my experiences and delve deeper into statistics."

Engaging Students with Statistics

John Mahoney, who teaches in an inner-city school in Washington, DC, has found that statistics courses engage and empower many high-school students. He said, "Students can walk into class any day and quickly see why someone would be interested in the problems that are being discussed. The problems have a practical, real-life setting."

Teachers are encouraged by former students who discover that statistics is highly relevant to their work. One former pupil said to Al, "Make sure you tell everyone they need to take statistics. On the job, it's the most important math skill you need to have."

Improving Statistical Literacy of Scientists

Doug Everett (National Jewish Health) is a physiologist who has been a reader since 2009. Doug attends the readings because he wants to improve statistical literacy among researchers in science. This is a long-term effort that he compares to "changing the course of an ocean liner with a kayak."

Doug believes AP Statistics will make the difference by preparing tens of thousands of future researchers with an early understanding of statistical thinking. Many of these students are motivated to take additional statistics courses at the university level.

Doug adds, "The ultimate impact on statistical literacy in science is likely to originate from AP

Statistics—from its passionate, committed teachers and from its students who end up as researchers in science and medicine."

Launching Statistical Careers

After returning from the reading, I met a local AP Statistics teacher, Nancy Lassiter (Green Hope High School), whose former students are using statistics in a variety of careers. Among the students Nancy has taught during the past nine years, three are now applying statistics to research in traffic safety, material science, and health studies. One is working on a master's degree in biostatistics, and two are planning to major in statistics this fall. Another former student will be teaching AP Statistics next year.

Improving Statistics Teaching with JSM Workshops

The 2012 Joint Statistical Meetings (JSM) in San Diego, California, provided additional development opportunities for AP Statistics teachers. The ASA/NCTM Joint Committee on Curriculum in Statistics and Probability again sponsored a Beyond AP Statistics (BAPS) workshop, organized by Roxy Peck (Cal Poly, San Luis Obispo).

BAPS workshops offer enrichment material that is one step beyond the AP syllabus (see *www.amstat.org/education/workshops.cfm*). This year, the topics were randomization tests, logistic regression, what to do when assumptions are not met, and engaging students in statistics.

Sharon Hessney (John D. O'Bryant School of Math and Science), who attended the BAPS workshop at JSM 2011, wrote, "The sessions were particularly effective because the presenters related their topics to our curriculum."

JSM 2012 also provided statistics workshops for math and science teachers at the middle- and high-school levels. Sponsored by the ASA and chaired by Katherine Halvorsen (Smith College), this program—known as Meeting Within a Meeting—enhances the teaching of statistics within the mathematics/science curriculum through conceptual understanding and real-world data applications (see *www.amstat.org/education/mwm/index.cfm*).

Helping Your Local Statistics Teacher

The teachers I met as I prepared this column are leading the way in improving how statistics is taught in American schools. Unfortunately, in most middle schools and high schools, statistics is taught by teachers who are not well prepared in this area. Many lack familiarity with statistics as a critical reasoning skill and with real-world applications of statistics.

Here is how you can make a difference: Contact your local school and meet the statistics teacher.

Photo by Ken Weigand

Nancy Lassiter (left) reviews sample exam questions with Hannah Bultman, one of her AP Statistics students.

Volunteer to visit the classroom and talk about your work. Offer to help with a statistics lesson. For K–12 education resources, see *www.amstat.org/education/pdfs/EducationResources.pdf.*

September is the perfect month for us to connect with classrooms. This month is also the beginning of a school year that extends into 2013, the International Year of Statistics (IYOS).

Is there a better way to celebrate IYOS than helping teachers with our experience, expertise, and encouragement? Better teaching will lead to greater statistical literacy, increased public awareness of the contributions of statisticians, and a work force that is adequately equipped with statistical skills.

Lee Kucera (Capistrano Valley High School) urges all of us to help teachers by bringing the world of statistics into their classrooms. "The results," she promises, "will be phenomenal!"

To read about the experiences of an AP Statistics teacher, go to Page 32

Robert W. Rodriguez

Stephen Fienberg: Applying Statistics to Make a Difference

Jessie Biele

Professor. Researcher. Writer. Editor. Stephen Fienberg has taken different roles throughout his decades-long statistics career. His focus is on developing methodologies for statisticians to use in other fields of study.

"What I like to do in lots of areas is develop methodology for people to use with the hope that it will be used … and make a difference, whether it's a message for census-taking or counting casualties in human rights context or privacy protection and confidentiality, all of the different kinds of things that I do," Fienberg said.

Fienberg has authored more than 20 books and 400 papers and related publications. He has served as the dean of the Carnegie Mellon University (CMU) College of Humanities and Social Sciences and vice president for academic affairs at York University, as well as on the faculties of the University of Minnesota and University of Chicago. He currently teaches statistics at CMU. Earlier this year, Fienberg was awarded a grant for a project titled "Data Integration, Online Data Collection, and Privacy Protection for the 2020 Census" from the National Science Foundation-Census Bureau Research Network.

Born and raised in Toronto, Fienberg attended the University of Toronto from 1960 to 1964. He was originally enrolled in honors mathematics, physics, and chemistry.

"People came in with an interest in that range and had the same first-year courses, and began to specialize after year one," Fienberg explained. "So after the first year, I dropped chemistry; after the second year, I dropped physics … but I took my first course in statistics my third year."

That first statistics course was taught by Don Fraser, who later became Fienberg's longtime friend and mentor. Under Fraser's tutelage, many University of Toronto students went on to make a name in statistics. Fraser recently earned the Order of Canada for his contributions to the field of statistics.

"I think it would be safe to say that, on the technical issues that he focuses on in his research, we've never seen eye to eye, but it never stopped us from having terrific interactions," Fienberg said of his relationship with Fraser. "He has a geometric way of describing many of the concepts and things he was trying to get across and, as an undergraduate, I was very much taken with geometric ways of looking at different mathematical concepts. The mix of geometry with statistics was intriguing. That was on the theory side. What really turned me on in a very different kind of way was the notion that this was really a set of methodologies to be used. In my fourth year, I began to learn about how statistics had made a major impact in a number of different fields, and the prospect that I might contribute to something like that, rather than simply trying to do mathematics, was what made me want to go on to study statistics in graduate school."

Fienberg earned his undergraduate degree in mathematics and statistics in 1964 and went on to Harvard University to study in the department of statistics, a "very small department" at the time.

"It was part of the golden age of that department, and there was a terrific group of fellow graduate students," Fienberg recalled.

During his time at Harvard, Fienberg grew close to assistant professor Paul Holland, fellow graduate student Yvonne Bishop, and Fred Mosteller, founding chair of Harvard's statistics department. Not only was Mosteller Fienberg's thesis adviser, he became a mentor and friend.

"Fred was not just an adviser on my thesis, but on many, many things over the years, and we interacted in a variety of ways up until his death in 2006," Fienberg explained.

Fienberg earned both his master's degree in statistics in 1965 and his PhD in statistics in 1968 from Harvard.

While Fienberg was a graduate student, Mosteller was involved in research in the National Halothane Study. Halothane was used as an anesthetic, and there were several case studies published in medical journals about people who had operations in which halothane was used as an anesthetic and died subsequent to the operation. The cause of death was usually unrelated to anything the patients had suffered at the time of their operations. Mosteller and a group of statisticians, including Bishop, were involved in data collections and analysis from more than 25 hospitals across the country, comparing death rates from different anesthetics. That work, Fienberg said, led to what is known as modern literature on nonlinear emergent models for categorical data.

"Over the next several years, Yvonne, Paul, and I worked on different aspects of this and ultimately were the authors of a book called *Discrete Multivariate Analysis,* published by MIT Press in 1975, in which we laid out what was the basic theory of the time and some of the mathematical underpinnings," Fienberg recalled. "There were lots and lots of applications and extensions. It included a lot of work from students from the department."

It was through Mosteller that Fienberg met fellow statistician Judy Tanur during the early 1970s. "Fred was an organizer for many, many different things, but one of the activities he led around 1970 was something called the ASA-NCTM (National Council of Teachers of Mathematics), and they were set up to produce educational materials," Fienberg explained. "They set out to develop two different products. One ended up being called *Statistics by Example*; the second was called *Statistics: A Guide to the Unknown*. Fred organized a meeting in Cambridge to which I was invited and Judy was there, and she ended up being the editor for the second project. That's when we first interacted. I did do several pieces for *Statistics by Example.*"

Tanur and Fienberg didn't interact again until the ASA meeting in Boston during the summer of 1976. Fienberg, Bishop, and Holland were teaching a continuing education course based on their book *Exploratory Data Analysis*. Tanur attended the course, and she and Fienberg started to talk.

"We became quite friendly in discussions and had gone out to dinner and then got together with Fred at some point during the meetings one of the evenings," Fienberg recalled. "We then interacted in a number of different ways. Beginning in 1978, we began to go and visit as a family in Montauk, where Judy and [her husband] Mike had a small cottage. My wife and I went with our children and our dog every summer until the kids were grown. And Judy and I would write papers and develop different project

Awards and Achievements

American Statistical Association Founders Award, 2009

Statistical Society of Canada's Lise Manchester Award, 2008

American Statistical Association Wilks Award, 2002

COPSS Presidents' Award – Outstanding Statistician Under 40, 1982

Fellow of the Royal Society of Canada

Fellow of the American Association for the Advancement of Science

Fellow of the American Statistical Association

Fellow of the American Academy of Political and Social Science

Member, U.S. National Academy of Sciences

Fred Mosteller

Our role is to help people do good things with statistics that will address their scientific or policy goals and also . . . technical goals for the field.

ideas, and much of our collaboration was work that was done out at the deck looking out south toward the ocean."

Fienberg still visits Tanur at her home in Montauk. Fienberg and Tanur co-edited Mosteller's autobiography, *The Pleasures of Statistics: The Autobiography of Frederick Mosteller,* which was released in 2010.

Carnegie Mellon: A Place for Exploration

Fienberg began teaching at Carnegie Mellon University in 1980 and has remained there. "Carnegie Mellon is a very special place," Fienberg said. "Most people talk about places where people do interdisciplinary research. We just do it."

While at Carnegie Mellon, Fienberg has collaborated with a group of professors who worked with the computer science department to form the department of machine learning, as well as in the Heinz College and a variety of IT fields.

"The thing about CMU is we really did collaborate and cross boundaries with very little obstacles," Fienberg said. "In my case, I've worked with people in a dozen different units."

Fienberg currently serves as the Maurice Falk University Professor in the department of statistics. He also teaches in the machine learning department, Cylab, and i-Lab.

Fienberg's attitude about statistics education has changed since he began teaching more than 30 years ago. "I think it needs to be taught well and taught by people who understand the details of what they're teaching," he explained. "In the past, and still, it's been taught by people who either have only a rudimentary notion of statistics, or, often, too narrow perspectives. But there are lots of wonderful scientists out there who are every bit as knowledgeable about important aspects of statistics as are people trained with PhDs in statistics."

Polygraph Accuracy Study

Fienberg has been involved in committees at the National Research Council for 35 years. "They are very fertile grounds for discovering new places to bring statistics," he explained.

At one time, he served on the Divisional Advisory Board for the Division of Behavioral and Social Sciences and Education. The executive director asked Fienberg to serve as chair of a new committee she was setting up and to participate on a committee that was exploring technical aspects of a study done on polygraph accuracy.

"I had two principal qualifications," Fienberg recalled. "One was I had never read any literature on the polygraph and, two, I had never had one. So I brought no direct biases to the table when I had to evaluate what the literature had to say about polygraph accuracy."

The committee was a consequence of the Wendell Lee case, Fienberg explained. Lee was accused of being a spy for the Chinese, and Congress told the Department of Energy to attend the National Academies and have them perform a study on the accuracy of the polygraph for security purposes.

The committee concluded "government agencies could not justify their reliance on the polygraph for security screening." The DOE's proposed regulations disregarded the committee's findings and conclusions.

"We had been what I would say substantially negative about the use of polygraphs for security screening, but they intended on going ahead and doing what they had been doing," Fienberg said. "At which point, the ranking members of the Senate oversight committee set up the hearing."

Fienberg enjoys applying statistics to different fields to help others reach their goals, whether in research or public policy.

"One of the things Fred Mosteller taught me that has affected, I hope, almost everything I do is that [statisticians] are not supposed to be negative, telling people they shouldn't do something or what they did was no good," Fienberg said. "Our role is to help people do good things with statistics that will address their scientific or policy goals and also … technical goals for the field."

Fienberg currently resides in Pittsburgh with his wife. He plays hockey in his spare time, an activity he says is a "wonderful way for me to try to blow off steam and keep a little bit fit." He also enjoys spending quality time with his grandchildren. ■

Judith Tanur: A Woman of Many Hats

Jessie Biele

Judith Tanur has had an enriching career in statistics lasting five decades. She has inspired many students through her work as a teacher and mentor at Stony Brook University.

A member of the American Statistical Association since 1965, Tanur has worn many hats. She is a statistician, editor, adviser, and mentor who has made many contributions to the fields of statistics and education.

Tanur was born in New Jersey and raised in Great Neck, New York. A dedicated student, she says she is fortunate to have had a "really good high-school education."

"In my third year of high school, I took trigonometry. My average dropped from 100 to 97," she explained. "I never took 12th-grade math, which has haunted me all my life. I often think if I had been a boy, somebody would have said to me, 'That's silly, don't drop it,' but nobody said any such thing."

After graduating from Great Neck High School in 1953, Tanur began her college education at Antioch College in Yellow Springs, Ohio. She describes her two years there as "amazing."

"The classes were small, students had a large voice in curriculum, promotion, and tenure decisions for faculty," Tanur recalled. "It was absolutely fascinating."

Tanur began working at the Fels Research Institute during her freshman year at Antioch College through the school's co-op program. "It was a requirement for people who had never held down a job to work part time on campus for the experience before they sent you off to some strange city to work full time," she explained.

While she was working in the on-campus psychology lab as a statistical assistant in physiological psychology, she was actually doing statistical analysis. She wanted to learn more about statistics, but eventually decided to major in psychology when she transferred to Columbia University in 1955 after spending two years at Antioch. One of the reasons she transferred was to be closer to Michael Tanur, then a dental student at Penn, who she married in 1957.

"[Columbia] was exactly the opposite of Antioch," she said. "Very large classes, most classes were evaluated by multiple-choice exams, and you rarely knew the names of your professors, let alone the names of your fellow students."

In 1955, while still on a cooperative work period from Antioch, Tanur began working at Biometrics Research at New York State Psychiatric Institute in New York City, where she continued for 15 years as a statistical analyst. Tanur earned her bachelor's degree in psychology from Columbia University's School of General Studies in 1957, summa cum laude. She started in the master's program at Penn, but left when she became pregnant with her first

On a More Personal Note …

In 2008, Tanur edited a book of photographs by her daughter, Rachel. Commentaries on 50 of Rachel's photos were solicited from social scientists around the world, which before appearing in book form, were part of a show called Visualizing Social Science at the National Science Foundation in 2006. Rachel passed away from cancer in 2002 at the age of 43. A memorial prize has been established in her memory, which you can read more about at *www.racheltanurmemorialprize.org*.

child, Rachel. She spent some time following her husband across the country while he served in the military. During that time, she realized what she really enjoyed about psychology was statistics, analysis, and experiments. She decided to go back to graduate school to study statistics when she was able, but took math courses in the meantime to brush up on her skills. Once her husband settled down, she enrolled in the mathematical statistics program at Columbia University, where she earned her master's degree in 1963.

That year, Tanur received a call that changed the course of her career. "I got a call from people who were publishing the *International Encyclopedia of Social Sciences*," Tanur recalled. "They needed someone to be an assistant to Bill Kruskal, who was the statistics editor. They had called Columbia and asked if they had any recent master's degree graduates."

Tanur accepted the position of staff editor for statistics for the *International Encyclopedia of Social Sciences.*

"It was the most wonderful statistical education anyone could ever hope for," she said. "My job was to read all those articles and comment on them. I don't know the position I was in to comment on them, but I was in position to learn from them. So I learned from them."

Tanur remembers her time working with Kruskal as "wonderful." "He was a gentleman, and a gentle man, and very, very knowledgeable. He never made me feel unknowledgeable. He acted as if he respected my opinion and always was helpful as he could be to me."

She recalls a story she told at his memorial service:

> [Kruskal] smoked little, tiny cigars, and those days you could smoke in the workplace. He came into New York one time to visit the office and was standing in my cubicle, and he asked me if I minded if he smoked and I said, "No, I don't mind at all, my husband smokes cigars, too." And he said, "Yes, but that's why you go out of the house to work."

It was through Kruskal and her work at the *International Encyclopedia of the Social Sciences* that she landed a teaching position at Stony Brook University in 1968. She had edited an article about survey research by Hanan Selvin, who was then the chair of the sociology department at Stony Brook. Selvin hired her to teach statistics in the sociology department.

