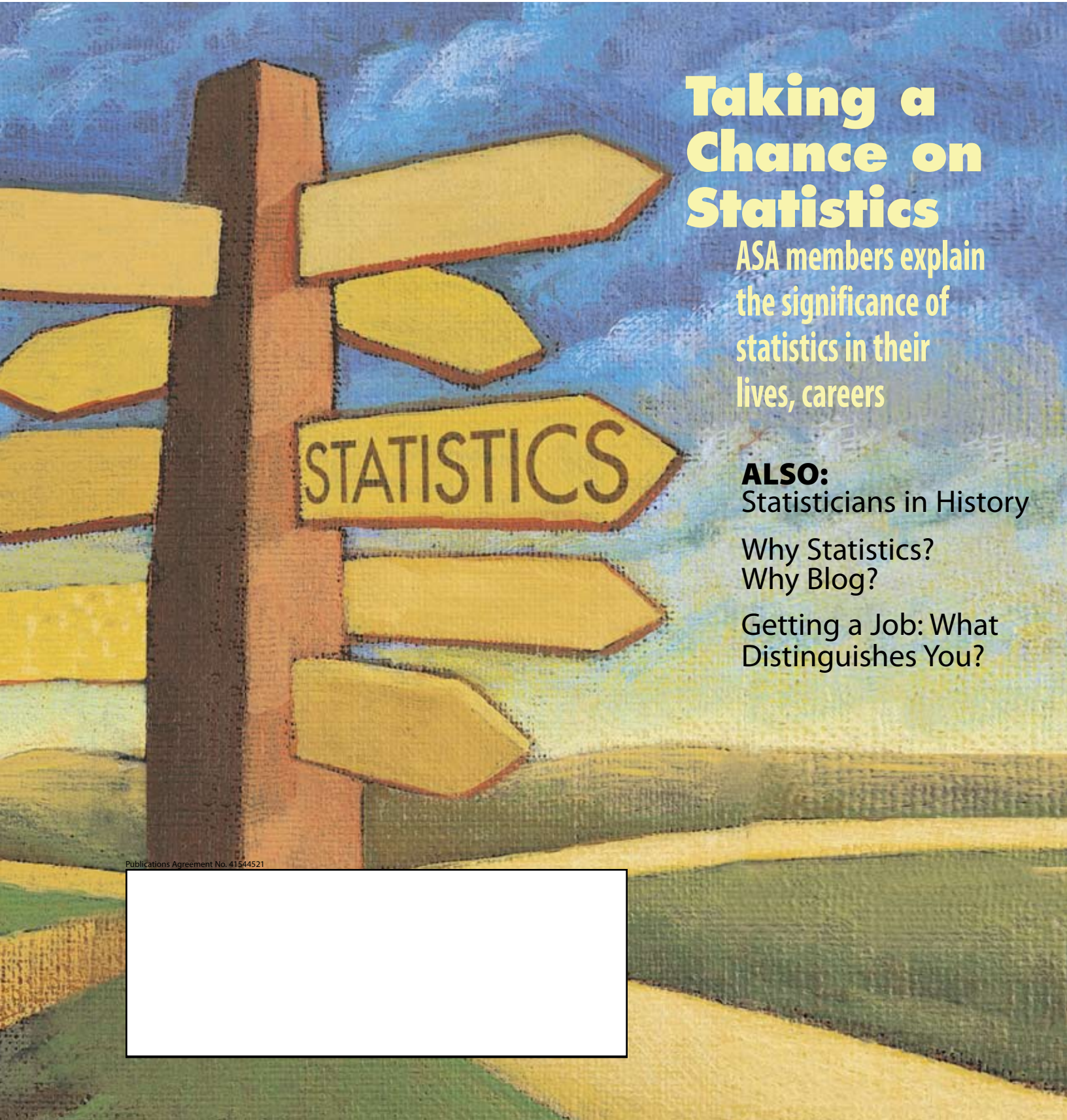


September 2010 • Issue #399

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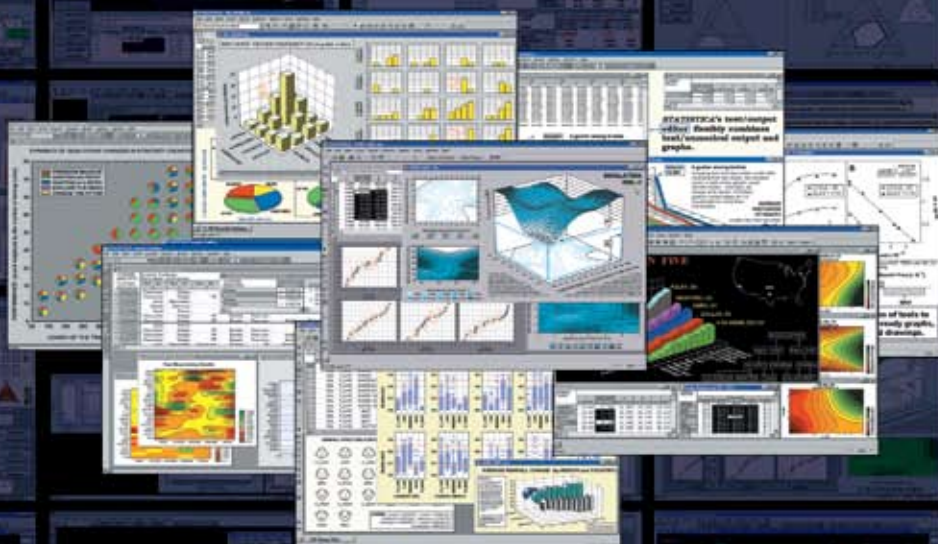
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American Statistical Association

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To be a world leader in promoting statistical practice, applications, and research; publishing statistical journals; improving statistical education; and advancing the statistics profession

MISSION STATEMENT OF THE ASA

Support excellence in statistical practice, research, journals, and meetings. Work for the improvement of statistical education at all levels. Promote the proper application of statistics. Anticipate and meet the needs of our members. Use our discipline to enhance human welfare. Seek opportunities to advance the statistics profession.