"Because I came up through a research track, it never occurred to me that people got higher degrees to teach," Tanur explained. "It managed to escape my consciousness, and so I was not anxious to start teaching, but on the other hand, I didn't want to say, 'I'm not prepared to teach,' so I tried to price myself out of the market, and I was unsuccessful. They kept meeting my demands, and so I came to Stony Brook to teach undergraduate statistics with just a master's degree."

Shortly after she arrived, Selvin suffered a heart attack and she was asked to teach his graduate statistics classes in addition to her undergraduate statistics courses. "I was thrown into that without having done any kind of teaching and the students suffered from that for a very long time," Tanur said.

When Tanur started her doctorate coursework, she received a phone call from Fred Mosteller, asking her if she would be interested in helping edit the book that became *Statistics: A Guide to the Unknown.* It was an offer she found difficult to turn down.

"I realized I was teaching full time, studying full time, and raising two kids, and the last thing I needed was another project," Tanur said. "But this was Fred Mosteller, a great man, and I was not prepared to say no. So I told him to let me think about it and that I would call him back. Luckily, one of my senior colleagues was sitting in the room, heard this conversation, and said, 'You really don't have time to do this, you shouldn't do this, but on the other hand, if they give you first authorship, then it really would be worth doing.' It seemed to be ridiculous that Fred Mosteller should be doing something with Bill Kruskal and other big names and I should be first author when I was very, very junior. But it seemed to me like it was a good way of getting out of it. So, I called Fred back and I said I could do it if I could be first author and he said, 'Sure,' and I had another job."

According to Tanur, the purpose of the book was to convince the general public that statistics was a beneficial skill for high-school students to learn and that it should be part of the curriculum. She has fond memories of collaborating with Mosteller.

"It was great fun working with Fred," Tanur said. "He was always generous with credit. He would give you a gold star if he thought you did something very well. Once, I got something returned to me that was marked 'Heroine of the Empire.' I was very lucky to have been thrown in with lots and lots of good people I got to work with."

It was from Mosteller that Tanur received the greatest piece of advice she had heard about mentoring. "The most important thing to do with any kind of mentoring, when someone submits something to you, they're not going to listen to criticism until you give praise," she reported him saying. "So however bad it is, you find something you can praise and praise it. You've got their attention, you've got their goodwill, and they will listen to whatever criticism you will offer."

That advice has surely paid off. Tanur received the Geoffrey Marshall Mentoring Award in 2006 for her work in supporting graduate students.

Statistical education has changed a good deal in the last few decades since Tanur began teaching.

"When I first started teaching statistics, our department didn't even have mechanical calculators; I had to teach students to use a slide rule if they were to make any calculations at all," Tanur recalled. "Now that there are easy-to-use programs for statistical analysis, courses have become much more conceptual, stressing the principles of gathering data, using the computer to analyze them, and understanding how to interpret findings. I find that progress wonderful."

Tanur has retired from teaching and lives in Montauk with her husband, who also is retired. She still keeps busy, though. She will be making her fifth trip to Vietnam this summer for a project under the auspices of the Social Science Research Council; she serves on the organization's Vietnam Health Project's International Advisory Committee. "I've discovered what it means to retire, at least for me. You don't teach classes anymore, but pretty much do a lot of the same things except that nobody pays you," she commented.

In her spare time, Tanur enjoys being outdoors. She lives a few blocks from the ocean and enjoys swimming, boating, and admiring the scenery and wildlife. She also enjoys entertaining visitors, especially her daughter, Marcia, and her two grandchildren. Tanur and her husband also spend time at their apartment in Manhattan, where they attend concerts and theater productions. ■

Professional Highlights

Judy Tanur has earned many awards for her contributions to the field of statistics. She was elected a Fellow of the American Statistical Association in 1980. Following is a list of her awards and fellowships:

- Arnold Constable Competitive Scholarship, 1953
- Merle M. Hoover Award, Columbia, 1957
- BS, Summa Cum Laude,1957
- Phi Beta Kappa, elected in 1957
- United States Public Health Service Predoctoral Fellowship, 1962–1963
- Fellow, American Statistical Association, elected in 1980
- Fellow, American Association for the Advancement of Science, elected in 1983
- Member, International Statistical Institute, elected in 1987
- ASA/NSF/BLS Senior Research Fellow, 1988–1989
- President's Award for Excellence in Teaching, SUNY, Stony Brook, 1990
- Chancellor's Award for Excellence in Teaching, SUNY, 1990
- Kievel Lecturer, Humboldt State College, 1992
- Distinguished Statistical Lecturer, The Pennsylvania State University at Harrisburg, 1994
- Founders Award, American Statistical Association, 1997
- Innovators Award, American Association for Public Opinion Research, 2005
- Dean's Award for Graduate Student Mentoring, SUNY, Stony Brook, 2005
- Geoffrey Marshall Mentoring Award, Northeastern Association of Graduate Schools, 2005–2006

Joe Ward: A Champion for Statistics Education

Melissa Muko, ASA Production Coordinator and Graphic Designer

One could say that education was in Joe Ward's blood. Growing up in Texas, his parents were both teachers and athletic coaches, with his father going on to serve as the director of the local YMCA and his mother becoming a principal of an elementary school in San Antonio. As a teenager, Ward was active in sports—football, basketball, and track—and discovered that his favorite subject in school was math. These interests led him to have early career aspirations and follow in the footsteps of his parents by becoming a math teacher and basketball coach.

After graduating from high school in 1943, Ward attended The University of Texas at Austin and enrolled in the Navy V-12 Electrical Engineering program. (The V-12 Navy College Training Program was designed to supplement the force of commissioned officers in the U.S. Navy during World War II.) He served in the Navy from 1944–1946 and re-entered the university as a mathematics major upon discharge. He earned his BA in 1946, MA in education psychology in 1949, and PhD in educational psychology and mathematics in 1953—all from UT Austin.

In 1949, Ward married his college sweetheart, Bettie Branson, and moved back to San Antonio, where he taught math at the Texas Military Institute. He moved on in 1951 to work as a research scientist for the U.S. Air Force for the next 30 years.

As a research scientist, Ward developed a number of innovative strategies using computer models in the Air Force Human Resources Laboratory, including a hierarchical clustering procedure that was used extensively in the U.S. Air Force's Comprehensive Occupational Data Analysis Program—a decision index used for sequential classification of personnel to jobs—and a policy development approach for combining multiple measures of outcomes into a single value. He also made time to attend summer statistical programs at the University of Florida, North Carolina State University, and Virginia Tech.

In 1966, Ward took a five-year leave of absence from the Air Force to serve as the director of an educational technology project for the Southwest Educational Development Lab, which developed computer-based scheduling and instructional modules for the public education system. Then, in 1973, Ward collaborated with Earl Jennings at UT Austin to author *Introduction to Linear Models*.

Giving Back

Ward had a passion for learning and a love for sharing his knowledge with children. He worked with San Antonio youth in many arenas—statistics, computers,

Artist's rendition of Ward Elementary School, courtesy of Northside Independent School District, San Antonio, Texas

science fairs, and basketball—and became a champion for statistics education.

In 1959, before computers were introduced into high schools, Ward volunteered to teach an introduction to computers class to high-school students and teachers. These free classes continued for approximately 10 years, until schools started to add computer classes to their regular curricula.

For many years, he volunteered as an instructor at the Northside Health Careers High School in San Antonio, teaching an independent studies statistics course for credit. He taught computer basics and applications of statistics to any student who was eager to learn and provided valuable assistance to both students and teachers in their efforts to use statistics and computers in research. He also encouraged and assisted teachers in introducing advanced placement statistics courses into their curricula. Ward was a co-sponsor of the Biostatistics/Research Club (an extracurricular program that provided activities to develop competence in the application of statistics) that was active at the high school from 1995–2001. He also loved to mentor students with their science fair projects, giving them guidance as to what statistical methods were best to use. He often traveled across the country as a judge for the International Science and Engineering Fairs.

Ward had a unique approach to teaching. He believed you should introduce students to statistical data analysis topics as needed, without having them deal with ideas that are not essential. He said this approach allowed students to make maximum use of the mathematics they have learned, so that they can see the value of the skills they have acquired. Ward also said the main objective was to "sell" students on the value of the new ideas for their research projects and to maintain a positive attitude toward statistical analysis.

Honors and Awards for Community Service and Educational Work

- San Antonio's Civil Servant of the Year Award in 1963 (professional and scientific career category)
- The YMCA of San Antonio and the Hill Country 1994 Gene Holmgreen Outstanding Volunteer Leadership
- Texas State Board of Education 1997 Hero for Children Award
- The Northside Independent School District 1997 Partnership Award for Outstanding Intergenerational Volunteer of the Year
- The Northwest YMCA 1998 Volunteer of the Year Award
- The Coca-Cola Scholars Foundation and the Joseph B. Whitehead Foundation 2001 Educator of Distinction Award
- Dr. Joe Ward Elementary School, opened August 2003
- 2006 ASA Founders Award

Outside of the classroom, Ward continued with his love of basketball and spent many years coaching at the YMCA and teaching basketball and life skills to San Antonio youth.

Hero for Children

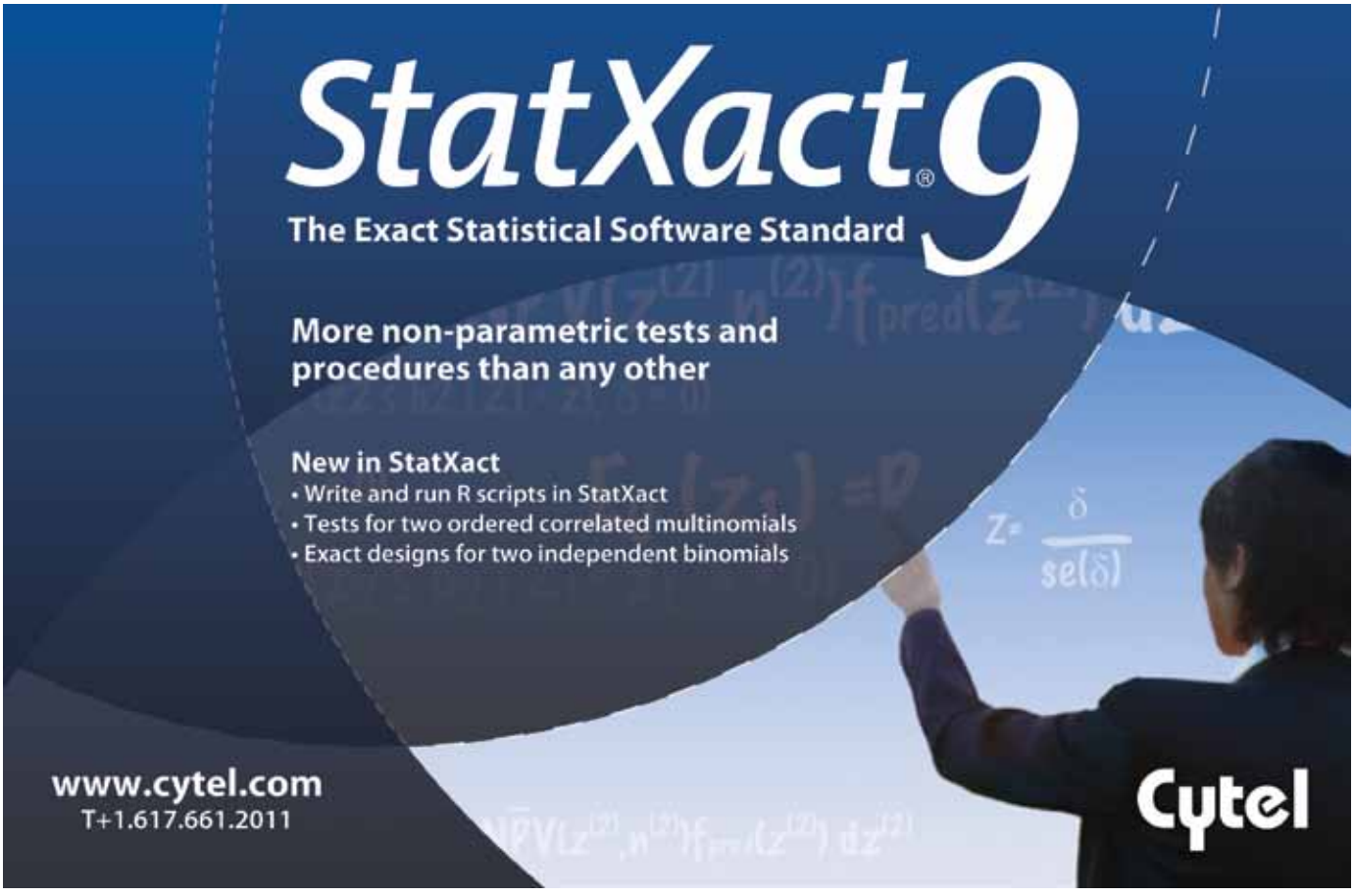
Ward developed many programs and services that had a positive effect on the education community and the lives of students he encountered. His zest for life, educational beliefs, and community involvement were the motivations behind his efforts. He took pride in volunteering and encouraged educators to "catch the children being good."

In 1997, he was honored as Northside's Outstanding Intergenerational Volunteer in appreciation for "outstanding service to Northside Independent School District students in a School-Business Community Partnership with Health Careers High School." That same year, he was recognized by the Texas State Board of Education as a "Hero for Children" in recognition of his "outstanding contributions to the success of the Texas Public Education System."

Ward's work in education in San Antonio culminated in December 2001, when the Northside Independent School District Board of Trustees announced a new school would be named the "Dr. Joe Ward Elementary School" to honor his many years of volunteer work with the district. Ward called this one of the proudest moments of his life. "This recognition is the highest I could have received since my heart, mind, and body have always been devoted to education," he stated. The school opened on August 18, 2003, and Ward spent the remainder of his life involved in the activities and projects of the school that was his namesake.

In 2006, Ward received an ASA Founders Award for "excellent efforts in K–12 education that are so far ranging an elementary school is named in his honor; for fundamental efforts with a Chapter; and for lasting efforts to make statistics understandable to the general population."

Ward passed away on June 23, 2011, at the age of 84. He had been a member of the ASA since 1951. ■



The Emergence of Analytics in the World of Business Decisionmaking

Aric LaBarr

Analytics is an emerging field of modern data analysis used to help companies and people drive important decisions. Analytics revolves around the data that exists around us on a daily basis.

Many people subscribe to customer loyalty programs or at least have seen them offered. Companies are rewarding loyal customers with discounts and sales, which hopefully bring these customers back to the store to purchase more. However, smart companies are starting to realize that these customer loyalty programs can help a company evaluate the purchasing habits of their customers. Every transaction on a customer loyalty account is recorded and analyzed in aggregate to try and determine common purchasing patterns across individuals. Millions of transactions need to be collected and analyzed with modern data analysis techniques to accurately mine information about the customers' purchasing habits. Once common purchasing patterns are identified, companies can make more accurate and useful suggestions and rewards for individual customers.

With the growing availability of online purchasing, companies are applying the same tracking of customer purchasing habits to items bought online. With online data, companies can design customer-specific advertisements that would increase the probability of a customer making a purchase. Companies even monitor how much of the transaction process customers complete on certain products. If customers abruptly stop the transaction near the end of the process, these companies can analyze this data and directly market online through paid advertisements the exact product that the customer almost purchased. Online transactions provide enormous amounts of data for companies to analyze to better adjust their marketing strategies.

Although odds are that most people have not committed medical fraud in their lifetimes, the threat of medical fraud is easier to solve with the help of analytical methods. In millions of people, only a small percentage will actually commit fraud. However, detecting these couple hundred people in a population of millions is extremely difficult and time consuming, especially with the fact that these few hundred people committing fraud are trying not to be found. Fraudsters have become too advanced for companies to leave their detection up to people searching manually through records trying to develop patterns. With modern data analysis techniques, millions of people can be analyzed simultaneously to try and decipher patterns of behavior that could lead to investigation. This saves the company time and money in handling fraudulent cases.

In these examples, we can see that the emerging field of analytics involves a combination of collecting and integrating data properly, developing statistical and mathematical models for analysis using advanced techniques and analytical software, optimizing these models and forecasts, and using the results to assist in making sound, strategic decisions. This is an exciting field for people to strongly consider as a career path.

Why Is Analytics Important?

The common denominator in the previous examples is enormous amounts of data. This big data "problem" is highlighted in a recent study published in the IDC *Digital Universe Study* (April 2011), which estimated that the amount of digital data produced worldwide in 2011 at 1.8 zettabytes (ZB). A zettabyte is approximately one billion terabytes (TB), or one trillion gigabytes (GB). Although this amount of data seems rather large, it represents only the tip of the iceberg. The same study projected 35 ZB of digital data produced worldwide by 2020.

What Makes a Good Analyst?

With the increase in the amount and availability of data, people with the talent to analyze it find themselves increasingly pursued by companies hoping to derive value from it. The *McKinsey Global Institute Report* (May 2011) projects a shortfall in the United States of 140,000–190,000 people with the necessary deep analytical skills by the year 2018.

People with statistical and mathematical backgrounds have a great foundation for this field. Unfortunately, most traditional academic institutions do not adequately prepare people for this rapidly changing field.

Aric LaBarr is an assistant professor of analytics at the Institute for Advanced Analytics. He teaches courses in statistics, mathematics, and operations research for the nation's first Master of Science in Analytics (MSA) degree program.

[E]mployers seek analysts who can solve their problems using business and statistical sense.

Companies are looking for more than just analytical background and statistical methodology. A quick look at job-posting sites reveals that employers also want analysts who have training in industry-standard statistical software, strong communication skills, teamwork facility, and business savvy.

Statistical software comes in many flavors, and understanding industry-standard software is appealing to potential employers who would rather not invest extensive time and resources in training new employees. However, employers do not want to hire programmers who blindly believe the output of a piece of software. A true analyst understands how the output was calculated, the assumptions behind the output, and the inferences that can be made from it.

The need for communication skills has been highlighted frequently in *Amstat News*. Communication skills connect analysts to customers and decisionmakers and explain statistical results so people without advanced training can quickly comprehend and make an actionable decision on the results of the analysis. Training in communication skills should extend beyond the lecture by taking students out of their comfort zones and giving them extensive practice in communication of results to real-world problems.

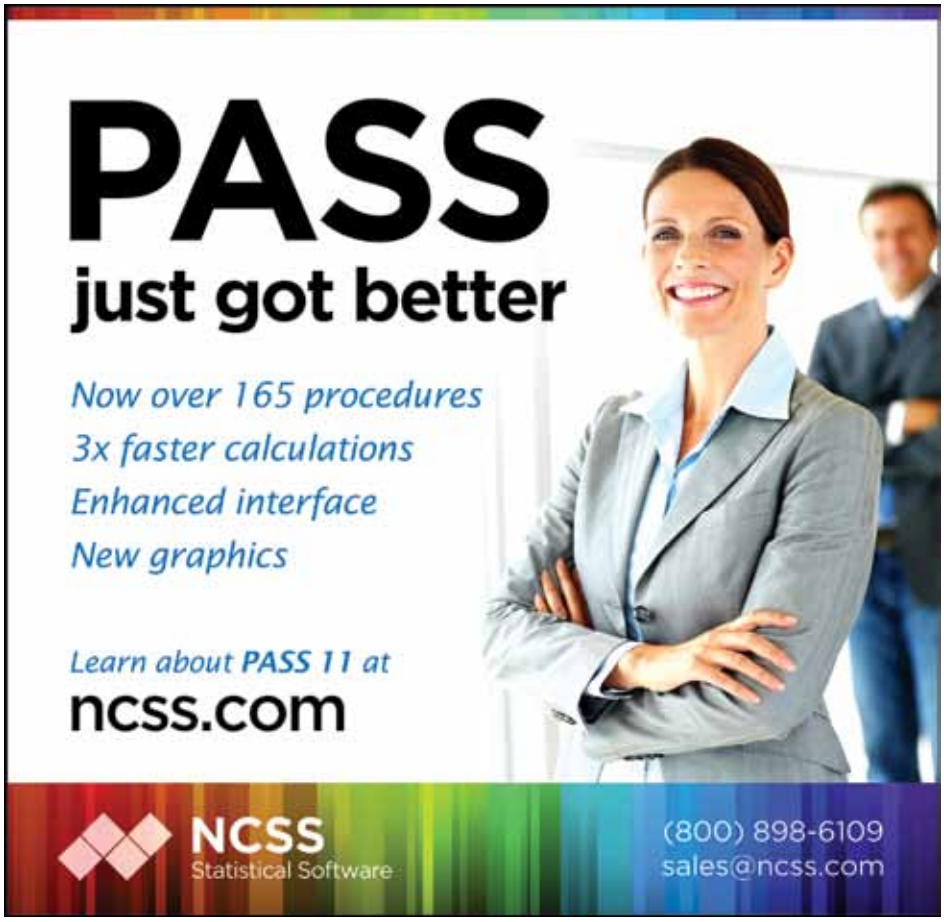
These communication skills also increase one's ability to work in a group setting. Analysts in modern corporations and federal agencies must be able to thrive in interdisciplinary teams. Like communication, teamwork is best learned by doing: immersing students in team settings and coaching to elicit desired and appropriate behaviors.

Finally, employers seek analysts who can solve their problems using business and statistical sense. The biggest lesson I had to learn as an analyst was that a fancy statistical model wasn't always the best solution from a business point of view. Too often, traditionally trained statisticians try to find a beautiful, perfect answer instead of understanding how to tie the available data together in a creative way that adequately solves a specific business problem. Model-building is just as much art as science, and not taking the business problem into account is akin to an artist not knowing the medium they are using for their masterpiece.

New programs are in development all over the country to prepare professionals for the new field of analytics. Several—including programs at North Carolina State, Northwestern, the University of Tennessee-Knoxville, DePaul, Louisiana State University, and the University of San Francisco—are notable ones.

The Future of Analytics

Analytics is only beginning to grow as a field, with more industries joining the wave of data analysis every year. Banking, insurance, finance, and retail are major players in the game. However, analytics careers are emerging in health care, gaming and entertainment, sports, government, and nonprofit organizations. The data deluge will not go away; it will only get bigger. Analysts with proper training are becoming sought-after employees who help make data-driven decisions. Will you be one? ■



Master's Degrees in Analytics

As you know, businesses have a lot of data to be analyzed, and that means companies everywhere are hiring statisticians. Consequently, universities have begun to develop degrees and certificate programs geared toward analytics.

These unique programs offer students hands-on experience so they are ready to enter the work force with the skills needed to succeed. In fact, companies such as Amazon.com, IBM, PayPal, and Walt Disney hire graduates from these programs soon after graduation.

A few such programs and their unique aspects are highlighted below.

University of Cincinnati

Department of Operations, Business Analytics, and Information Systems

Carl H. Lindner College of Business
Master's in Business Analytics

Website: *http://business.uc.edu/programs/graduate/msbana.html*

Director: David Kelton
Master of Science in Business Analytics Program

The program is designed to provide a strong foundation in all the areas of business analytics, while allowing considerable flexibility so that students can tailor the course work and research project individually according to interest or career plans. The program has been in continuous operation for over 30 years (its former name was MS – Quantitative Analysis).

Program Features: Core courses in optimization, probability modeling, statistical methods, and simulation modeling.

Five to eight elective courses (depending on credit hours)—quantitative, technically oriented courses from a wide variety of areas such as optimization analysis, simulation analysis, statistical modeling, data mining, data visualization, statistical computing, forecasting and time series, multivariate methods, case studies, operations management, supply-chain management, finance, marketing, computer science, statistics, biostatistics, epidemiology, mathematics, and others both inside and outside the department and college.

A highly diverse, committee-based research project, in which each student is required to work closely with at least two faculty members to develop and report research with a significant business-analytics component or perform an acceptable application and analysis of business-analytics methodologies. The research project is required for all students.

A career service office that helps each student promote their individual strengths by providing opportunities for professional development.

Length: Full-time is 2–3 semesters or 9–12 months. This program is also available part-time.

Who Should Apply: Students who have a strong prior foundation in mathematics (three semesters of calculus plus a course in linear algebra); basic business knowledge is also required, but can be taken during the program as needed. A detailed prerequisite list is available at *http://business.uc.edu/programs/graduate/msbana/academics/prerequisites.html.*

Unique Aspects: While our program has significant statistical content in both the required core courses and the electives, it also contains significant core and elective material in operations-research topics (optimization, simulation, and stochastic processes). We also offer electives that bridge those two fields, such as statistical computing, data visualization, and applications development using VBA. Students also can take up to half of their electives outside our department, in fields such as computer science, information systems, engineering, biostatistics, marketing research, and finance.

North Carolina State University

Institute for Advanced Analytics, Master of Science in Analytics

Website: *http://analytics.ncsu.edu*

Director: Michael Rappa, Advanced Analytics Founding Director and Distinguished University Professor

The Master of Science in Analytics (MSA) prepares students for quickly deriving insights from a vast quantity and variety of data.

Program Features: A team-based learning experience called "the practicum" gives students the opportunity to conduct real-world analytics projects using data from sponsoring organizations. Students work in teams of 4–5 to understand the business problem and then clean and analyze the data. The practicum spans seven months and culminates with a report and presentation to the sponsor.

Classes are developed exclusively for the program and include data mining, text mining, forecasting, optimization, databases, data visualization, data privacy and security, financial analytics, and customer analytics, as well as communication and teamwork skills.

Length: Full-time, 10 months

Who Should Apply: Applicants must hold a bachelor's degree from an accredited college or university and have a proven track record of strong academic performance. It is not uncommon for applicants to already hold advanced degrees. Applicants come from a variety of academic majors. However, prospective students who have not majored (or minored) in mathematics or statistics will need to have successfully completed prerequisites in these subjects to be admitted. Students also can do a self-assessment online to see if the program is right for them: *http://go.ncsu.edu/msa_guide.*

Unique Aspects: The MSA program is a fully integrated curriculum, not simply a menu of core and elective courses, which pulls together faculty and subject matter from across several departments and colleges. While a graduate program in statistics would focus predominantly on topics within statistics, the MSA is a blend of applied mathematics, statistics, computer science, and business disciplines. Furthermore, the program has a strong professional orientation that prepares students for careers in industry. Students work with real data in a team context and receive extensive training and coaching in practical matters such as teamwork, leadership, and communication skills. As a result, graduates are in high demand by a wide range of employers. The MSA has an unmatched five-year track record of placing more than 90% of its students in well-paying positions by graduation.

Northwestern University

Department of Industrial Engineering and Management Sciences

McCormick School of Engineering, Master of Science in Analytics

Website: *www.analytics.northwestern.edu*

Director: Diego Klabjan, Associate Professor, Industrial Engineering and Management Sciences

Program Features: The program serves two main audiences: students and industry. We seek to provide students with the skills they need for a fulfilling career in analytics while also satisfying the needs of industry for highly skilled staff.

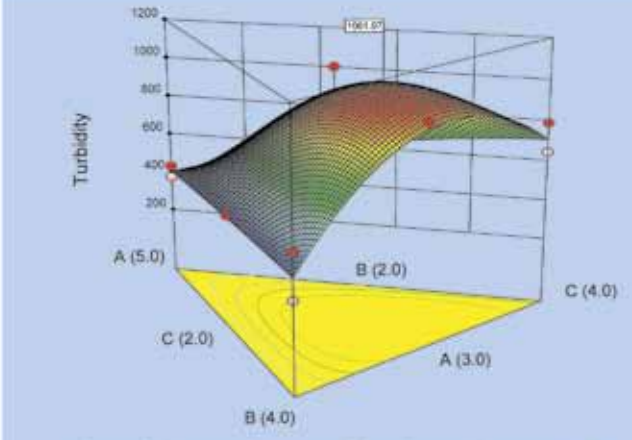
This program teaches the skills that drive business success and produces exceptional analysts who can lead project teams able to fully understand and clearly communicate the business implications of their work.

Graduates of the Master of Science in Analytics will be able to do the following:

- Integrate information technology and data science to maximize the value of data
- Communicate clearly and persuasively to a variety of audiences
- Identify and assess the opportunities, needs, and constraints for data usage within an organizational context
- Design innovative and creative data analytics solutions
- Lead analytics teams and projects

The program is highly selective—only 30 students. The aim is to build a high-quality program, rather than a large one. The focus is on collaboration, rather than competition within the cohort. Therefore, there is lots of teamwork (reflects professional reality), which helps build a ready-made professional network.

Design-Expert ver. 8



A few of the new features offered in version 8 include:

- Half-normal selection of effects on all factorial designs
- Plant flags on 3D surfaces
- D-, IV-, and other optimal designs
- Partial quadratic mixture (PQM) models

Software for Design of Experiments (DOE)

Apply Specialized Statistical Tools
Download a free 45-day trial at www.statease.com! Call 612.378.9449 for more information.

"I've always been a fan of Stat-Ease and Design-Expert® software. The latest version does not disappoint! You consistently provide a high-level statistics and graphics program and still make it easy to use. Excellent! I would recommend this to anyone performing designed experiments for product development, process development or even failure analysis."
—Ph.D., Consultant, Boston, MA

Stat-Ease
statistics made easy®

$995. Order today at 612.378.9449 or online. Download a 45-day trial copy at www.statease.com.

All three areas of data analysis are studied: predictive (forecasting), descriptive (business intelligence and data mining), and prescriptive (optimization and simulation).

The program also includes a summer internship placement in which each student spends three months contributing to an actual project team, choosing from a variety of industries.

During their final quarter, students participate in the capstone design project, in which they work in teams to develop a business solution to a current real-world problem provided by a U.S. company.

The Master of Science in Analytics program also provides training in SAS, SPSS, Tableau, Cognos, and Hadoop. Students will use all during the program.

The Master of Science in Analytics offers merit-based fellowships to its most outstanding applicants; is housed within the top-five–ranked department of industrial engineering and management sciences (IEMS); and draws upon the faculty of IEMS as well as Northwestern's considerable resources, including the departments of electrical engineering and computer science, integrated marketing communications, and the Kellogg School of Management.

Approximately one-third of the program instructors are current industry professionals.

Length: Full-time, 15 months

Who Should Apply: Students who have bachelor's degrees in engineering, business, computer science, math, information technology, and a number of other academic disciplines. No specific undergraduate degree is required, but a background in one of the above areas is encouraged. We are looking for savvy students who can demonstrate an aptitude for quantitative material and show potential for being able extract the value of the data and communicate it to a variety of audiences.

Unique Aspects: The Master of Science in Analytics contrasts with traditional graduate programs in statistics in that it is highly applied, focusing on preparing students for both immediate employment and a lucrative and rewarding career in data analytics.

Also, the program offers unique and innovative classes such as "Analytics for Big Data" and "Data Visualization" and incorporates a summer internship placement and industry-supplied design projects for which students are responsible. The courses are highly applied, making use of industry-supplied data from real-world situations. With regular guest lecturers and our industry professionals' seminar series, students have frequent touch-points with those who are at the leading edge of applying analytics today.

Finally, the program offers a diverse range of industry collaborators, including IBM, SAS, and Teradata.

University of San Francisco

Master's in Analytics

Website: *www.usfca.edu/artsci/msan/program*

Director: Terence Parr, *parrt@usfca.edu*

The MS in analytics is an innovative, multi-disciplinary program offered jointly by the college of arts and sciences and the school of management that provides students with the skills necessary to develop techniques and processes for data-driven decisionmaking—the key to effective business strategies.

The USF Analytics Program delivers training in both the techniques and skills required to analyze structured/unstructured big data to derive meaning and drive business decisions. Graduates become data scientists and analysts in finance, marketing, operations, business intelligence, or other groups generating and consuming large amounts of data.

Students study topics such as data mining, machine learning, statistical models, predictive analytics, econometrics, optimization, risk analysis, data visualization, business communication, and management science. They learn to acquire, filter, clean, organize, and store data using Python and SQL/NoSQL as "glue" between data sources and statistical tools such as R and SAS. The focus is on applying mathematics, statistics, and computer science to solve real problems.

Training goes beyond the hard skills to teach students to work effectively in teams and communicate analytical results in business settings. The analytics program is designed for students with a strong background in one or more of the following areas: math, computer science, engineering, or economics.

Program Features: The program begins in early August with a month-long intensive foundation—three one-week modules that establish the core skills required to succeed in the program. These modules cover (1) probability, statistics, and mathematics; (2) programming in SQL, Python, and R; and (3) economics, accounting, and strategy.

An ongoing practicum project takes place, in which groups of students work in small teams on real-world data sets, perform comprehensive analysis, and develop reports and recommendations in preparation for a presentation to meet the goals established by our business "clients." The practicum is where students apply the knowledge they have learned in the program. The practicum is also where students work with mentors to develop the professional skills they need to succeed in a business setting. Companies associated with our advisory board sponsor the practicum projects.

Length: 11 months. The application date for priority admission and scholarship consideration is May 1 of each year.

Who Should Apply: Applicants with academic or professional backgrounds in math, computer science, engineering, finance, economics, or equivalent skills are encouraged to apply. Applicants who hold a bachelor's degree in any field and have fulfilled the foundation requirements/equivalencies are considered for admission.

Unique Aspects: The MS in Analytics program is explicitly interdisciplinary. It is a joint program between the computer science department and the school of management, bringing together faculty from computer science, mathematics, economics, and business.

Our analytics program provides training in computer science, statistics, and business analytics with a focus on practical applications in finance, marketing, operations, and strategy. It has a broader, more practical orientation than traditional graduate programs in statistics.

The newest wave of big data firms and startups demand data scientists who can mash up and analyze disparate data types and sources that are often beyond the capabilities of traditional analytics software. Unlike other graduate programs in analytics, our focus is on open-source programs for manipulating and analyzing all the types of data inherent in today's business opportunities. Students in the program will complete certification workshops in Python and R, as well as more conventional software such as SAS and MATLAB. ■

Promoting Your Consulting Career in the Era of Web 2.0

Steve Simon

Steve Simon is a part-time independent statistical consultant and part-time faculty member at the University of Missouri-Kansas City. He has a website (*www.pmean.com*), Facebook account (*www.facebook.com/pmean*), LinkedIn account (*www.linkedin.com/in/pmean*), and Twitter feed (@ProfMean). He publishes *The Monthly Mean*, an email newsletter that dares to call itself average (*www.pmean.com/news*).