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Special CAREERS IN STATISTICS ISSUE

STAT|@k | |

STAT|@k is a new *Amstat News* column geared toward people who are in a statistics program, recently graduated from a statistics program, or recently entered the job world. Featured in the first column are two personal accounts written by recent statistics graduates.
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Never Say 'No'

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Andrew Cron, a second-year PhD student in statistical science at Duke University, discovers how taking risks can lead to success.

Nuclear Engineering to Ultimate Frisbee

A Conversation with an Intern at the Energy Information Administration

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Gabrielle Rossetti, a student at Simmons College, talks candidly about her internship experience at the Energy Information Administration.



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CAREERS IN STATISTICS

Statistics Ready for a Revolution

Next Generation of Statisticians Must Build Tools for Massive Data Sets

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The statistics profession is ready for a revolution, one driven by clear, objective benchmarks by which tools can be evaluated. Is the new generation of statisticians ready to take on this challenge?

Business/Industry Offers Dynamic Environment for Statisticians

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Statistics has had a significant effect within business and industry. Here, Roger Hoerl, of GE Global Research, shows how the private sector is another viable career option.

Getting a Job: What Distinguishes You?

p. 44

What does it take to be one of the top candidates for a job? Jeffrey Larson Keller and Daniel J. Sargent, of the Mayo Clinic, have been involved with placing hundreds of top statisticians into jobs at all levels. Here, they tell you what they expect to find in a sound statistician.

Soft Skills Just as Important as Core, Computational Skills When Looking for a Job



Sastry Pantula

There is an axiom in the business world: Your hard skills—that is, what you can show and quantify on your résumé—will get you an interview, but it is your soft skills that will land you a job.

Since this issue of *Amstat News* deals with careers in statistics, it is worthwhile to emphasize the three Cs—core, computational, and communication skills, especially the softer communication skills. I include here some points I made at a workshop for young industrial and business statisticians.

A quick look at JobWeb, the ASA's online job-posting site, confirms there are excellent opportunities for statisticians, biostatisticians, survey statisticians, bioinformaticians, quality engineers, predictive modelers, business analytics specialists, climate analysts, and computational scientists, among others. They include both technical/research-type jobs requiring focused problemsolving skills and managerial-type jobs requiring project and resource management skills.

To succeed in our careers, we need both hard skills and soft skills. There is no doubt that all our jobs require us to have a strong foundation in statistical theory and methodology and excellent computational skills to manage massive data. Soft skills are not a cover-up for the lack of hard skills; we must have and show our expertise in our field. However, hard skills by themselves are not enough. Soft skills help us work in teams, communicate with other scientists, aid management, and move up the ladder through leadership.

Other characteristics sought in the JobWeb ads include a strong work ethic, positive attitude, communication skills, problemsolving skills, ability to work with a team, confidence, ability to work under pressure, flexibility, and good time management.

So, what are soft skills? If you google “soft skills,” you will receive a number of definitions and a good number of advice columns about how to develop them. I will attempt to summarize them here.

Soft skills are the qualities or social skills we all possess. They are the interpersonal skills we have and use when working with others—how we interact with our peers; how we network and communicate; how we empathize with others; our integrity, optimism, and enthusiasm; how we formulate important problems and find solutions for them.

When consulting, we have to help our clients formulate the problem, create an appropriate hypothesis, and possibly offer advice about the type of data to collect. To accomplish this, we must listen.

Listen Proactively

Give full attention to the person talking and understand what he or she is saying before offering advice. As Stephen Covey, who wrote the popular book *The Seven Habits of Highly Effective People*, put it, “Seek first to understand and then to be understood” and “diagnose before you prescribe.”

Covey gave an example of a guy visiting an eye doctor. The doctor gave the guy his own glasses and said, “These are very good. They have been helping me a lot. You can keep these since I have another pair of glasses at home.” The patient tried them on and told the doctor he couldn't see very well and that things were still fuzzy. The doctor told him how well they worked for him and mentioned his disappointment with the patient, saying he was ungrateful.

Do not prescribe before you diagnose.

How many times while we are listening to someone do we run through our autobiography to relate a similar situation and begin offering advice before the other person is finished speaking? As Covey put it,

Congratulations Are in Order

I would like to congratulate and thank the ASA staff and JSM 2010 Program Committee for putting on a wonderful meeting in beautiful Vancouver. I appreciate all the members who participated and made the Joint Statistical Meetings a success. We received excellent press coverage, thanks to the Canadian census issue (which I sincerely hope reaches a positive resolution) and the hard work of our public relations specialist, Rosanne Desmone. If you need help working with reporters, Desmone has good advice and contacts. Email her at rosanne@amstat.org.

we want others to see through our glasses, whether they fit the other person's needs or not. Resist the temptation to formulate a response or go through your autobiography to share your stories while someone else is speaking. Learn to listen and empathize. Listen to understand, because all of us like to be understood, affirmed, validated, and appreciated.

Be Aware of Your Body Language

Our body language is a good indication of whether we are empathizing with someone. Keep eye contact while listening. Blank stares are dead giveaways that we are not empathizing.