If you are embarking on a career as an independent statistical consultant, you have to get the word out to potential customers. There are traditional ways to do this, but there are also new ways of promoting yourself using Web 2.0. These new approaches should not replace actions like giving talks and asking current customers to recommend new clients. Even so, they can be useful supplements to what you are already doing. These new approaches are inexpensive, if not free, but they are labor intensive.

Your goal, whether using Web 2.0 or more traditional approaches, is to build a level of familiarity with your potential customers. People don't like to hire strangers. Sometimes, they will, but it is scary. If someone knows you because they read your blog regularly, or because they follow your Twitter feeds, that reduces the fear factor somewhat. Don't forget to build that level of familiarity with your colleagues, as well. You will get many referrals from other statisticians who either aren't in the consulting business at all or who are unwilling or unable to assist in a particular consulting area. If your colleagues know of your expertise, they are more likely to refer business opportunities to you.

There are effective traditional ways of promoting yourself. Word of mouth is what most consultants rely on for getting the bulk of their customers, and there are many ways to enhance the word-of-mouth effect. Writing articles (like this one) also can be useful. You should consider volunteering for high-visibility roles in professional organizations and giving informational seminars related to your areas of expertise. Web 2.0 tools won't replace these more traditional means of self-promotion, but they do offer new and different approaches to build familiarity and trust with your potential customers.

If you're confused by Web 2.0, I am too. It is a hectic game of musical chairs (Is Google+ going to replace Facebook?), and every new Web 2.0 tool touts its unique features. In essence, Web 2.0 refers to a class of new tools for creating and sharing information on the Internet. Web 2.0 offers relative ease in creating and publishing information. Web 2.0 also makes it easy for others to comment on and enhance the material you publish.

Blogging software is the simplest example of a Web 2.0 application, and it is an excellent starting point if you want to try out Web 2.0. A blog provides a straightforward way to create content, much easier than building a website from scratch. The blogging software can handle formatting and indexing for you. Some blogs even allow you to add new entries by email. Most importantly, a blog (unlike a static website) offers your readers a chance to comment on what you've written. This is a double-edged sword, but it is mostly good.

I like to think of other Web 2.0 tools as variations on a blog. (Twitter, in fact, is called a micro-blogging site.) So everything I say about a blog applies just as well to other Web 2.0 tools. But these Web 2.0 tools do offer important features beyond a blog. The most common extra feature is the ability to create or join communities of people with similar interests. This is useful for your professional development

(e.g., getting your data mining questions answered on a data mining group on LinkedIn), but if you regularly provide useful resources for others as well, you develop an aura of expertise and build your name recognition. Whatever Web 2.0 tool you use, keep these three adjectives in mind: focused, fresh, and fun.

Focused. Think carefully about what you will blog about. A wide-ranging blog about anything and everything is likely to be too diffuse to be of interest. It also will be difficult to build a critical mass of content when you tackle too broad a range of topics.

Focus is good, but where should you place your focus? Pick something that helps establish your credibility as an expert in a particular area, of course, but more importantly, find an underserved niche. There are 393 R bloggers (*www.r-bloggers.com*), so you won't get much notice if you become the 394th blogger. If you must blog about R, pick a specialization within R, such as GIS applications, or you'll get lost in the crowd.

Raynald Levesque found an underserved niche when he developed a website about SPSS (*www.spsstools.net*). It wasn't a general site about SPSS, but rather a site about syntax and macros in SPSS. His site became the "go to" site for the really tough problems in SPSS that require macro solutions. Other people started contributing macros to his site. What a wonderful success you have achieved when your site gets fresh content from your readers.

Michael Chernick developed a different niche. He produced reviews of statistics textbooks for Amazon (*www.amazon.com/gp/pdp/profile/AQ7ZQWXAYT8HZ*). He has reviewed more than 600 books, and his reviews are always informative. It's impossible to look on Amazon for advanced applications in statistics without repeatedly seeing his name next to a detailed review.

Focus also applies to the Web 2.0 tools you choose to use. Select one tool as your primary focus, and if you use others, use them mostly to supplement and support that primary focus. So, for example, focus mostly on a blog and use Twitter to update people when a new blog post appears. Or focus on Twitter, and use your blog as an archive for your tweets. There are many tools that help you update multiple Web 2.0 sites simultaneously. LinkedIn, for example, offers you the option of sharing updates on Twitter as well. But even with this type of assistance, you run the risk of spreading yourself too thinly.

Fresh. You need to provide regular entries. It doesn't matter whether you write every other day or every other week, but make the commitment to update on a regular and predictable basis. Don't start out too fast. You'll burn yourself out, but you'll also raise a level of expectation from your readers that you won't be able to maintain. Freshness is even more critical for Facebook and Twitter. Old posts and tweets fade into the background more quickly than a blog entry. If you can't make the commitment to visit a Web 2.0 site and update it regularly, leave that site off your list entirely.

Your Web 2.0 entries can be original content, or they can be commentary on other resources. If you write your own content, keep it short and sweet, both for your sake and for the sake of your readers. This is a free sample, and if you spend all your time on blog entries, you won't have time for your paying customers. Also, people who go looking for your content on the Web aren't usually interested in a lengthy dissertation. Write enough to do the topic justice, but no more.

If you provide commentary on other resources, do take the time to add something more descriptive than, "Hey look at this interesting website I just found." No one likes to click on a link without first getting a hint as to what they will see when they reach that site.

For commentary, Facebook does an even better job than a blog because it automatically includes a thumbnail of one of the graphic images from the web page you are linking to. Better still, your Facebook posts also will include your picture (be sure you have a good Facebook picture). Repeated reminders of what you look like go a long way to making people more comfortable with who you are.

You also should consider using Web 2.0 tools to aggregate other people's content. The Internet is a huge place, and you can provide a great service by providing a "one-stop shopping" experience for your readers. I come across statistics events in the Kansas City area (e.g., ASA chapter meetings, local university seminars, R and SAS user group events) from a variety of sources and I was constantly losing track of what was happening when. Partly for my own benefit, but also for others, I set up a web page (*www.pmean.com/kcstats.html*) with general contact information for each group and announcements of upcoming events. With a bit of work, I could set up reminder tweets that would provide notice 24 hours in advance of these events.

Twitter gets a lot of criticism for the 140-character limit, and it clearly is not the Web 2.0 tool for expounding on the recent advances in hierarchical models. But for simple announcements (like KC stats events), it is an excellent choice. Tweets are easily followed on your smartphone, an ideal platform for this type of information.

Fun. Make your blog fun for you and it will become fun for your readers. Make sure you have passion for what you are writing. If it seems like a chore, you won't have enough motivation to contribute regularly and your readers will pick up on your tone.

This applies double for the Web 2.0 tools you choose to use. Don't use Web 2.0 tools that you find annoying. Twitter is wildly popular, but if you chafe at its 140-character limit, dump Twitter. Facebook and LinkedIn have their competing partisans, and if you find yourself taking sides, that's okay. Some people love the informality of Facebook and cringe at the stodgy nature of LinkedIn. Others find Facebook to be vapid and self-centered and prefer the professional demeanor of LinkedIn. Use what you're comfortable with and ignore everything else. Just because you adopt one Web 2.0 tool does not mean you are obligated to recreate a similar presence on all the other Web 2.0 tools.

Talk directly to your readers. You should try as much as possible to use the pronoun "you" rather than the pronoun "I," or the dreaded passive voice. Your blog is not the place to establish an aura of objectivity by adopting an encyclopedic tone.

Encourage your readers to talk back to you. Part of the value of a blog is that your readers can post comments on your blog posts. This might be scary, but these comments can add great value. Your readers will feel a better emotional connection to you and see you as more of a colleague and peer. Stay vigilant, though, and remove off-topic or off-color responses. Bad commentary will reflect poorly on you.

Some people advocate keeping your personal life separate from your professional life, but I think it works to your advantage to share a little bit about yourself, your family, your hobbies, and your travels. It tends to humanize you and make you seem less of a stranger. Don't flood Facebook with hundreds of pictures of your cute dog, though. Your true friends will endure this and even pretend that they adore your dog as much as you do, but your professional contacts won't be so charitable.

Some Cautions

Use Web 2.0 tools too aggressively and it can backfire. While some self-promotion is okay, it's a fine line. You don't want to act like the stereotypical insurance salespeople who are constantly badgering all their friends to buy more insurance. A good ratio to start at is one blog post directly promoting your consulting career for every 10 blog posts that do not.

Be even more cautious about self-promotion on Facebook and LinkedIn. These sites often evolve community standards about what is acceptable and what is not. These standards are many times tacit and they can vary greatly across sites. Even within a Web 2.0 site, there is substantial variation on what constitutes excessive self-promotion. The best thing to do is watch how others behave and emulate them. If someone complains, apologize profusely and publicly. The worst thing you can do is argue, even if the complaint is unfounded. Let others in the community come to your defense if someone tries to enforce a standard more rigid than what the community as a whole prefers.

One final caution is to not spend too much time with Web 2.0 tools. These are usually cheap, and often free, but the trade-off is it takes time to produce information of enduring value. Don't skimp on your time, but place limits, or these efforts will suck away your whole life.

Summary

Web 2.0 tools shouldn't replace more traditional means of promotion, but they can help. If you use Web 2.0, be sure you make your content focused, fresh, and fun.

Have you used Web 2.0 tools? I'd love to hear about what has worked well for you and what hasn't. ■

Benefits and Opportunities Associated with the ASA's Accredited Professional Statistician Program

Tom Short, PStat®

pstat®
Accredited Professional Statistician™

The ASA has been offering voluntary professional accreditation for a year and a half now, and there are well over 150 members who have completed the application process and may proudly use the PStat® designation. As the number of Accredited Professional Statisticians has grown, so have the benefits provided by the ASA to accredited members. Recently added benefits include free access to LearnStat on Demand and discounts on JSM Continuing Education courses and registration and short courses at the Conference on Statistical Practice.

The ASA's accreditation program offers peer-reviewed acknowledgment of a member's advanced statistical training and knowledge, application of statistical expertise, continuing professional development, assurance of ethical practice, and effective communication. In addition to evidence of competence in these areas, a cover letter that makes the case for the applicant is required. Two letters of support from persons with first-hand experience working with the applicant also are required.

In answering questions from members considering applying for accreditation, and in reading testimonials posted on the Accredited Professional Statistician (PStat) LinkedIn group, I find that accreditation seems most appealing to statisticians who do not have traditional terminal advanced degrees in statistics. Members with terminal degrees in related quantitative disciplines and master's-level statisticians with extensive applied experience are attracted to peer-reviewed accreditation as a pathway to opportunities for consulting and collaboration that have traditionally been restricted to PhD statisticians.

Amid concerns about the need for more statisticians in this age of big data, I think the ASA should consider adding a graduate level of accreditation. Our partner societies in Canada, the United Kingdom, and Australia offer such a designation, in line with the background expected of a recent master's-level graduate. Offering such a designation through the ASA would provide additional opportunities for employment, advancement, education, and professional development to master's-level statisticians and might attract new members from related quantitative disciplines.

I remain curious to find out where the ASA accreditation program will level off as a percentage of total membership. Reports leading up to the program coming online set the bar at over 40%, but I think 10% is more in line with the experience of our partner societies.

If you have questions about accreditation, contact Iain M. Johnstone, chair of the Accreditation Committee, at *imj@stanford.edu* or Ron Wasserstein, the ASA's executive director, at *ron@amstat.org*. Specific information about becoming accredited is available at *www.amstat.org/accreditation.* ■

Tom Short is a professor in the department of mathematics and computer science at John Carroll University. He is a Fellow of the ASA and Council of Chapters representative to the ASA Board of Directors.

Need Data Mining Essentials?

SPM
SALFORD PREDICTIVE MODELER
CART MARS TREENET Random Forests

Try Salford Systems' new
SPM Basic Software Suite

What's included?
All of the SPM™ software suite's
essential power-house features:

Summary of Statistics
ROC Curves (Train/Test)
Learn/Test/Pooled Results
Gains Chart: Show Perfect Model
Multi- tree selection control for scoring and model translation
Ability to control default settings
Ability to use weighted cases for MINCHILD/ATOM values
Additional fraction for auto-validation

Prices so low we can only advertise to statisticians!

SALFORD SYSTEMS

Ask one of our sales representatives today at:
sales@salford-systems.com or **619-543-8880.**

Consulting Best Practices

David Morganstein

In February, the ASA held the first of what is hoped to be an annual conference on statistical practice. This article summarizes a presentation on statistical consulting, one of the panel topics.

What are the characteristics of a good statistical consultant beyond technical expertise? A good place to start is with the characteristics suggested by practitioners and clients. Among the most important are good interpersonal skills, the ability to and interest in listening carefully and fully to the client, and an appreciation for the client's concerns. While these may be considered low tech compared to the latest algorithm, they are necessary and important characteristics for successful consulting.

What is the purpose of statistical consulting? It might be as simple as helping understand a perceived problem or it might be as complex as identifying and solving a problem and implementing a solution. Possibly, the client might want the consultant to not only recommend, but also implement the improved method via software training or changes in the process. Each of these possibilities requires additional skills, and virtually all require understanding how to communicate effectively at and with all levels of an organization.

Many good consultants will suggest something like the following list of skills and characteristics:

- Professionalism
- Time management
- Judgment
- Team player
- Good communication
- Good listening
- Roles and responsibilities
- Involving other consultants
- Reputation

Martin Ashford surveyed London Business School alumni to find out what skills they thought were most prized in consulting and noted the following responses:

- Skill in structuring task
- Technical knowledge/skills
- Industry experience
- Commitment to clients
- Getting along with clients

David Morganstein is a vice president and the director of Westat's statistics unit of 65 master's and PhD statisticians. He has consulted, published, and taught about survey sample design, weighting and analysis, and statistical quality control for more than 40 years. He is a recipient of the ASA's Founders Award and a Fellow of the ASA.

In Steven Covey's widely read S*even Habits of Highly Effective People*, you will find this advice: "Seek first to understand, then to be understood. Communication is the most important skill in life."

An important element of good communication between the client and consultant is defining the boundaries of the work. It's as important that you indicate what you won't do as it is to describe what you are committing to do. Of course, once you get into the project, you may see something that wasn't obvious from the outset. You can always provide optional steps that would extend the range of the original agreement and that may require additional resources.

In almost any consulting task, assumptions must be made, as few projects will be so obvious that no assumptions are required. It will be to your credit to clearly identify and state these assumptions and, to the extent possible, emphasize their implications. In the survey world, for example, assumptions are needed about response and eligibility rates and about respondents' ability to recall events. These are rarely known precisely when a study is designed. As one example, deviations from your assumed values may have an impact on the total survey error, and the effective consultant will convey this to the client. This, too, is about clear communication.

Communications occur in many directions, all of which are important to the statistical consultant. The most basic line is between you and your client. When you are trying to understand the processes that affect your problem, there are also communications between various members of your client's organization—between staff and management, between departments, between new staff and old hands, between research units and operations, between members of a team or committee, and between you and the processes you are trying to improve.

One of W. Edwards Deming's 14 points was to break down barriers between departments. His rationale was to prevent the disruption of critical communications and to facilitate the exchange of information between coworkers who depend upon each other to improve the quality of the work and, most importantly, who are essential in implementing the changes recommended by the consultant. As statisticians, we appreciate the value of good data, which can only come from clear and accurate communications.

The most basic communication is between the statistical consultant and the problem we are addressing. We use our statistical tools to see the problem and potential solutions in ways others may not be

equipped to. Irving Burr, a consultant in statistical process control, offered that the process is speaking to us all the time, but do we understand it? Statistical tools as simple as the Shewhart diagram and as complicated as multi-level modeling help the consultant understand what the process is saying.

Some of the 'softer' tools for improving communication include agendas, flowcharts, checklists, and minutes from meetings. Agendas and meeting minutes, when done well and in a timely fashion, can be a real help in communicating between people trying to solve problems. Flowcharts and checklists also help in clarifying change, whether through developing software or modifying processes.

Whether you are consulting within your own organization or invited in to another organization, you're likely to spend lots of your time in meetings. You may be the planner or the participant. Either way, an effective consultant wants the meetings to be efficient. Following are several important steps in ensuring meetings are efficient:

- Include the right people
- Set an agenda
- Stick to the agenda
- Follow up the meeting with minutes

It might seem surprising, but taking time to review the problem and identifying people with important inputs, and then making sure they attend the discussions, is an easy step to overlook. Creating an agenda of the key discussion points and distributing it in advance can help encourage active participation and lead to a focused discussion. Taking and distributing minutes that summarize key points of agreement and disagreement—including action items and next steps—and identify the responsible person and a tentative due date helps move from the meeting to problem resolution.

Since costs are an inevitable component of any proposed solution, it's reasonable to ask how much is enough and what is good enough. Morris Hansen, a respected and wise statistical consultant, had the following quote by Voltaire on his office wall: "The perfect is the enemy of the good." Morris was all too aware that virtually no one could afford the cost or time to arrive at a 'perfect' solution to a problem. Knowing what is too much effort to expend for the next improvement step is a valuable attribute of a good statistical consultant.

If part of your task is to implement changes resulting from your evaluation, you will be well served to consider the reward system at work in the client's environment. The most efficient solution may never work if the people who need to bring it about do not benefit in some way from the change. Even more basic, many have an understandable motivation to continue using tried-and-true methods. It may be important to ensure the staff is involved in the development of the new procedure and 'buys in' to the new methods. It may be critical that managers also are involved, agree with the approach, and convey support for the changes, demonstrating rewards for those who help in a successful transition.

Finally, never forget that ethical issues undergird all our work. Following accepted ethical practices is a necessary requirement for any statistical consultant. Our professional societies (e.g. the ASA and International Statistical Institute) have established and published acceptable codes of ethical practice. Among other characteristics, they require pursuing objectivity, clarifying objectives and roles, assessing alternatives impartially, and avoiding conflicting interests and preempted outcomes.

The importance of good communication and the need to clarify assumptions and understand the reward systems can be seen to underlie many of these basic principles.

A final word about a few pitfalls: Beware of the type III error, "the right answer to the wrong question." Always remember that part of a statistician's continued professional development is to ensure we broaden our tool kit. "If the only tool you have is a hammer, don't be surprised if everything looks like a nail."

And since I enthusiastically believe fairy tales are not just for kids, I remind you of the story *Emperor's New Clothes*, a tale that has been retold over the ages, yet is of value in our profession as well. It's a simple summary of how not understanding the reward system can lead to a breakdown in communications and the absence of the very data needed for good decisions. ■

Further Reading

Ashford, M. 1998. *Con tricks: The shadowy world of management consultancy and how to make it work for you*. UK: Simon & Schuster.

Burr, I.W. 1976. *Statistical quality control methods*. New York, NY: M. Dekker.

Covey, S.R. 2004. *The 7 habits of highly effective people: Restoring the character ethic*. New York, NY: Free Press.

Deming, W.E. 2000. *Out of the crisis*. Cambridge, MA: MIT Press.

Ramakrishnan, N. (n.d.). 10 winning qualities of consultants. Retrieved from *http://thinklikecenter.com/consultant/10-winning-qualities-of-a-consultant*

Putting the 'WORK' in NetWORKing

Bill Williams, Organizational Learning Consultant

Throughout history, people have relied on informal connections with others to build alliances and find business opportunities, new jobs, and even new careers. Many consultants find work almost entirely through referrals and introductions. Professionals new to organizations learn to navigate and contribute by spending time getting to know peers in other departments. And these days, when hundreds of people may blindly apply for one open position, hiring managers still call fellow professionals to ask, "Know anyone?" when they have a vacancy.

Whatever it may have been called in days of yore, in these tech-obsessed times, we've taken to calling it "networking."

Networking—the kind you do face-to-face, not face-to-Facebook (though we'll address that, too) — is not everyone's vision of a good time. For some, the very word conjures pictures of crowded trade association mixers dominated by an army of assertive, well-dressed, glad-handing close-talkers with a seemingly endless supply of business cards. For those of us who are more at home dealing with people one at a time, this can be intimidating. Luckily, that depiction represents only a small slice of what networking truly is.

Networking is simply the practice of making meaningful connections with people, usually one person at a time. Most new opportunities and productive work relationships are made through informal face-to-face contacts based on a few degrees of separation. In this article, I'll address the basics of how to seek and establish useful connections with others and prepare yourself to represent your capabilities, or those of the group in which you work, effectively. Even if you think of yourself as somewhat shy, you'll see how this can be done with just a little stretch on your part.

What Can Networking Get Me?

There are several benefits to networking, depending on what your goal is. If you're already working in an organization and are looking to build stronger relationships with peers in other functions, networking can accomplish the following:

- Provide information to help you spot opportunities for process improvements or new cross-functional initiatives
- Raise your profile to others as someone who looks for ways to contribute beyond the boundaries of their job or department

If you're an independent consultant looking for new clients, networking can do the following:

- Help you identify people with challenges similar to those you've helped other clients solve
- Get your name out among people who might be looking for someone with your talents

And if your aim is to change jobs, or even careers, whether inside your current organization or in a new one, networking can ensure the following:

- Give a potential future employer a name, face, and personality to precede a blind résumé or CV
- Help test your assumptions about whether a particular line of work or organization is right for you
- Build a larger network of people who might keep their eyes peeled for opportunities that interest you

Pursued thoughtfully, networking can potentially yield all of these benefits, and perhaps more. It's the word "thoughtfully" that matters most. Doing this right takes some preparation and planning. Let's have a look at the basic ingredients.

Prepping Yourself

If you have ever painted a room in an old house, you know that painting is the least part of the work. First, you have to scrape off old paint, steam off old wallpaper, spackle, and maybe a few other chores. Networking is similar in that you should first ready yourself to talk to others before reaching out. The prep depends upon the goal, though the following basic components are similar:

1. Have a goal that is easy to explain to others
2. Be prepared to tell other people about yourself (or your business or function) succinctly and meaningfully
3. Know what you want to find out from others; you don't have to be painfully specific, but have some sensible questions mapped out that you'd like answered
4. Start jotting down some notes about who you want to talk to
    a. If you don't know these people personally, make notes about people you know who know them
    b. If you don't yet know who these people are, make notes about who among the people you already know might be able to help you find them

Ultimately, all this prep is intended to ready you for what is commonly called an "informational interview." There's more to come on that after we cover some of your prep details.

Articulating Your Goal

If you are going to ask people for a bit of their time to get information, they'll naturally want to know why. You don't need to provide them with reams of detail—they just need to understand your purpose. Here are some examples:

If you're new to an organization: "I've been here just a few weeks learning the ropes in financial planning and analysis. I want to get acquainted with all the budget managers in the largest divisions we serve. I think smoother relationships will lead to more open communications about changes in business plans that affect their budgets."

If you're a consultant: "I had a chance recently to develop and deliver management training to a new media company. I liked the challenge and now have a better understanding of the culture. If I got to know others in similar firms, maybe I'd find more opportunities for this sort of work."

If you're seeking a new job or career: "After two years in accounting operations while finishing my bachelor's, I've become interested in credit policy. I want to find out more about that field, what the environment is like, and what they look for in a person."

Talking About Yourself

This can be a toughie for the modest person, but it can be easily done without feeling as though you're bragging or selling. Here are some suggestions for

going about it. For the independent consultant and the career seeker, the advice is similar: Be ready to talk about what you do well that you also like to do. Look at the box below and note that, whether you're an independent consultant or a professional in a company, you're probably happiest when you're engaging in the activities in the upper left-hand box.

Things that I…	Do well	Don't do well
Like to do		
Don't like to do		

In your networking, be sure to inform others of these actions. Couch them in terms of *transferable skills,* career counselor geek-speak for what you know how to do that transcend specific jobs or organizations. For example, analysis of data is a transferable skill. People do it in government agencies, banks, scientific research organizations, media and entertainment companies, and numerous other places. Likewise, training, creative writing, project management, visual design, event planning, and people management are all activities thousands of people do—and enjoy doing—in a variety of settings.

To keep it simple, I recommend a "pick four" strategy to keep your message tight: pick the four transferable skills you possess that you want to use most and be prepared to talk about them. Draw on your real experience. If you want to leave your listener with the sense that you are skilled at, say, marketing communications or management consulting with Internet startups, you need to back it up with something tangible. So look back at your experience and find a couple of good, honest examples illustrating how you used relevant skills toward a productive outcome. Combined with personal acquaintance, this beats a blind résumé or letter of solicitation any day of the week.

If, instead, you're the professional getting to know others in your organization for collaboration purposes, talking about transferable skills is not important. Instead, be prepared to succinctly explain the purpose of your department or team—don't assume they know it just because you work for the same organization.

Who Should I Talk To? How Shall I Reach Them?

What all this leads to is the notion that, if you want to raise your profile with others around a field or organization, you need to start talking to people. No chatter = no network. This is the bit that requires something of a leap of faith for those who are intimidated by approaching strangers. The best advice I can give is to start with people you know. Take out a piece of paper and jot down any of the following:

- One or more fields or jobs you're interested in
- Names of people you want to meet (because of connection to a particular job, organization, or department where you currently work).

Now ask yourself, "Who do I know (e.g., friend, relation, acquaintance) who might have a connection to one of these?" Write down any hunch you have. Regardless of whether anything comes to mind, your next move is to tell the people you know what you're looking for and ask if they know anyone in that field, organization, or department whom you could talk to. This part is simple and low-pressure. Consider this: At a family gathering, hallway chat, or visit with friends, invariably someone asks you, "How's everything going?" This is the very opportunity for you to say something like, "Things are pretty good. I have been thinking recently that I should put some thought to:

- … my next career move."
- … getting to know more about the research department."
- … seeing if I can expand my consulting practice to businesses in (insert industry here)."

See what their reaction is. Do it enough and someone will eventually say, "Oh, I have a friend/relative/former colleague who might be able to help you." If they don't volunteer that, exercise just an iota of assertiveness and ask, "Do you know anyone connected with anything like that?" In either case, if you get a nibble, ask, "Do you think they would be willing to talk to me so I can find out more about that field/organization?" Most people will answer, "I don't know, but I'd be glad to ask them for you." That's the very red carpet you're looking for. There's no better way to get acquainted than through a mutual friend or acquaintance.

The 'Informational' Interview

The best networking is done in low-pressure circumstances and structured like an interview. People in

career counseling call it an "informational" interview. Granted, every interview is about obtaining information. The label is to distinguish it from employment interviewing. Informational simply emphasizes that you are not interviewing for a specific job. Moreover, you are the interviewer.

To be a good interviewer, you need to prepare questions that will get you to the heart of what you want to know. A typical informational interview will last only 30 minutes, maybe an hour if your subject is generous with time. Thirty minutes doesn't require a lot of questions. A few good open-ended questions will do the trick. The ones you choose depend, again, on your goal and subject.

If you feel hesitant about this—perhaps for fear of rejection—bear this in mind: Most people who enjoy and care about their work are happy to share that with you, provided you're prepared, respectful of their time, and—most importantly—expect only information in return. No promise of a job, engagement, or anything else. This is just for information, with no strings attached.

As far as questions, here are some samples, depending on the situation:

For those seeking career information:

- How did you get into this field (or organization)?
- What do you like about it?
- What do you think are essential skills and attributes for succeeding in it?
- What kinds of career paths do you see people taking once they're in this field?
- What are the biggest challenges or frustrations you encounter with this type of work?
- Who else do you know that I might talk with to learn more?

For those networking for future consultancy opportunities:

- Tell me a bit about your organization/function; in particular, what do you think are your top strengths?
- When you think about areas for improvement, what comes to mind?
- How would you define the gap between how things are and how you wish they could be?

For those networking for improved collaboration within their organization:

- For what is your department/team primarily responsible?
- With what other teams/departments do you most closely work?
- Where are things working most smoothly?
- Where could things be better?
- What would you like to know about my team?

As the meeting draws to a close, always ask who else they know who you might talk to. This gets you more referrals, more people to expose yourself to. In this way, you build a network of people who know what you're looking for and know something about your background.

Finally, thank your contact, both in the meeting and with a polite note or email afterward. They've given you the gift of time and knowledge.

With that, you've planted the seed. You've raised your profile with someone who may be in a position to help and may tell others. You have no idea when or if this will pay off, but it's a low-cost, low-pressure investment that increases the likelihood you'll hear about opportunities through your network.

Virtual Networking

All the preceding information has been about face-to-face networking, which I think is the most critical for giving others an impression of who you are and what you have to offer. But you should use every tool you have to raise your profile, including virtual networking. Here are a few dos and don'ts:

- Set up accounts on sites like Linked-In, which are specifically for professional networks. Make sure your work history and transferable skills are evident.
- Keep your information succinct and don't make it tedious or painful for others to learn about your professional attributes—excessive acronyms that mean little outside of the places you've worked will prove tedious to the reader.
- If you're going to include a picture of yourself, be mindful of your audience. This is a professional site, so I suggest steering clear of personal shots of you ballroom dancing, playing the banjo, or running a marathon (unless you're angling to be a dance instructor, bluegrass musician, or personal trainer).
- Be careful of what you post on Facebook or other sites. The line between private and public information has blurred so much that, like it or not, what you post is fair game for others' judgments. Does your network really need to know (I'm not making this up) about the restraining order your ex has obtained or the details of your most recent DUI? Your use of social media is one big IQ test. ■

Editor's Note: Bill Williams will be teaching courses on management fundamentals and leading effective meetings at the 2013 Conference on Statistical Practice. For information about the conference, visit *www.amstat.org/meetings/csp/2013/index.cfm*.

On Being a Statistics Educator and Loving It

Stephen Miller

I believe I was destined to become an educator. Coming from a family of educators (mother, father, stepfather, stepmother, aunt, great aunt, grandmother, and most likely others), teaching was a profession that was familiar and natural to me. In fact, I have written documentation dating from when I was in first grade indicating that I wanted to be a teacher when I grew up. I did not, however, go to college with the goal of becoming a teacher.

In high school, I was a self-described math/computer/science guy. In college, I studied science because I could combine all these interests and use the knowledge and skills I worked so hard to develop in high school. After college, I went to graduate school, again without the plan of becoming a teacher.

I eventually realized that teaching was what I wanted to do, so I took a job at a small independent school in the Washington, DC, area, teaching science and math. As the school started to grow and needed additional course offerings in the math department, I suggested someone (not necessarily me) begin teaching AP Statistics. At that point in my education, I had had little exposure to statistics, primarily only in science classes. Lacking a formal statistics course, I took an evening class and fell in love with the discipline. In fact, I enjoyed statistics so much that I left teaching for a few years to return to graduate school so I could earn my MS in statistics. I then worked in the corporate world for about one and one-half years. However, I missed being in the classroom, so I returned to teaching high school.

One great benefit of teaching statistics is that I get to combine all my academic passions—math, science, and computers. Teaching statistics is particularly exciting for me because I have the opportunity to continue learning about other disciplines through reading studies reported in both the popular press and research articles. I enjoy sharing and discussing the results of many of these studies with my students. I often ask them about their interpretation of the study results, sometimes including having them do analyses of available data, and what questions they would like to ask the researchers. I also am thrilled when my students bring me articles they have found and think I might be interested in reading.

Another exciting component of teaching statistics is using activities to engage students. Activities can bring a class alive in a way that traditional lecturing cannot. Students can remember the activities and tie the outcomes from the activities to the statistical content being studied at that point in the year.

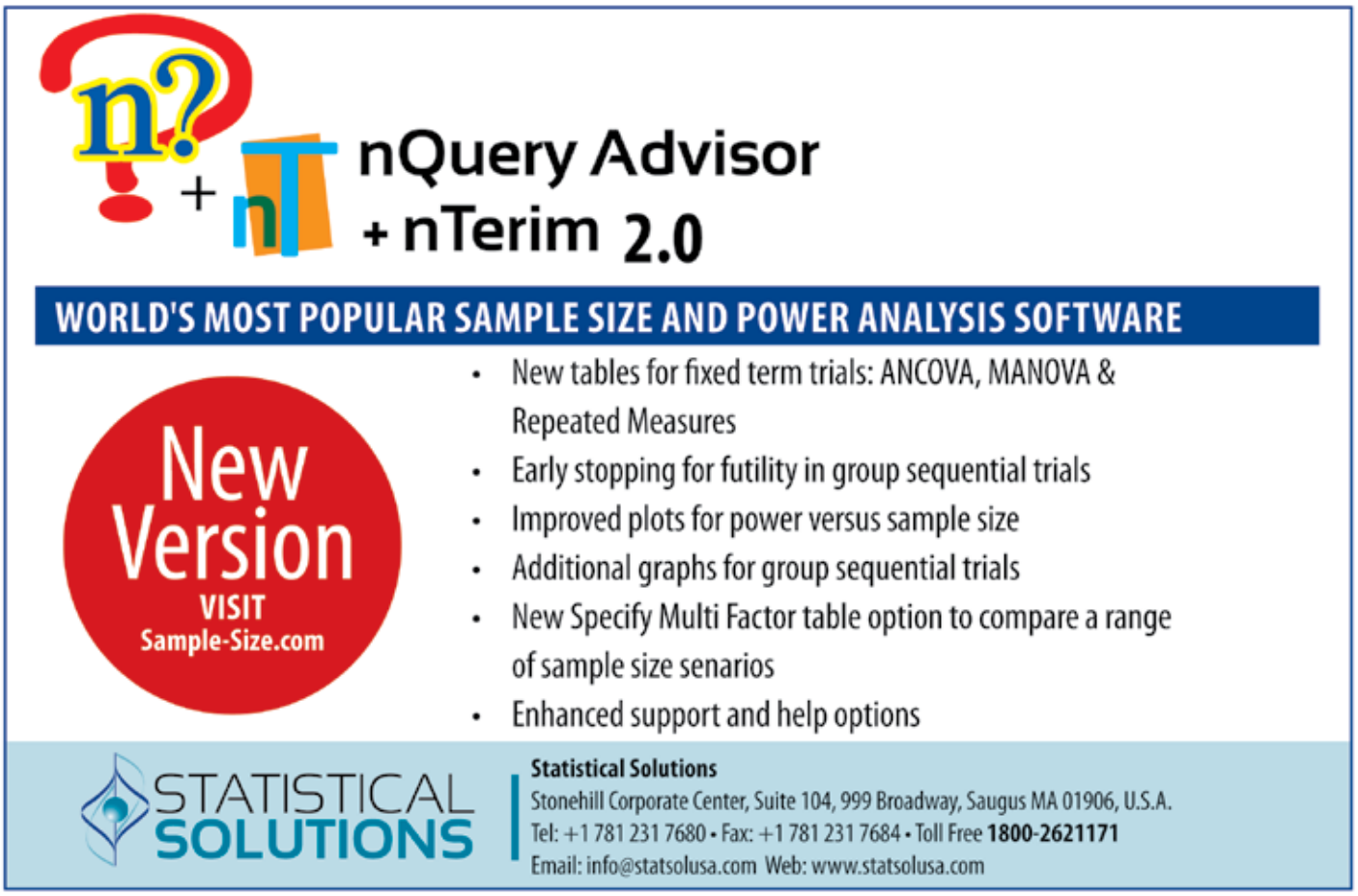
In addition to content, a critically important lesson I teach my students is to be skeptical and question what they read or are told. They should learn to draw their conclusions based on the evidence presented in the form of data.