It is also a good idea to rephrase in your own words what you understand someone's thoughts and feelings to be. When you repeat, it also gives you time to formulate a response.

It is also important that we use simple language in our conversations. It is distracting to use TLAs (three-letter acronyms) of which only a few people know the meaning. Jargon can become a barrier and is unimpressive. Some folks may be too shy to stop us or embarrassed to ask what those acronyms or complicated words mean. Look for common ground, rather than differences.

In a conversation, we should not speak for a long time without giving others the opportunity to speak. Pause and ask probing questions: What do you think? Do you agree? It's a two-way street. We learn much more from listening to others than listening to ourselves.

In addition to listening and speaking, we need to develop good writing skills. Most correspondence is done via email these days. However, email does not have eyes to see body language. It is easy to trade bullets over email. A small comment (pebble) may feel like an admonishment (boulder) to the person reading it at the other end. Also, be concise in your writing. No one has the time or patience to read long emails or memos. If it must be long, include a summary at the beginning of it.

Learn to Work in Teams

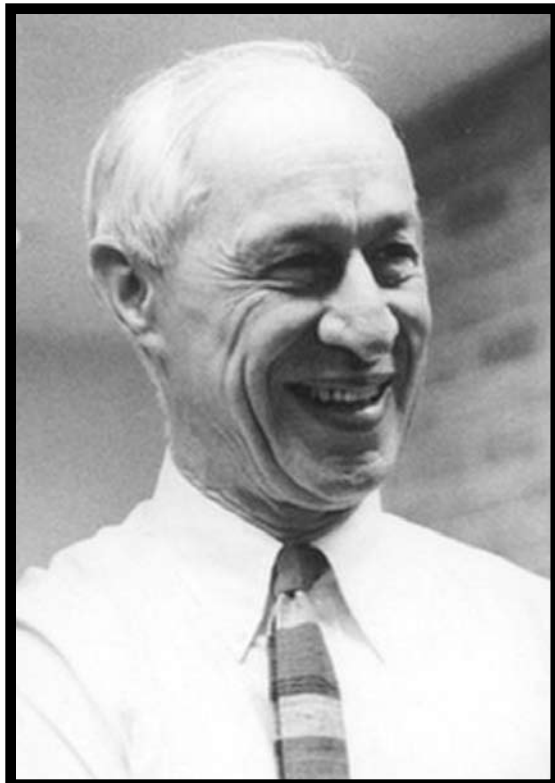
Know the rules and expectations at work. Different companies probably have different expectations. Share and learn the rules early so everyone has the chance to succeed. Make sure to greet people you run into: staff, peers, the boss, security personnel, the janitor. Share a smile; it is contagious. By all means, avoid political and religious comments or jokes. Always tell the truth so you don't have to remember what lie you said to whom. Don't gossip. It is important to have values and not be tempted to give up your ethics for short-term gain. Trust takes a long time to build, and we can lose it with one mistake. Our profession depends on having the public's trust. We should not give into pressure for sensational news or results someone else desires.

When we are working in teams, we need to get to know how our part may affect or benefit our team members (or the folks who have requested it). Every team member brings a different strength. As on a football team, not everyone is a quarterback; other offense and defense positions are needed. Everyone is important in his or her own way and contributes to the team's success. Working well in teams also means dressing appropriately and maintaining good hygiene.

As we move up, we need to bring others up with us, not step on and push them down. Just as a saw needs regular sharpening, we—young or seasoned—need to work regularly on improving our soft skills. Maintaining soft skills is a hard skill!

Enjoy reading the rest of this issue about all the wonderful opportunities out there for statisticians. All the best!

Sashy G. Pantula



Rensis Likert: Creator of Organizations

This article was originally written by Leslie Kish and appeared in The American Statistician in 1982.

Rensis Likert served as vice president of the American Statistical Association from 1953 to 1955 and was president of the ASA in 1959. His service to the ASA, however, hardly begin to indicate the breadth of the achievements of his long and vigorous career.

Likert was born in Cheyenne, Wyoming, in 1903. After living with his parents in several states, he entered the University of Michigan in 1922. There, he concentrated on civil engineering for a couple of years, until he took a course in sociology. Robert Angell recalls him from that class as his brightest engineering student. The respect was mutual, and Likert found that his scientific interests were more in people than in things. He transferred in his senior year from the college of engineering and took his bachelor's degree in sociology in 1926.

Likert went from Michigan to Union Theological Seminary for one year, then to the Columbia University Department of Psychology, where he took his PhD in 1932. At Columbia, Likert gradually moved from traditional fields of psychology to the new social psychology. In this, he was influenced by Gardner Murphy, who served as chair for his dissertation committee. His doctoral research

Started by Rensis Likert, the University of Michigan Institute for Social Research (ISR) is the world's largest academic social science survey and research organization. For 60 years, social scientists have trained there to develop new research methodology. Visit the ISR website at www.isr.umich.edu for more information.

dealt with a wide-ranging set of attitudes, interrelating student attitudes toward race and international affairs; it was published in 1932 as “A Technique for the Measurement of Attitudes.”

Engineering, sociology, psychology, ethics, and statistics. Likert maintained throughout his life an energetic appreciation of concepts and values from all these areas. He was always curious about how things work[ed] and how to fix them when they did not. His strong feel for structures and measurements also showed in his quantitative and pragmatic approaches to social problems and social measurements. The year at Union Theological Seminary was reflected in his openness, his optimism, and both his desire and his ability to do good.