My greatest moments of satisfaction come when a student tells me she or he has learned a lot in my class, was challenged, and hopes to take more statistics courses in college.

Being a teacher has its challenges, as well. I take my role as an educator seriously, and it can be disheartening when students aren't interested. In fact, when I do have students who don't show much interest, I work even harder to engage and excite them. Last school year, I had a student who didn't seem to care at all about the statistics class. He tried to sleep during class (I did not let him get away with that!) and didn't put much effort into in-class activities, homework, reading, classroom discussions, or test preparation. At one point, however, we were discussing an article from *CHANCE* magazine about human rights issues and the role of statistical sampling ("Speaking Stats to Justice: Expert Testimony in a Guatemalan Human Rights Trial Based on Statistical Sampling," Volume 24, Issue 3) and he seemed to come alive. The article genuinely interested him, and he was hooked! For the remainder of the year, he was active, engaged, and a frequent classroom discussant. This was a teaching moment I will not forget.

I take great pleasure in getting my students involved in not only studying statistics, but also actually doing statistics.

Being a high-school teacher is rewarding and personally satisfying. I take great pleasure in getting my students involved in not only studying statistics, but also actually doing statistics. I am excited for them when they succeed and when they take control of their learning. In addition, I enjoy the opportunity to combine my academic interests and, to paraphrase John Tukey, to play in everyone's backyard. ■



STAT*tr@k*

QUESTIONS FOR RECRUITERS:
My First Job Interview, How Do I Prepare?

Yes, statisticians are in demand, so if you have a degree in statistics your chances are good of finding a job, even in this economy. But, how do you prepare for the interview?

We found three recruiters from three industries and asked them to tell us.

RECRUITER

Name: Lyn Adkins

Job Title: Talent Acquisition Specialist

Business: R&D

What kind of statistician do you typically hire? Do you hire fresh graduates?
Yes, we do hire recent graduates with a master's or PhD (mostly PhD). We hire statisticians who have a statistics background combined with a programming background.

What are the job titles you use to attract recent graduates?
Research statistician developer

PROCESS

How do you initially screen applicants?
All applicants have to apply online. They are initially screened by the recruiter.

Does your company use an automated applicant tracking system?
Yes.

What approach do you recommend applicants take to improve their chances of nabbing an interview?
Having their technical skills specifically outlined in their résumé. If the job posting has specific skills listed, make sure they are listed in the résumé. Our positions are specialized, and about 95% of our candidates send in generic résumés and don't tailor their résumé to that specific job posting; candidates don't make an effort to bring out their strengths, which sends a message that they aren't thinking about the position, but just trying to get in the door.

RÉSUMÉ

What do you expect to see on a résumé?
That the experience is clearly outlined. Technical skills are included. Detail of projects—résumé does not have to be one page.

Is a GPA important?
We routinely see very high GPAs. Many of our applicants have a 4.0, but a high GPA doesn't necessarily translate into a strong candidate; the candidate must have strong communication skills.

What have you seen on résumés that should not be included?
Too much nonrelated personal activities. Also, to note: If you are writing a cover letter, make sure you have the correct employer listed :).

INTERVIEW

What is the best way a candidate can prepare for an interview?
To research the company, ability to articulate his/her responses. Also, the candidate needs to thoroughly read the job description, not just the history of the company.

Do not talk too much about the company's perks/benefits, such as the gym. Focus on the job itself.

Also, one of our managers gives what he calls the "pen test." He will begin by telling the applicant about the position and who the team members are, where they reside, what they specifically focus on, etc. If the applicant does not pick up a pen and start taking notes, he has concern about this applicant's interest in the position and the culture. Always take notes. For example, when the applicant is then taken to the next interview down the hall, he can share, "Hi, John Doe, it's nice to meet you. I understand that your work is mainly focused on XYZ. …"

Can you recall an experience in which a job candidate impressed you during an interview? What was it that impressed you?

When someone begins taking notes, and when someone asks, "What are the characteristics of making an outstanding developer?"

RECRUITING

Where do you go to attract candidates?

Referrals, our career site, LinkedIn

ADVICE

What advice can you offer a first-time job candidate?

They need to be interviewing the company, too :).

1. Work that is exciting and challenging and will keep them engaged; the nature of the work
2. The caliber of people they will be working for.

When an applicant asks these questions, then I know this candidate is really interested in this opportunity. Also, it is great when applicants ask about what distinguishes top performers from average performers.

Name: Jason Bratton

Job Title: Recruiting Manager

Business: Financial Services

RECRUITER

What kind of statistician do you typically hire? Do you hire fresh graduates?

We hire all levels of statisticians, from fresh graduates through corporate leaders.

What are the job titles you use to attract recent graduates?

Statistician and senior statistician

PROCESS

How do you initially screen applicants?

We conduct a review of the résumé. We then have qualified candidates pass a series of online assessments. Next, candidates are given a phone interview. Finally, candidates are invited to an onsite interview.

Does your company use an automated applicant tracking system?

Yes, we definitely use an applicant tracking system.

What approach do you recommend applicants take to improve their chances of nabbing an interview?

Highlight your academic success and GPA. I would also suggest providing detailed information about internships, research work, teaching assistant roles, and professional work experience.

RÉSUMÉ

What do you expect to see on a résumé?

We like to see clean, concise résumés that clearly outline your experience and qualifications. We like to see bulleted lists that are quick and easy to read.

Is a GPA important?

GPA for our recent graduate candidates is very important. We have a minimum GPA requirement and typically do not consider candidates who withhold their GPA.

What have you seen on résumés that should not be included?

Pictures of themselves are not really necessary. Hobbies are also not of importance. Try to avoid lengthy paragraphs or run-on sentences to describe your experience and qualifications; stick to concise or bulleted statements.

RECRUITER

INTERVIEW

What is the best way a candidate can prepare for an interview?

Research the company and its interview process. Work with your recruiter to ensure you're as prepared as possible for each of the styles of interviews you're going to have. Have job- and company-specific questions prepared.

Give me an example of a general question you ask during an interview, and tell me why you ask it.

Tell me why you'd like to work for our company. We'd like to understand what about our company interests you and to ensure you're attracted to us, rather than just looking for a job. It also shows how prepared you are and how much you've researched our company.

Can you recall an experience in which a job candidate impressed you during an interview? What was it that impressed you?

Candidates who are prepared and have numerous examples of successes they've had, as well as when they've had to overcome challenges. This allows us to assess how they handle adversity.

Can you recall when a candidate made a horrible blunder during an interview?

Candidates have cursed on occasion, which is very unprofessional. We also have had candidates who have given up on our problemsolving interviews, which is not a good approach. We also don't recommend speaking badly about a former employer, colleague, professor, or adviser.

Are there questions a candidate should be sure to ask during an interview?

Ask insightful questions that show you're interested in the role and the company. Always have prepared questions. Ask job-specific questions.

Describe your ideal candidate, one you would consider hiring right away.

Our ideal candidate is well-rounded. We obviously want candidates who are great at statistics, model-building, and problemsolving, but we also want candidates who are great communicators, are great people and will mesh well with our corporate culture.

RECRUITING

Where do you go to attract candidates?

For our more senior candidates, we leverage networking sites (e.g., LinkedIn), job boards, and recruiting sites. For our more junior candidates, we recruit specifically from colleges and universities, as well as the Joint Statistical Meetings through the ASA. We also advertise in *Amstat News*.

ADVICE

What advice can you offer a first-time job candidate?

Be prepared. Know the company. Know the interview process. Ask great questions. Be enthusiastic. Be a great and clear communicator.

Anything else you would like first-time job candidates to know?

As much of an emphasis as we place on one's statistical and problemsolving ability, we place an equal amount of emphasis on one's ability to be able to convey statistical analysis and terminology to someone with no statistical background. Our statisticians work with our associates out in the business who may be an analyst or a project manager with no statistical education or background.

Name: Logan Marsh

Job Title: Recruiter

Business: .com

What kind of statistician do you typically hire? Do you hire fresh graduates?

Probably 60% of statisticians/research/BI engineer candidates we hire in my group are fresh PhD graduates.

What are the job titles you use to attract recent graduates?

Research scientist, business intelligence engineer, analytics manager, machine learning scientist, principal research scientist

PROCESS

How do you initially screen applicants?

As the recruiter, I screen for relocation, compensation, and basic technical skills/statistics package knowledge. Then, the hiring team dives in to very in-depth technical phone screens and onsite interviews.

Does your company use an automated applicant tracking system?

We have an automated ATS, but 99% of these types of candidates are found via active/passive searches and networking.

What approach do you recommend applicants take to improve their chances of nabbing an interview?

Keep your LinkedIn profile up to date, and if you have a résumé online, update it every 30–60 days to keep it fresh for searches.

RÉSUMÉ

What do you expect to see on a résumé?

Top schools, eCommerce experience, statistics/math educational background

Is a GPA important?

I look at it, but almost all of these candidates have very high GPAs, so it's not as an important indicator for my teams. It's more about their ability to apply the knowledge they have learned in school and industry.

What have you seen on résumés that should not be included?

Long summaries at the top of the résumé, and also some candidates put in at the bottom of their résumés every technology they have ever seen or touched. Only include technologies that are relevant to your line of work and you are very proficient in. If I see a technology listed on your résumé, it's free game for me to test you on it, so you better know it well.

INTERVIEW

What is the best way a candidate can prepare for an interview?

For my team/company, make sure your fundamentals are studied up and spot on. Study the company principles as we eat, sleep, and breathe them. Finally, don't overthink, just be who you are and let your education and industry experience guide you through the interview.

Give me an example of a general question you ask during an interview, and tell me why you ask it.

As the recruiter, I don't get into technical questions, but the first question I typically ask a candidate is, "Why do you want to work for this company?" This question quickly allows me to see who really wants to work here and who is trying to sell me as to why they want to work here. People, who give answers like "you guys called me" typically don't do well in their interviews. We are a company who hires intelligent individuals who are passionate about their work.

Can you recall an experience in which a job candidate impressed you during an interview? What was it that impressed you?

I can usually read candidates in the first 10 minutes of my interview with them to see what their comfort level is, how confident they are in themselves and their work, and how bad they want to work for the company. By observing these few aspects of my interview, I can usually tell how successful someone will be in their interview. Obviously, I'm not always right, but after hundreds of interviews, I've gotten pretty good at it.

Can you recall when a candidate made a horrible blunder during an interview?

Specifically, I had a candidate show up with very casual attire to his interview, with sunglasses on his head, his iPad in his lap during the interview, and holy jeans on with a chain hanging out of his pocket. We are a casual environment, but this was way too casual and the interview didn't go well.

Are there questions a candidate should be sure to ask during an interview?

Ask the recruiter about compensation, company culture, team culture, and what to expect during the interview. For the team interviews, ask a lot of clarifying questions if unsure about a question someone is asking to avoid going off on a tangent about something that wasn't asked.

Describe your ideal candidate, one you would consider hiring right away.

Someone who is technically savvy, has a good education, is excited about their work, has a lot to offer to the team they are interviewing with, and can explain themselves well.

RECRUITING

Where do you go to attract candidates?

Wherever the talent is. LinkedIn, networking events, hiring events in specific locations, etc.

ADVICE

What advice can you offer a first-time job candidate?

Have someone look over your résumé for errors before posting it. Prepare for your interview. Know what is in your résumé, have good examples from previous work or school experience, and, finally, be who you are and don't lie. ■

175

Statistics in Business and Industry: The Path Forward

Gerald J. Hahn and Necip Doganaksoy

Happy (forthcoming) 175th birthday, ASA! This is a good time to reflect briefly on our past and to consider where we need to be heading. Our emphasis will be on statistics in business and industry—the focus of our combined 80 years as statisticians (spanning more than a third of the life of the ASA)—but we think our comments have general applicability. They reflect views expressed in our two recent books.

Statistics gained recognition in business and industry (beyond Bell Labs) in the years following World War II. Early applications were principally in manufacturing and (what was then called) quality control—building on the work of Walter Shewhart, W. Edwards Deming, and others. Data analyses were left mostly to statisticians in light of the complex calculations required using early computing equipment and the newness of the field. Over time, statisticians became heavily involved in "fire-fighting" projects, such as combating defective manufactured product and premature field failures.

Today, we live in a vastly different world, largely as a result of advances in computer technology and statistical methodology. Many industries—from semi-conductors to pharmaceuticals—rely heavily on statistics in their operations. Statistics also is making key contributions to advancements in the biological sciences, to cite just one example.

Moreover, "user-friendly" statistical software is readily accessible. Globalization has resulted in the outsourcing of many statistical analyses. As a result, statistics is used in business and industry more extensively than ever before.

However, much of the work is performed by practitioners, rather than professional statisticians. "Weibull analysis" is part of the toolkit for many engineers working in reliability. Mixture experiments are widely used by chemists to optimize product formulations. Manufacturing engineers rely on statistical studies to validate measurement systems and design experiments to improve product performance. Only the pharmaceutical industry—with its statutory need for rigorous product assessment—appears to be a, perhaps partial, exception to this extensive democratization of statistics.

These developments present fresh opportunities for statisticians. Relief from more routine data analysis has opened new dimensions for us. The changing environment allows us to play a more prominent role—even as we continue to encourage and help our nonstatistical colleagues use statistics effectively. This involves exerting statistical leadership in seeking out and addressing the key quantitative challenges that face a business and, in general, playing a proactive role in averting problems, rather than responding to them after they occur. It calls for seeking applications in continuingly broader domains and integrating statistical concepts directly into addressing often complex and unstructured business problems. This has resulted in what Roger Hoerl and Ronald Snee call "statistical engineering."

In such expanded roles, statisticians need to become increasingly and intimately involved, often as team members and sometimes as leaders, in such areas as the following:

Getting good data up front. Traditionally, we have focused principally on data analysis, often requiring extensive initial data cleaning. The resulting analyses and data mining are only as good as the data upon which they are based. Much more emphasis is needed on getting the right data in the first place. This frequently calls for statistically designed experiments, but often goes beyond. The planning of comprehensive test programs during product design to assess and help improve performance and reliability is just one example.

The development of early-warning systems. Statistical monitors that process the data as generated are increasingly embedded into business processes. Applications range from systems that continuously track the performance of, say, an automobile or locomotive to signal impending failures to ones that examine ongoing financial transactions to provide early identification of vulnerable accounts.

Systems integration. This may involve dynamically combining data from multiple sources to achieve creative solutions to large-scale problems. A typical example is optimizing jet engine maintenance scheduling—to maximize reliability with minimal adverse effect on operations—by combining the results of recent inspections with information on in-flight performance and the integration of additional data from service shops, parts availability records, and flight schedules. Such integration often calls for the marriage of statistical and nonstatistical approaches, as, for example, in the merger of statistical and engineering process control into a single system that leads to both short-term and long-term quality improvement.

Exciting new challenges for statisticians continue to emerge. These include leveraging online information (e.g., early identification of consumer preferences by searching social media); the making of further inroads into finance (by developing improved risk models); personalized medicine (to find patient groups that are uniquely responsive to a particular treatment); and such hot areas as bioinformatics, climate change, nanotechnology, and improved customer servicing. We anticipate, moreover, a particular acceleration of opportunities for statisticians outside North America, especially in developing countries.

There is, in addition, much interest in emerging applications under such banners as big data, cloud computing, and analytics. These revolutionize the way organizations capture, store, share, and use large volumes of data. We need to be on top of these areas to leverage new opportunities that will arise as advances in technology make massive and timely computations still easier and even more accessible. This will call for even greater use of data-intensive methods in general and such approaches as Bayesian methods and incisive statistical graphics in particular.