Likert did well in several areas. During the course of his doctoral research, he developed what soon became the famous “Likert scale,” an early example of “sufficing” that exemplifies Likert’s pragmatic approach. He showed, with empirical comparisons, that his much simpler method (asking the respondent to place himself on a scale of favor/disfavor with a neutral midpoint) gave results very similar to those of the much more cumbersome (though more theoretically elegant) Thurstone procedure (based on the psychophysical method of equal-appearing intervals). The Likert scale has been adopted throughout the world, and continuing demand for the thesis led to its re-publication in the series *Classic Contributions to Social Psychology*. The scale also appears as Chapter 3 of the pioneering *Public Opinion and the Individual*, which Likert and Murphy published in 1938.

During his time at Columbia, Likert married Jane Gibson, whom he had known at [the University of Michigan]. They formed a loving, lasting, close bond. She was a lifelong source of support to him and, often, his collaborator.

Likert’s activities over the years 1939–1970 made a tremendous impact on the development of social statistics. In September 1939, he was appointed director of the U.S. Department of Agriculture’s Division of Program Surveys. Henry Wallace, secretary of agriculture, had invited Likert to organize this new unit, which was created to obtain more reliably farmers’ experiences with, and reactions to, the diverse new programs sponsored by the department.

This was a new idea—an independent statistical unit monitoring the activities of program agencies.

In 1941, the scope of Likert’s division expanded overnight from agricultural surveys and became the first general sample survey organization. Reliable and efficient multistage probability area sampling methods for households and individuals were developed and used with high standards for many national surveys of behaviors and attitudes. Several important new methods were introduced, among them the “fixed question with open-ended answers” to let respondents interpret questions on their own terms, rather than within rigid alternatives. The important surveys included research to explain and predict the buying and then the redemption of war bonds. In 1945, Likert also led a talented team of social scientists for studies of the effect of constant bombing of cities on the morale of the civilian populations of Germany and Japan. For the leadership of these strategic bombing surveys, Likert received the Medal of Freedom in June 1946.

In the fall of 1946, Likert and six associates left Washington to set up the Survey Research Center at the University of Michigan. With support from professors Robert Angell and Theodore Newcomb, it was started in a basement of the university; much of the staff worked on PhDs while doing professional grant research. The center grew in size and prospered, and with the addition of three more centers, it became the Institute for Social Research (ISR).

ISR developed and published many innovations in statistical methods and applications; some were discovered during the busy war years in Washington. These included scientific probability methods of sampling from the country level on down to the household and personal level, sound methods of controls for responses and nonresponses, improved questionnaire and coding methods, machine computations, and deeper methods of analysis and presentation of results.

In 1970, after 24 years, Likert retired from the University of Michigan as emeritus director of ISR and professor of psychology and sociology. He was impatient, at the age of 67, to put his ideas of organizational management into consulting practice and he created another organization, Rensis Likert Associates.

Most of Likert’s energies and time went into building and maintaining organizations, public service, and support and ideas for others. He wrote three more books: *New Patterns of Management* (1961), *The Human Organization: Its Management*

and *Value* (1967), and *New Ways of Managing Conflict* (1976), the last in collaboration with his wife. These books—based on surveys and studies in business, industrial, and governmental settings—deal with principles of participative management. They represent Likert's principal research interests and his collaborative efforts with many researchers, especially Robert Kahn, Daniel Katz, Floyd Mann, and Stanley Seashore. The central principles of his "System 4" are (1) supportive relationships between organizational members; (2) multiple overlapping structures, with groups consisting of superiors and their subordinates; (3) group problemsolving by consensus within groups; and (4) overlapping memberships between groups by members who serve as "linking pins."

Likert's optimism and friendliness were genuine and infectious. They were crucial assets in external relations for the diverse organizations he invented, established, and maintained. They were also important for creating self-confidence and confidence, loyalty, and inventiveness in the many talented people he attracted to lives in collaborations devoted

Based on surveys and studies in business, industrial, and government settings, Rensis Likert identified four main styles of leadership in his book *The Human Organization: Its Management and Value*:

Exploitive authoritative—where the leader imposes decisions on subordinates and uses fear to achieve employee motivation

Benevolent authoritative—where the leader uses rewards to encourage productivity, but management is responsible for all decisions and there is no teamwork

Consultative—where management does listen to subordinates and incorporates some employee ideas, but most subordinates do not feel responsible to achieve the organization's goals

Participative—where the leader engages subordinates, solves problems with teamwork, and everyone feels responsible for achieving the organization's goal

to rational problemsolving in the social sciences. Likert's initiative, enterprise, and unending energies had more important goals than merely being right; he wanted to make the world better, and he had a youthful belief that the sciences of human behavior can be developed to make unique and vital contributions to those goals. ■

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Stuart Arthur Rice: Student Activist to Statistical Statesman

*The following appeared in the October 1969 issue of
The American Statistician.*



Stuart Arthur Rice, president of the American Statistical Association in 1933, was born in Wadena, Minnesota, November 21, 1889. He earned an AB degree from the University of Washington in 1912 and a PhD in sociology from Columbia University in 1924.

Rice's career can, in one sense, be epitomized as the evolution of a student activist and young radical political party worker to social worker, to student and teacher of sociology, to statistician and statistical statesman. In another sense, his career epitomized the development of social and governmental statistics since the 1920s.

As an undergraduate in Seattle, he switched from the school of engineering to major in political science under J. Allen Smith, an exponent of the "economic basis of politics." On graduating, he served briefly on the staff of the Washington State

Industrial Welfare Commission, after which he became a confidential investigator for the New York City Department of Public Charities. Masquerading as a derelict, he sought refuge in the municipal lodging house for homeless men. His exposure to abuses in that institution led to his appointment at the age of 27 as its director.

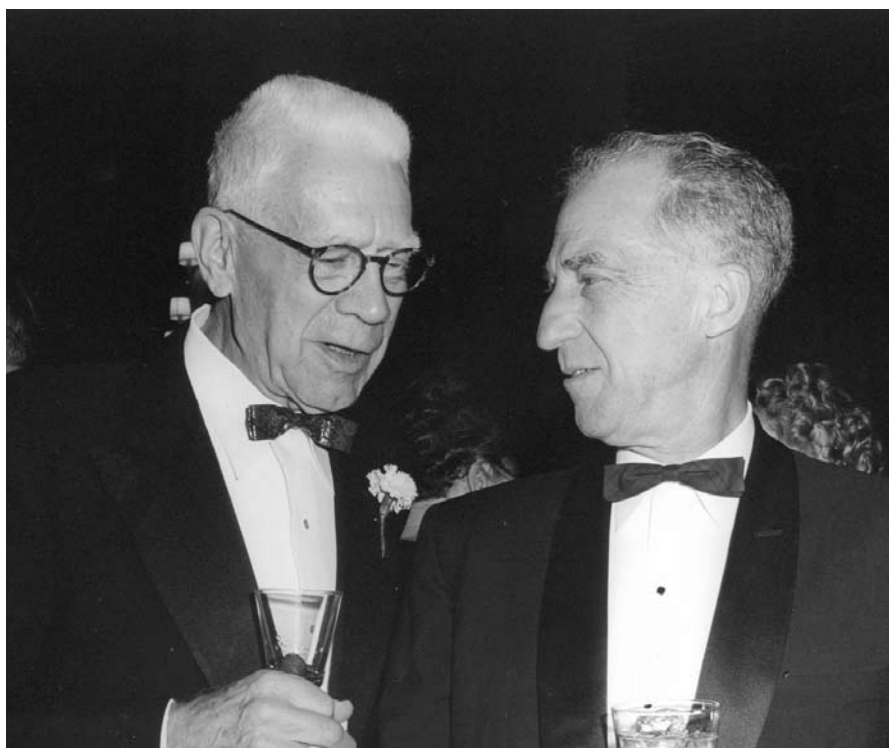
During and immediately after World War I (being then a conscientious objector to military service—a stance he emphatically repudiated in later years), he worked for the War Camp Community Service and American Red Cross. In 1920, he returned to Seattle and resumed political activity as executive secretary of the local Farmer-Labor Party, unsuccessfully campaigning for the nomination of Robert M. LaFollette Sr. as the party's candidate for president.

“I wanted to abandon preconceptions and to learn what makes the world ‘tick,’ rejecting in the search everything but demonstrable evidence and objective analysis.”

Disillusioned by the break-up of the political coalition of disaffected farmers, industrial laborers, and white-collar workers, Rice returned to New York and enrolled as a graduate student of sociology at Columbia. Long afterward, he wrote of this turning point in his career: “My matriculation in sociology ... was a confession of failure, a search for freedom from illusions. ... I wanted to abandon preconceptions and to learn what makes the world ‘tick,’ rejecting in the search everything but demonstrable evidence and objective analysis ... finding the truth and taking the consequences.”

Professor Franklin H. Giddings challenged Rice to find out why his political endeavors had failed; the resulting doctoral dissertation, “Farmers and Workers in American Politics,” stands as a landmark in the statistical analysis of political behavior. The former young agitator had now become what one of his close associates of the time has called “a pragmatic theorist.”

In the latter role, Rice taught sociology at Dartmouth College from 1923–1926 and was professor of sociology and statistics at the University of Pennsylvania until 1940. The 1930s saw his activities extend rapidly beyond the academic campus. In 1931, he joined the staff of the Social Science Research Council; during the ensuing years, he served on several of the council’s research committees and was a member of its board of directors. *Methods in the Social Sciences*, a volume edited by Rice under the council’s auspices and published in 1931, was a significant product of the council’s effort to foster more objective and verifiable research. Around the same time, Rice participated in the pioneering work of the President’s (Hoover) Committee on Social Trends, which was charged with making a comprehensive inventory of social trends in a nation staggering under the impact of economic depression. The growing need for more adequate statistical data, which that committee’s studies made sharply evident, led the Social Science Research Council and American Statistical Association to join in creating a Committee on Government Statistics and Information Services (COGSIS).