Finally, broadening our horizons, we see future statisticians from all application areas serving increasingly as citizens of the world. Paraphrasing former U.S. Secretary of State Madeleine Albright, statistics are in the center of many arguments. We need to work toward expanding the role of statistical literacy to developing routine mechanisms for critically and impartially examining the numerous data-based claims—often from questionable data and/or analyses—with which our society is constantly bombarded.

Needless to say, all the preceding requires us to communicate and interact more effectively than ever. The now familiar quote by Google Chief Economist Hal Varian about statistician being "the sexy job in the next 10 years" might seem a little dramatic, but it holds much truth. It is up to us to recognize the changing environment and leverage the new opportunities. ■

Further Reading

Hahn, G.J., and N. Doganaksoy. 2008. *The role of statistics in business and industry*. Hoboken, NJ: Wiley.

Hahn, G.J., and N. Doganaksoy. 2011. *A career in statistics: Beyond the numbers.* Hoboken, NJ: Wiley.

Hoerl, R.W., and R.D. Snee. 2010. Moving the statistics profession forward to the next level. *The American Statistician* 64(1):10–14.

Jensen, W. (Editor). 2012. Statistics to facilitate innovation: A panel discussion. *Quality Engineering* 24(1):2–19.

Kettenring, J.R. 2012. Statistics research at Bell Labs in the regulated monopoly era. *International Statistical Review* 80(2):205–218.

Steinberg, D.M. (Editor). 2008. The future of industrial statistics: A panel discussion. *Technometrics* 50(2):103–127.

Profiles in Statistical Courage

As an experiment, the 2012 Graduate Survey Management class at The George Washington University interviewed the following distinguished statisticians in the survey field:

Ivan Fellegi, David Hemson, Arthur Kennickell, and **Lars Lyberg**

To read these profiles, visit the website at *www.statisticalcourage.info/overview.htm.*

The online edition is at *www.StatisticalCourage.info.*

Have You Seen These New Books from Wiley-Blackwell?

Spatial Analysis Along Networks: Statistical and Computational Methods

Atsuyuki Okabe and Kokichi Sugihara

Spatial analysis has a vast range of applications, due to its widely varying nature. It can be as simple as taking measurements from a map or as sophisticated as complex geocomputational procedures based on numerical analysis. This book provides researchers and students with a logical, and much-needed practical guide to this versatile and increasingly popular system of analysis.

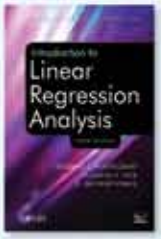
Cloth • 296 pages • 2012 • ISBN 978-0-470-77081-8 • $105.00

Adaptive Tests of Significance Using Permutations of Residuals with R and SAS

Thomas W. O'Gorman

This book successfully introduces readers to the theory and applicability of adaptive tests, reviews the main contributions in the field, and provides readers with the tools needed to implement the statistical methodology.

Cloth • 364 pages • 2012 • ISBN 978-0-470-92225-5 • $125.00



Introduction to Linear Regression Analysis, 5th Edition

Douglas C. Montgomery, Elizabeth A. Peck wand G. Geoffrey Vining

This new edition of a a leading textbook on regression continues to present both the conventional and less common uses of linear regression in today's cutting-edge scientific research. The authors blend both theory and application to equip readers with an understanding of the basic principles needed to apply regression model-building techniques in various fields of study, including engineering, management, and the health sciences.

Cloth • 672 pages • 2012 • ISBN 978-0-470-54281-1 • $135.00

Sampling, 3rd Edition

Steven K. Thompson

Following the high praise of the second edition by Technometrics as a necessity to "any good personal statistics library," this new edition covers basic and standard sampling design and estimation methods with special attention paid to methods for populations that are inherently difficult to sample.

Cloth • 472 pages • 2012
ISBN 978-0-470-40231-3 • $115.00

Geostatistics: Modeling Spatial Uncertainty, 2nd Edition

Jean-Paul Chilès and Pierre Delfiner

This second edition of one of the best-selling books on geostatistics provides through updates from two authoritative authors with over twenty years of experience in the field. It removes information and data that have lost relevance with time while maintaining timeless, core methods and integrating them with new developments to the field.

Cloth • 734 pages • 2012 • ISBN 978-0-470-18315-1 • $125.00

A Practical Guide to Cluster Randomised Trials in Health Services Research

Sandra Eldridge and Sally Kerry

A practical guide to the design, execution and analysis of cluster randomized trials covering all the latest developments in the field.

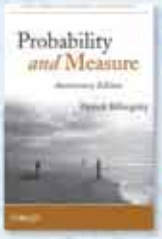
Cloth • 298 pages • 2012
ISBN 978-0-470-51047-6 • $79.95

Guidebook to R Graphics Using Microsoft Windows

Kunio Takezawa

Unlike other introductory manuals on the software, this book showcases the graphical capabilities of R and guides readers through the key methods for constructing meaningful visual representations of data from virtually any field of study.

Paperback • 278 pages • 2012
ISBN 978-1-118-02639-7 • $69.95



Probability and Measure, Anniversary Edition

Patrick Billingsley

This book is recognized as the most complete and comprehensive classic in probability and measure theory on the market today.

Cloth • 656 pages • 2012
ISBN 978-1-118-12237-2 • $135.00

Titles with e are also available as an e-book from Wiley.com or your preferred retailer.

How to order:

EUROPE, MIDDLE EAST, ASIA & AFRICA
John Wiley & Sons Ltd
Tel: +44 (0)1243 843294 Fax: +44 (0)1243 843296
E-mail: cs-books@wiley.co.uk
www.wiley.com

NORTH, CENTRAL & SOUTH AMERICA
John Wiley & Sons Inc
Tel: 877 762 2974 Fax: 800 597 3299
E-mail: customer@wiley.com
www.wiley.com

GERMANY, SWITZERLAND & AUSTRIA
Wiley-VCH Verlag GmbH
Tel: +49 6201 606 400 Fax: +49 6201 606 184
E-mail: service@wiley-vch.de
www.wiley-vch.de

WILEY-BLACKWELL

www.wiley.com/statistics

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

■ Faculty-level PhD biostatistician capable of independent research, collaboration, teaching. Preferred areas of research include but are not limited to clinical trials, survival analysis, and Bayesian modeling. (*www.cedars-sinai.edu/Patients/Programs-and-Services/Samuel-Oschin-Comprehensive-Cancer-Institute-/Research-and-Clinical-Trials/Biostatistcs-and-Bioinformatics-Research-Center/*). Email cover letter describing qualifications, vitae, three publications, three references in one PDF file to Andrew Rogatko, PhD, Director of Biostatistics and Bioinformatics Research Center at the Samuel Oschin Comprehensive Cancer Institute, Cedars-Sinai Medical Center c/o *Academic.Recruiting@cshs.org /www.cedars-sinai.edu/* EOE.

■ The principal biostatistician will provide biostatistics support to clinical research department regarding preparation of clinical study designs and conduct statistical analyses of clinical data in compliance with applicable regulations. A minimum of a master's degree in biostatistics / statistics or equivalent experience with 7 years of relevant experience OR a PhD in related biostatistics / statistics or equivalent experience with 5 years of experience. *www.Click2Apply.net/r4csx3c* EOE.

■ RAND Corporation is seeking PhD statisticians for exciting opportunities to collaborate on multidisciplinary public policy research projects. Openings exist for recent graduates and experienced statisticians. See our ad in this issue for details or go to *www.rand.org/statistics.* Applications received by December 15, 2012 will receive priority. Applications must be submitted online following the instructions at *www.rand.org/statistics/jobs.html* (Job ID #3221). Send questions to *Susan_Paddock@rand.org*. EO/AA Employer.

District of Columbia

■ Tenure-track assistant professor position for spring 2013 or fall 2013, depending on availability. Primary responsibilities: teaching, research and service. PhD in statistics and demonstrated excellence in teaching and research required. For full position announcement and to apply, please visit *www.gwu.jobs/postings/10427*. Review of applications will begin on October 15, 2012 and continue until the position is filled. The George Washington University is an affirmative action/equal opportunity employer.

Illinois

■ John Deere currently has a entry level statistician opening located at the world headquarters in Moline, IL. The position will perform statistic analysis on various functions in order fulfillment and demand forecasting. The position will create forecasts for Deere and competitive products, forecast farm industry drivers, and communicate forecasts to leadership. A good candidate will have a Statistics MS and R experience. *HoffmanDerekL@JohnDeere.com* for info. EOE.

Iowa

■ Statistician/biostatistician, The University of Iowa. Position supports clinical trials research by applying mathematical and statistical knowledge; validates statistical research and prepares documentation for publication/presentation. Requires the academic knowledge of the area of biostatistics or applied statistics, including advanced study generally associated with a master's degree. One year experience with SAS plus one year creating and manipulating SAS data sets. To apply- *http://jobs.uiowa.edu*, Requisition # 61195 The University of Iowa is an Equal Opportunity/Affirmative Action employer. Women and minorities are strongly encouraged to apply.

Massachusetts

■ Massachusetts Institute of Technology Department of Mathematics. MIT seeking to fill combined teaching and research positions as instructor, assistant professor and higher, in statistics beginning September 2013. Appointments based mainly on exceptional research qualifications. PhD required by employment start date. Submit online, *www.mathjobs.org*: CV, research description, three recommendation letters. Applications should be complete by December 1, 2012. (See full classified text at mathjobs.) Massachusetts Institute of Technology is an Equal Opportunity Affirmative Action Employer.

■ Amherst College Department of Mathematics invites applications for an associate or full professor tenured with statistics specialization. Responsibilities include teaching a range of undergraduate statistics courses, supervising undergraduate theses, mentoring junior colleagues in statistics, and helping to expand and improve the college's statistics curriculum. PhD in statistics required. Apply online at *www.mathjobs.org*. Include cover letter, vitae, statement of research/teaching, publications list and two references. EOE.

■ Massachusetts General Hospital's Medical Practice Evaluation Center (MPEC) is seeking 2 biostatisticians with a doctoral degree in statistics or biostatistics. Applicant must have a methodological background plus expertise in survival analysis, multivariate statistics, longitudinal modeling, simulation modeling, and

Looking for a **Job?**

The ASA JobWeb is a targeted job database and résumé-posting service.
www.amstat.org/jobweb

Come to your Census

Join the Census Bureau to help produce quality data that enable Americans to better understand our country - its population, resources, economy, and society.

Your work as a Mathematical Statistician at the Census Bureau

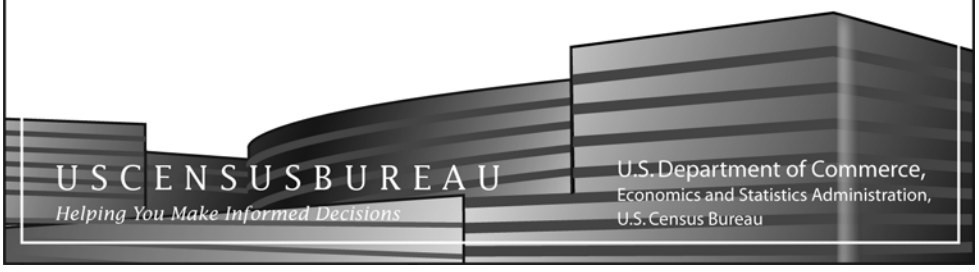
- Design sample surveys and analyze the data collected.
- Design and analyze experiments to improve survey questionnaires and interview procedures.
- Improve statistical methods for modeling and adjustment of seasonal time series.
- Perform research on statistical methodology that will improve the quality and value of the data collected.
- Publish research papers and technical documentation of your work.

Requirements

- U.S. citizenship
- Bachelor's, Master's or Ph.D with at least 24 semester hours in math and statistics (see website for more specifics on required coursework)

Apply at www.census.gov, click on Jobs@census, Headquarters and NPC Employment Opportunities, Mathematical Statistician

The U.S. Census Bureau is an Equal Opportunity Employer.



structural equation modeling. 3–5 years of experience required. To apply, visit *www.mghcareers.org* and search for these openings using job ID # 2229403 OR 2229405. EOE.

Michigan

■ The Survey Research Center (*http://www.src.isr.umich.edu*) in the Institute for Social Research invites applications from outstanding candidates for faculty research fellow appointments in any area of social science. These appointments are intended to lead directly into a research professor tenure-track career. Applicants should submit a cover letter, vita and one or two publications. Three reference letters should be sent electronically to *SRCSearch@isr.umich.edu*. Reference position #72722. The University of Michigan is an Affirmative Action/Equal Opportunity Employer and is responsive to the needs of dual career couples. Women and minority candidates are encouraged to apply.

Missouri

■ Department of Statistics/Division of Biological Sciences at University of Missouri invites applications for a joint mid-level tenured position in stochastic modeling. We're interested in candidates who use Bayesian approaches to model biological problems. A PhD in statistics/biostatistics is required. Apply online at *http://hrs.missouri.edu/find-a-job/academic*. Include cover letter, vita, statement of research/teaching interests and contact information for three references. MU is an Equal Opportunity-Affirmative Action Employer.

■ Department of Statistics/Division of Biological Sciences at University of Missouri invites applications for a joint mid-level tenured position in stochastic modeling. We're interested in candidates who use Bayesian approaches to model biological problems. A PhD in statistics/biostatistics is required. Apply online at *http://hrs.missouri.edu/find-a-job/academic.* Include cover letter, vita, statement of research/teaching interests and contact information for three references. Review begins 10/01/2012. MU is an Equal Opportunity-Affirmative Action Employer.

■ MU department of statistics is seeking at least one tenure-track assistant professor in statistics fall 2013. A PhD in statistics, biostatistics or related field by August 15, 2013 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 15, 2012. The University of Missouri is an Equal Opportunity/Affirmative Action/ADA Employer.

New York

■ The departments of psychiatry and biostatistics at Columbia University are recruiting for an open rank inter-disciplinary faculty position to be a member of the division of biostatistics in psychiatry. Interested

IOWA STATE UNIVERSITY

Chair and Professor, Department of Statistics
Director, Statistical Laboratory

Iowa State University is seeking a chair for the Department of Statistics, a position that also includes the role of Director of the Statistical Laboratory.

The successful applicant should have national recognition for research and scholarship and demonstrated leadership abilities. Primary responsibilities of the position are to provide visionary leadership; to encourage excellence and innovation in research, teaching, and service; to advance professional development of faculty, staff, and students; to foster productive interdisciplinary relationships with a variety of entities across the university community; to facilitate faculty efforts to attract extramural grant and contract funding; and to promote productive relationships with all constituents, including students, alumni, and industry and government agencies. The successful applicant also will have the opportunity to maintain his or her own program of scholarship through teaching or research in a manner that is consistent with a primary administrative appointment.

Iowa State's doctoral program in statistics is ranked as one of the top programs in the country, and Snedecor Hall, home of the department and laboratory, has recently undergone a $9 million renovation. The department and the laboratory are staffed by 36 tenured and tenure-track faculty and have a combined annual budget of $5.4 million. The department has areas of strength in biological statistics and bioinformatics, engineering statistics, survey statistics, computational statistics, statistical graphics, Bayesian statistics, theoretical statistics, statistics education, and spatial and environmental statistics. The Statistical Laboratory includes the Center for Survey Statistics and Methodology, as well as support for human subjects and establishment data collection through its Survey and Behavioral Research Services office. For more information, visit www.stat.iastate.edu.

The statistics department is one of a number of nationally ranked programs at Iowa State, the most student-centered public research university in the nation. One hundred majors, 800 student organizations, learning communities, undergraduate research opportunities, study abroad programs, and faculty committed to the land-grant principle of knowledge with practice have resulted in record enrollment, donations, and sponsored programs funding. Iowa State is a member of the Association of American Universities and is ranked as one of the top 50 public universities in the nation by *U.S.News and World Report*. The university is located in Ames, a community ranked as one of the top 10 places to live in the United States by *Money* magazine. Please visit www.iastate.edu/about.

For a complete job description, required qualifications, deadlines, and information about how to submit nominations and apply, go to Vacancy 120630 at www.iastatejobs.com.

Iowa State University is an Affirmative Action/Equal Opportunity Employer.

applicants should assemble a cover letter addressed to the Chair of the Search committee, Dr. Melanie Wall, a complete CV, and the names of three references and email to Ms. Jina James (*jamesji@nyspi.columbia.edu*). Columbia University is an Equal Opportunity/Affirmative Action employer.

■ One-year, full-time, visiting instructor position in mathematical sciences. Teach four courses per semester and serve on department committees. master's degree required. To view the complete vacancy notice and/or to apply, visit *https://careers.fredonia.edu/applicants/Central?quickFind=50796*. SUNY Fredonia prides itself on an outstanding workforce. To continually support organizational excellence, the university conducts background screens on applicants. An affirmative action/equal opportunity employer, SUNY Fredonia encourages and actively

Challenging Statistics Problems at the RAND Corporation

The **RAND Statistics Group** is seeking Ph.D. statisticians interested in exciting opportunities to collaborate on multidisciplinary research projects in public policy areas such as health, national security, criminal and civil justice, education, and population studies; to conduct research on statistical methods; and to teach. RAND projects pose novel challenges in analysis, design, sampling, measurement, and computing. Locations include Santa Monica, CA (RAND's headquarters), Washington, DC, and Pittsburgh, PA. For more information, please visit www.rand.org/statistics/.