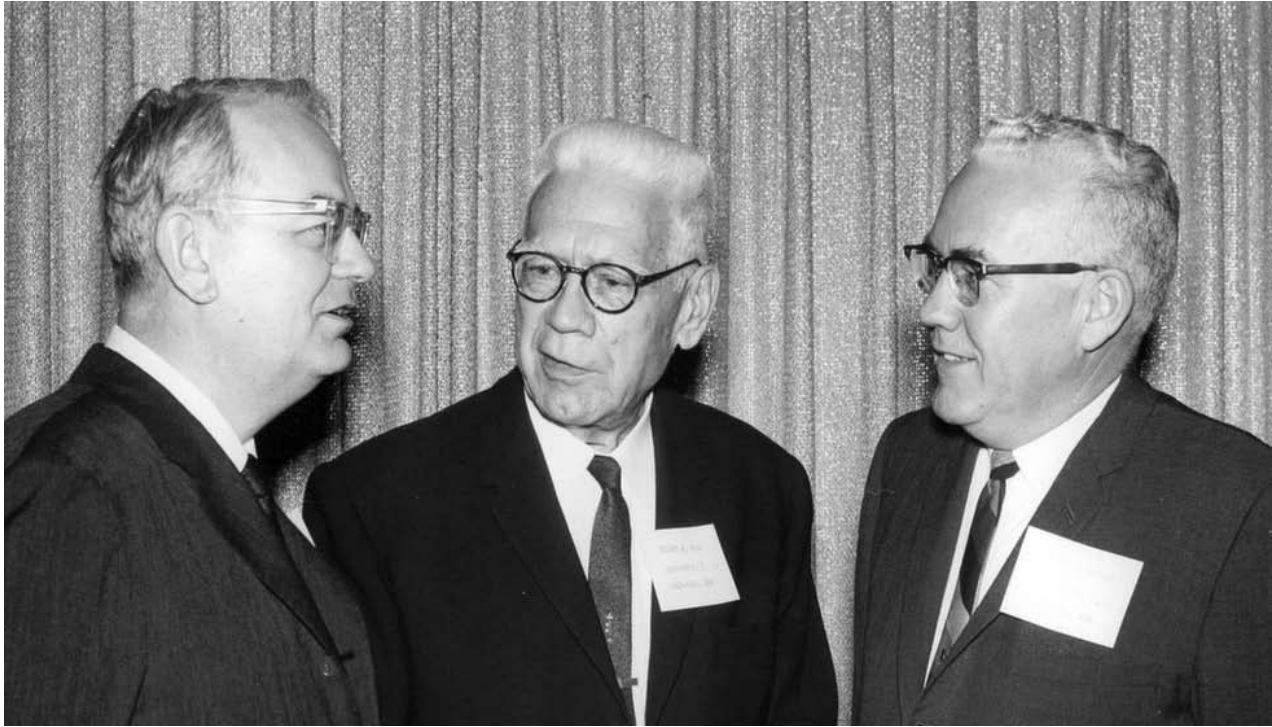
Stuart Rice (left), ASA president in 1933, and Raymond Bowman, ASA president in 1963

The following is an excerpt from an oral history interview with Stuart Rice’s wife, Sarah Mayfield Rice, on August 20, 1970. To read more about their social and political life in Washington, DC, during the Truman years, visit the Truman library archives online at www.trumanlibrary.org/oralhist/rices.htm.

I met my husband at The University of Chicago. He was my statistics professor for three quarters, and he scarcely seemed to know me, for at that time, he was engaged to Elizabeth Meade, the younger sister of Margaret Meade, the well-known anthropologist. ... We went to the theater once, and once we drove out to the dunes and went swimming, but he didn’t get interested in me really until that following winter when I was back in Birmingham and he used to fly down on the weekends. ... Stuart and I were married on May 29, 1934, and had a very lovely wedding and went to Europe for two months on our honeymoon.

In 1933, Rice assumed three positions, all related to his future work: president of the American Statistical Association, acting chair of COGSIS, and assistant director of the U.S. Census Bureau. He continued in the last of these positions until 1936, bearing responsibility for the bureau’s technical operations and working vigorously to raise the standards of professional competence of the staff of a traditionally patronage-plagued agency.

Largely through the influence of COGSIS, the Central Statistical Board was created by presidential



From left: Frederick Mosteller, Stuart Rice, and Morris Hansen during the ASA's 125th anniversary celebration in Boston, Massachusetts, in November of 1964

Originally called the National Labor Party, the Farmer-Labor Party—formed in 1919—changed its name to appeal to farmers. The party called for the public ownership of railroads, utilities, and natural resources; an end to private banking; and the nationalization of unused land. To read more about the organization, its beginnings, and its demise, visit www.marxists.org/history/usa/eam/flp/farmerlaborparty.html.

order in 1936, and Rice left the U.S. Census Bureau to become its chair and executive head. The board's mission was to improve the effectiveness of statistical work throughout the many agencies of the executive branch of the government—a mission that, in the absence of specific statutory authority, called for a high degree of tact and persuasiveness. Four years later, the board was supplanted by the newly created division (later office) of Statistical Standards in the Bureau of the Budget, and Rice was appointed the bureau's assistant director for statistical standards, remaining in that post until his retirement from government service in 1955.

When the organization for the United Nations took form, Rice is credited with having almost single-handedly laid the foundation for its Statistical Commission and Statistical Office. From 1945 onward, much of his time and energy were occupied in consultant service to foreign governments. He was responsible for reorganizing the statistical

services of Japan during the American occupation of that country; he advised a number of western European governments in the immediate post-war years; and, from 1958–1963, he was statistical adviser to the government of Korea. As a member of the United Nations Contributions Committee, he was influential in bringing about a more equitable balance between the assessments levied on the USSR and on other nations—a feat involving no little diplomatic skill.

Rice's contributions to international comity were not confined to the technical realm. During their stay in Korea, he and his wife “adopted” a number of young Koreans, some of whom they helped to come to the United States for higher education.

Retirement from federal service in 1955 did not mean cessation of activity. Rice continued for a decade to head the consultant organization known first as Stuart A. Rice Associates and later as Surveys and Research Corporation. After relinquishing the reins, he remained an active consultant to the organization in his last years. He also continued to participate in scientific gatherings, and a few months before his death in June 1969, he presented a critique of a report called “Lessons from the First Social Report and Thoughts for the Future.”

Among his list of numerous honorary awards, Rice received the District of Columbia Sociological Society's Certificate of Merit in 1968 for “representing the best in public service and excellence in social science inquiry for more than 50 years.” ■



Sandra Stinnett: Providing a Rich Contribution

Melissa Muko, ASA Graphic
Designer/Production Coordinator

Biostatisticians are a vital part of any medical research team. They collaborate with researchers to gather and analyze data that will provide answers to important medical questions. Physicians rely on this research to determine whether a medication will work for his or her patient or what medical procedure will be most effective. Without correct data, it is impossible to know what new treatments and techniques will be beneficial to patients. At Duke University Eye Center, that biostatistician is Sandra Stinnett.