Candidates should have strong theoretical training, a genuine interest in applied statistics, and excellent oral and written communication skills. We seek both recent graduates and experienced statisticians with substantial publication records and extensive applied experience.

Applications received by December 15, 2012, will receive priority. Applications must be submitted online at www.rand.org/statistics/jobs.html and reference **Job ID 3221**. Please submit cover letter, CV/résumé, statement of research interests and consulting experience, and writing sample. Three letters of reference and graduate transcripts (if degree received after 2009) should either be emailed to Susan_Paddock@rand.org or sent to: RAND Corporation, Attn: Susan M. Paddock, Ph.D., Head, Statistics Group, 1776 Main Street, Box 2138, Santa Monica, CA 90407-2138 USA. Questions may be emailed to Susan_Paddock@rand.org.

RAND CORPORATION

OBJECTIVE ANALYSIS. EFFECTIVE SOLUTIONS.

RAND is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply.

The RAND Corporation is a nonprofit institution that helps improve policy and decisionmaking through research and analysis.

Santa Monica, CA • Washington, DC • Pittsburgh, PA • New Orleans, LA/Jackson, MS • Boston, MA

Better. Together.℠

At Capital One®, we're looking for a few bold intellectuals who aren't afraid to drive breakthrough innovation and challenge conventional thinking. Are you ready to make your mark? If so, we've got a place for you.

Our Statisticians influence strategy for one of the largest banks in the U.S. Here, you'll find a dynamic, challenging and collaborative environment. Capital One provides diversified financial services products in a fast-changing market. To manage the risks and reap the rewards, we need your unique mix of talents, insights and passions.

Now hiring Statisticians in the following locations: Richmond, Virginia · McLean, Virginia · Plano, Texas

www.capitalone.com/careers

We are an equal opportunity employer committed to diversity in the workplace. We promote a drug-free work environment. If you require an accommodation to apply for a U.S. employment opportunity, please contact Recruiting at 1-800-304-9102.

Capital One

UNCOMMON CAREERS AND AN UNCOMMON
APPROACH TO RESEARCH

Research is the driving force behind our property loss-prevention engineering and understanding of the hazards our clients face. FM Global has been the leader in property loss-prevention research for more than 175 years, and our research department is responsible for some of the most important breakthroughs in fire protection and loss-prevention engineering.

Sr. Research Scientist – Statistician

The position typically conducts work as part of a research program or project under the supervision of a Team or Program manager. The position will focus on the use of statistics to analyze all facets of data analysis.

- Must have a Ph.D. in a quantitative science with a major or concentration in statistics, with 0-4 years experience preferred.
- Familiar with Excel, Access, Minitab, SQL, MATLAB, Visual Basic, or equivalent applications as well as Bayesian methods, Monte Carlo and bootstrapping techniques, and have the ability to define causal relationships from analyses.

Sr. Research Scientist / Sr. Research Specialist – Risk & Uncertainty Team Lead

This position will serve as Technical Team Leader to the FM Global Research Area Director of Risk, Reliability and Failure Prevention and must exhibit technical and personal leadership, in addition to technical expertise and problem solving skills to develop new projects and programs and perform challenging work on projects as part of one or more research programs.

A Ph.D. in a quantitative science such as statistics, applied mathematics or operations research or engineering with a concentration in mathematical statistics, and 5+ years of relevant experience is required with:

- Excellent verbal, written and oral communication skills with a track record of professional publications and presentations.
- A demonstrated ability to efficiently solve complex problems including the development of new methods as required.
- Leadership skills demonstrated through interactions with diverse technical staff both within and outside their discipline.
- Application of Excel, Access, Minitab, SQL, MATLAB, Visual Basic, or equivalent applications as well as a strong knowledge of Bayesian methods, Monte Carlo and bootstrapping techniques.
- Knowledge of Data Envelopment Analysis and supply chain analysis methods would be advantageous.

Please email resume with "position" noted in the Subject line to **tiara.addocie@fmglobal.com**

Your career. Explored.
Insurance evolved.
fmglobal.com/careers

FM Global

FM Global is an Equal Opportunity Employer.
©2012 FM Global. All rights reserved.

seeks applications from minorities, women, and people with disabilities.

■ SUNY Fredonia, Mathematical Sciences: tenure-track, assistant professor in statistics. PhD (earned or expected) in statistics, or closely related field, is required. To view the complete vacancy and to apply, visit *https://careers.fredonia.edu/applicants/Central?quickFind=50805*. SUNY Fredonia prides itself on an outstanding work force. To continually support organizational excellence, the university conducts background screens on applicants. An affirmative action/equal opportunity employer, SUNY Fredonia encourages and actively seeks applications from minorities, women, and people with disabilities.

Pennsylvania

■ RAND Corporation is seeking PhD statisticians for exciting opportunities to collaborate on multidisciplinary public policy research projects. Openings exist for recent graduates and experienced statisticians. See our ad in the September *Amstat News* for details or go to *www.rand.org/statistics.* Applications received by December 15, 2012, will receive priority. Applications must be submitted online following the instructions at (Job ID #3221). Send questions to *Susan_Paddock@rand.org*. EO/AA Employer.

Texas

■ The department of mathematics and statistics invites applications for a tenure-track assistant professor position in statistics beginning fall 2013. A PhD degree is required. Apply for position number T96800 at *http://jobs.texastech.edu.* Include AMS standard cover sheet and vita. Have three letters of reference sent to Alex Wang, Hiring Committee Chair, Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX 79409-1042.

LearnSTAT OnDemand

The ASA's Popular Web-Based Learning Program Is Now Available

Anytime, Anywhere

Enjoy previously recorded web-based lectures on an on-demand, pay-per-view basis.

Each two-hour webinar features top statisticians discussing their specialties.

Available topics include:

Bayesian clinical trials
Stratified analysis
Survey research methods

Please visit *www.amstat.org/learnstatondemand* for the full catalog and to register.

Review will begin immediately. EOE: Texas Tech is an AA/EO employer.

Nationwide

■ *Tutor.com*, the #1 leader in online tutoring and homework help services is hiring online statistics tutors. Work from anywhere you have an internet connection and schedule your own hours every week. Earn extra income and make a difference! For more information and access to the online application, please visit *www.tutor.com/apply.* Tutor.com provides equal opportunity in all of our employment practices to all qualified employees and applicants without regard to race, color, religion, gender, national origin, age, disability, marital status, military status, genetic information or any other category protected by federal, state, and local laws.

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
Job Code 5307BR

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/jobs** and enter **5307BR** in the space provided.

Westat® | An Employee-Owned Research Corporation®

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY (HKUST)

Assistant Professor in the Department of Industrial Engineering and Logistics Management

The Department of IELM invites applications for a tenure-track Assistant Professor appointment. Applicants should have a PhD in Industrial Engineering or related discipline, and potential for excellent teaching and research. We are seeking candidates with strong methodology training in Statistics and specializing in Applied/Industrial Statistics. Individuals with research interests in Data Analytics and Massive Big Data are particularly encouraged to apply.

The successful candidate is expected to develop a vigorous research program and to teach courses in Applied Statistics and the general area of Industrial Engineering. He or she may be affiliated with the Center for Statistical Science, a new interdisciplinary unit to be established.

HKUST is an international university in the cosmopolitan city of Hong Kong. It is ranked first in Asia by QS for the second year in a row, and its Engineering School has been ranked among the world's top 25 since 2004. The Department has attained international recognition and we have a strong group of researchers specializing in Logistics & Supply Chain Management, and Design & Quality. Located in the gateway to China and the most dynamic logistics hub of Asia, the Department is expected to experience rapid growth in the near future.

Salary will be commensurate with qualifications and experience. Fringe benefits include annual leave and medical/dental benefits. Housing will be provided where applicable.

Applications including CV, statement of research and teaching, transcripts and names of 3 referees should be sent to the Faculty Search Committee by email to ielm@ust.hk. More information about the Department can be found at http://www.ielm.ust.hk.

Join the Conversation

It is now easier than ever to become engaged in the ASA and its members through social media.

ASA Community—Join this online setting for ASA members to communicate, collaborate, and share.

Twitter—Follow *Amstat News* on Twitter @AmstatNews and keep up to date on the profession.

Facebook—Check out the ASA's page on Facebook to keep up with the latest deadlines, news, and activities and to share your tips and comments with colleagues worldwide.

Engage your fellow statisticians and enhance your mind, education, and career at ***www.amstat.org***.

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.

International

■ Open position for a senior biostatistician at clinical trials unit of the Faculty of Medicine of the University of Bern, Switzerland: Find details at *www.ctu-bern.ch* EOE.

■ Non-tenure track teaching position for business statistics in the dept of ISOM. Applications will be accepted until the position is filled. Excellence in teaching, and PhD required by employment start-date. The successful applicant is expected to play an important role in teaching and developing business statistics courses for undergraduate and MBA programs of the business school. Submit CV and three referees to *stat11@ust.hk jobs.amstat.org/jobs/#/detail/4846999* HKUST is an Equal Opportunity Employer. ■

Open Rank Tenure-Eligible Faculty Position
Department of Biostatistics
Position #F34450

VCU Medical Center
Virginia Commonwealth University

The Department of Biostatistics at Virginia Commonwealth University (VCU) is seeking to fill a tenured/tenure-eligible faculty position at the level of assistant, associate, or full professor. We are seeking applicants with training and research interest in the design and statistical analysis of high-throughput genomic data (e.g., next generation sequencing, microarray, proteomic technologies), bioinformatics, computational biology, or closely related area. Additionally, applicants should have collaborative research experience. Primary responsibilities include teaching and advising graduate students as well as conducting independent methodological research. In addition, the successful applicant will be expected to collaborate with other VCU investigators in related fields in obtaining extramural grant support.

The Department of Biostatistics has a 40+ year history in the VCU School of Medicine and is committed to excellence in both biostatistical research and graduate education. The department offers both M.S. and Ph.D. programs in Biostatistics, including a concentration in Genomic Biostatistics, a M.S. in Clinical Research in Biostatistics, and a Master of Public Health. Our biostatistics faculty, students, and staff collaborate with clinical investigators on the Medical College of Virginia Campus (which includes the Schools of Medicine, Dentistry, Pharmacy, Nursing, and Allied Health) in a wide variety of biomedical research projects. Located in Richmond, Virginia, VCU has established relationships with the Virginia Department of Health as well as local and regional health departments.

Qualifications: For all levels, candidates should have a Ph.D. in biostatistics, statistics or related field, demonstrated experience in the analyses of high-throughput genomic or proteomic data, familiarity with statistical programming environments for analyzing such data, and excellent oral and written communication skills.

By Level of Appointment:

Full Professor: Applicants should have an established track record publishing in peer-reviewed journals, have national or international prominence in their area of expertise, and have demonstrated experience obtaining extramural research support.

Associate Professor: Applicants should have an established track record publishing in peer-reviewed journals and have demonstrated experience obtaining extramural research support.

Assistant Professor: Applicants should have at least two years of experience beyond completion of their degree program and must demonstrate excellent oral and written communication skills.

All candidates should have demonstrated experience working in and fostering a diverse faculty, staff, and student environment or commitment to do so as a faculty member at VCU. Potential candidates can submit applications, including a statement of research, teaching philosophy, curriculum vitae and contact information for three professional references, via mail – to Yvonne Hargrove, Department of Biostatistics, Virginia Commonwealth University, P.O. Box 980032, Richmond, VA 23298-0032 – or by e-mail to *yfhargro@vcu.edu*.

Virginia Commonwealth University is an equal opportunity/affirmative action employer.

AMSTATNEWS
ADVERTISING DIRECTORY

Listed below are our display advertisements only. If you are looking for job-placement ads, please see the professional opportunities section. For more job listings or more information about advertising, please visit *www.amstat.org*.

misc. products and services

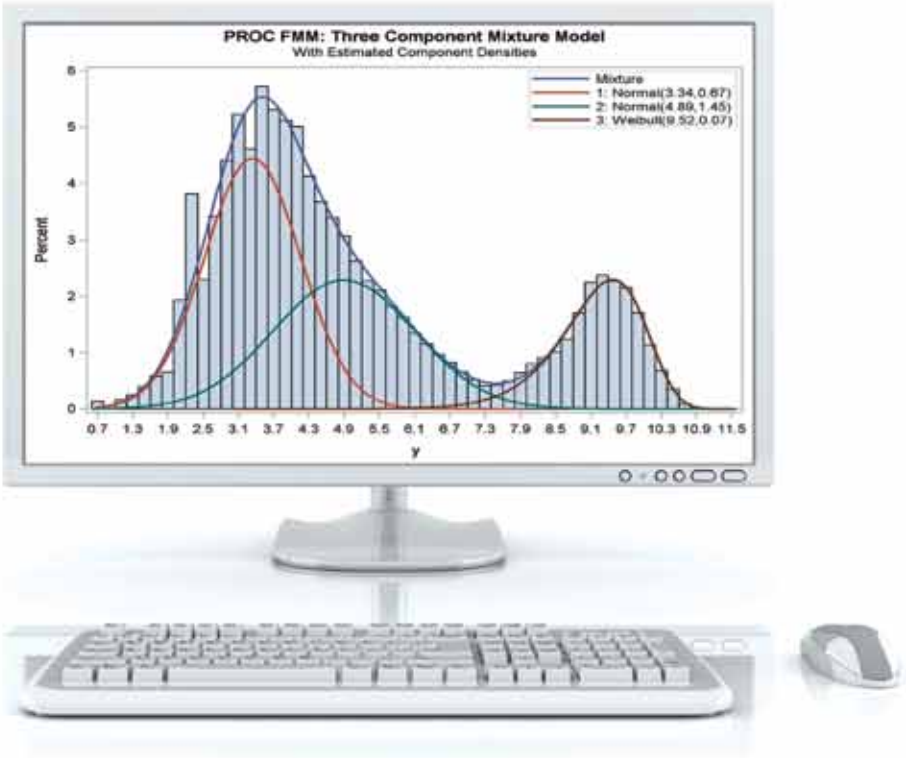
Wiley-Blackwell..... p. 40

professional opportunities

Capital One..... p. 44
FM Global..... p. 45
The Hong Kong University..... p. 46
Iowa State University..... p. 43
NORC..... p. 47
RAND Corporation..... p. 44
U.S. Census Bureau..... p. 42
Virginia Commonwealth University..... p. 47
Westat..... p. 46

software

Aptiv Solutions..... centerfold
Cytel Inc..... p. 14
JMP, a business unit of SAS..... cover 3
Minitab Inc..... centerfold
NCSS..... p. 16
Salford Systems..... p. 25
SAS..... cover 4
Stat-Ease, Inc..... p. 19
Statistical Solutions..... p. 33
StatSoft Inc..... cover 2



STATISTICS

More methods for more data.

You need statistical techniques today that you didn't learn in school, no matter when you graduated. And SAS® statistical software is not what you saw in school, either. Take a closer look at new features in SAS/STAT.® You might be surprised.

Analysis-centric statistical graphics are easy. Produce hundreds of graphs as simply as you generate tabular results, and create your own graphs with procedures specifically designed for statisticians.

Bayesian methods are built into analyses ranging from logistic regression to piecewise exponential survival models. Or, use a general purpose procedure that applies MCMC techniques to fit Bayesian models.

Statistical modeling, always a SAS strength, now includes model averaging, Cox regression for survey data, mixed models with large numbers of effects, convenient post-fitting inference, and exact Poisson regression.

Other new features include finite mixture models, the fully conditional specification method for multiple imputation, frailty models, group sequential analysis, new methods for structural equation modeling, and much more.

sas.com/morestatistics
for a free white paper

sas
THE POWER TO KNOW.

SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other brand and product names are trademarks of their respective companies. © 2011 SAS Institute Inc. All rights reserved. 372259US.0911

STATISTICAL DISCOVERY

Explore data visually and interactively. And then share your discoveries with others.

JMP® software covers the most widely used statistical techniques in a most visual way. Its comprehensive menu of analytics includes:

- Univariate Analysis
- Bivariate Analysis
- Matched Pairs
- Regression, GLM and ANOVA
- Screening
- Nonlinear Modeling
- Neural Networks
- Gaussian Process Modeling
- Decision Trees
- Time Series Analysis
- Categorical Data Analysis
- Conjoint Analysis
- Cluster Analysis
- Multivariate Analysis
- Principal Components Analysis
- Discriminant Analysis
- Partial Least Squares
- Item Response Modeling
- Reliability and Survival Analysis
- Design of Experiments
- R and SAS® Integration

jmp.com/statistics

jmp Statistical Discovery™ From SAS.

sas THE POWER TO KNOW.

SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other trademarks and product names are trademarks of their respective companies. © 2012 SAS Institute Inc. All rights reserved. 3035711US.0212