It might be surprising to learn that Stinnett did not take a single mathematics course as an undergraduate student studying psychology at the University of Houston. After earning her bachelor's of science degree in 1970, she realized she did not have that many employable skills. She decided to rethink her future by exploring her growing interests in both math and Spanish. Over three years, she began taking math courses at the University of Houston and Spanish classes at Berlitz, a school for language instruction and cross-cultural training.

On a Personal Note

What do you like to do in your spare time? Do you have any hobbies?

I practice Spanish whenever I can—through dinners with friends, traveling, or by listening to CDs while I drive. I also take classes at the Duke Center for Documentary Studies and am interested in making audio documentaries.

What is your favorite book?

I am a fan of Joyce Carol Oats and Jodi Picoult and have collected all of their books. *The Spirit of Survival* by Gail Sheehy impacted me a lot. It is the story of Sheehy's adopted daughter, Mohm, who survived the Pol Pot regime in the Cambodian jungle. The book chronicles the child's strength of spirit as she endured many tragedies. It also shows the mother's courage and hard work of adopting Mohm and helping her heal. Mohm's story offers lessons we can all apply to ourselves. We have the inner resources to prevail over adversity, to heal ourselves, and to emerge strengthened.

What is a website you can't go a day without visiting?

www.cnn.com

If you weren't in your current position, what would you be doing?

I would continue to work on my Spanish, travel, and volunteer as a statistician at a hospital in the Dominican Republic. I would also work on my photography and audio recordings and make documentaries.

In 1973, Stinnett discovered the University of Texas School of Public Health. She intended to go into international health, but had a chance encounter with an epidemiology professor while interviewing at the university. The professor asked her if she had an interest in math (which she did) and suggested she go into biometry and work for him on a study of hypertension and African Americans in Panama. After the professor explained that biometry was the application of statistics to biology and health, Stinnett knew this program would be a good fit for her and her career goals. She entered the master's program and, in 1975, traveled to Panama to collect data for the professor's hypertension study.

While working on her master's thesis on regression to the mean in repeated measurements of blood pressure, Stinnett learned of Sir Francis Galton (1822–1911), who first used the term “regression to the mean.” She found it interesting how Galton worked out the details in ways that were easy to understand. She enjoyed reading not only about his statistical role models, but also of the many careers he had. “He was an English Renaissance man who traveled in Africa and was a tropical explorer, a geographer, an anthropologist, a meteorologist, a geneticist, and a psychometrician, as well as a statistician,” she said. “What a romantic time that must have been! It inspires me to explore many fields and interests ...”

After completing her master's degree in 1977, Stinnett began working at the University of Texas School of Public Health in the epidemiology research unit. She worked as a statistician on grants funded by the National Institutes of Health and Environmental Protection Agency related to health effects of petrochemical plants—facilities that produce substances such as methanol, ethylene, toluene, propylene, vinyl acetate, vinyl chloride, and styrene—in several Texas counties.

After working at the UT School of Public Health for several years, Stinnett decided she wanted to continue her studies and chose The University of North Carolina School of Public Health as the place to pursue her doctoral degree in biostatistics. In 1981, Stinnett moved to North Carolina after a series of what she called “cosmic events.” “I kept meeting people from Chapel Hill, found a house on my first visit, and got a job in the biostatistics department. And my employer in Houston allowed me to continue working remotely in Chapel Hill. It was a heady time.”

In the fall of 1982, Stinnett entered UNC as a doctoral student. “I remember sitting in the orientation for new students in Rosenau Hall. As I listened to Bernie Greenberg, a biostatistician and the dean of the school, tell his vision for the future of health care and research, I got chills. I was so inspired. I knew that I had come to the right place.”

While at UNC, Stinnett wanted to understand more about her field of study. Why are we here? Who came before us? How useful is this field? What is this all about? So, she began to do research on the history of statistics in North Carolina. She sought out many of the pioneering statisticians and interviewed them individually. Following the interviews, she scheduled talks, which she videotaped. The tape that resulted from Greenberg's talk was one of the few audio-visual legacies left when he died shortly thereafter. Her investigations led to the creation of a departmental seminar series that was so successful the faculty voted to send her a letter of commendation.

As part of her tenure as a student, Stinnett was the coordinator of the Biometric Consulting Laboratory in the department of biostatistics. The lab was comprised of students who wanted to gain consulting experience by working on projects under the faculty supervision of professors Dennis Gillings and Gary Koch. Stinnett credits Koch as her mentor during this time. He coached Stinnett on management of the lab and analysis for projects. She had the opportunity to develop course materials while serving as Koch's teaching assistant for several classes, some of which were used in workshops in which he included her as a presenter. “He served on my dissertation committee and freely gave career advice—whether I asked for it or not! He was the ultimate mentor,” recalls Stinnett.

While working in the lab, Stinnett realized all students in the department could benefit from a consulting experience. In 1986, she developed and presented a proposal for a course on statistical consulting. (She was always looking for innovative teaching ideas and received weekly advice from Doug Zahn—a statistics professor at Florida State and prominent figure in the consulting field.) The proposal was accepted and Stinnett began teaching her first statistical consulting course. For the class, Stinnett developed a series of role-play situations, in which students would act out both the client and consultant roles. She taught the course as a student for five semesters from 1988–1990. While working for Duke in 2001, she was invited back to UNC to teach the statistical consulting course, which she did for eight years. During her last tenure there, she developed a course pack, PowerPoint presentations, video examples of consultations, and full-fledged consulting projects for use in the class.

In 1987, Stinnett took a break from her studies to work for Dennis Gillings and his rapidly developing company, Quintiles—a fully integrated bio and pharmaceutical services provider offering clinical, commercial, consulting, and capital solutions—in Chapel Hill. For six months, she lived in London while developing Quintiles' first foreign office. At the end of a hectic year, she spent a month at a language school in Spain and, after taking the opportunity to travel abroad, returned to UNC in the spring of 1988 to finish her dissertation, consult independently, and teach her consulting course. That same year, she wrote an article for the ASA Section on Consulting's newsletter titled, "Statistical Consulting for the Pharmaceutical Industry," which recounted her work with Quintiles.

While completing her dissertation, Stinnett worked at Rho as a consultant for Ron Helm, one of her dissertation advisers. She graduated with a DrPH in biostatistics in December 1993.

After all her experience, Stinnett knew when she took her first "real" job, it would have to be special. In 1994, she saw an advertisement for someone to manage the statistical group at the Duke Clinical Research Institute. "I felt that it had my name on it," said Stinnett.

Stinnett has taken on several roles since her appointment at Duke in 1994. She has been an assistant research professor in the department of biostatistics and bioinformatics at Duke University Medical Center. For more than four years, she was director of statistical operations at the Duke Clinical Research Institute, where she was responsible for managing approximately 35 statisticians who assisted with the design and analysis of clinical trials. From 1995–2000, she taught the introductory statistics course to physicians in the Duke Clinical



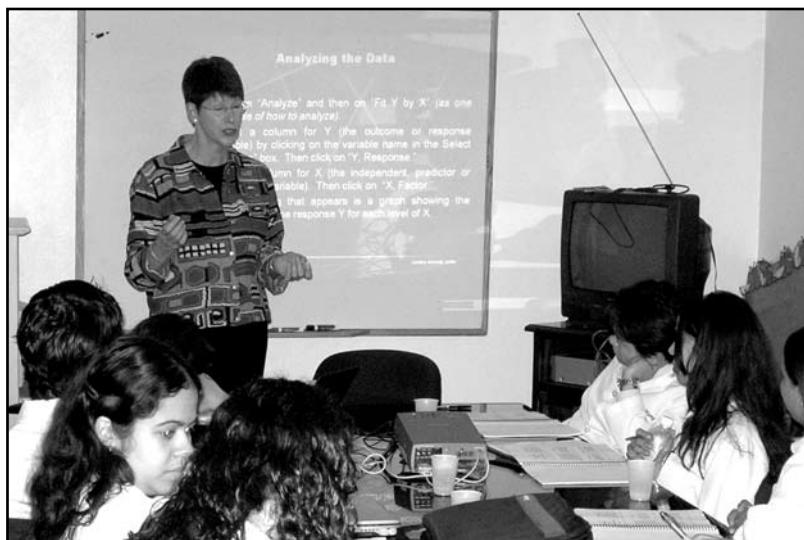
Sandra Stinnett prepares a presentation in the OCT Reading Center of the Duke Eye Center while (from left) Cynthia Toth, a retinal surgeon; Char DeCroos, a resident at the eye center; and Cynthia Heydary, an employee who works with the data in the reading center, look on.

Research Training Program. Finally, she received a secondary appointment in the department of ophthalmology in 2001.

As a biostatistician for the Duke Eye Center (ranked one of the top 10 U.S. ophthalmology centers in *U.S. News & World Report's* best hospital edition), she works with faculty, fellows, and residents in a variety of roles. She assists with the planning and implementation of research projects, including creating data-collection instruments and data files, executing statistical analyses, and interpreting results for publications and presentations. In addition, she provides sample size estimates for the planning of new projects and assists with writing grant proposals. Projects she has analyzed data for include risk factors for peripheral vascular disease, associated factors in age-related macular degeneration (AMD), impact on visual acuity of translocation surgery for AMD, and the assessment of physician skills with respect to guidelines of the practice of ophthalmology.

Another component of the Duke Eye Center is the OCT Reading Center. It specializes in the imaging technology known as optical coherence tomography. Staff grade OCT images of patients' eyes. Stinnett assists with the assessment of quality assurance for the grading process and produces reports for study sponsors and data and safety monitoring.

Recently, she assisted the departments of radiology, orthopedic trauma surgery, and general surgery at Duke with their data analysis and provided lectures for residents. Additional responsibilities include serving on the thesis committees for physicians in the Duke Clinical Research Training Program, serving on the Duke Institutional Review Board, and teaching medical statistics to Duke third-year medical students. At the moment, she is



Stinnett lectures residents at Elias Santana Hospital in Santo Domingo, Dominican Republic.

redesigning her course in medical statistics to use term-based learning.

What does Stinnett love about being a statistician and her current position? “I enjoy working at the Duke Eye Center,” Stinnett says. “I get to be involved in exciting, cutting-edge research, and I appreciate the recognition I get as part of the research team. The faculty and staff here are wonderful—it’s like working with a great family.” She appreciates the freedom to do her work whether she’s at the office or home. She also finds that combining teaching with consulting is enriching. “I am never bored!”

In 2007, Stinnett was invited to give a lecture series on research designs and statistical methods at Elias Santana Hospital in Santo Domingo, Dominican Republic. She covered research methods, planning a research project, reading and writing of medical literature, and an overview of statistical methods.

At this charity ophthalmology hospital, residents gain experience while working with some of the poorest patients in the country. An important part of their curriculum is an individual research project. Residents have earned top prizes for these at the annual Dominican Republic congresses of ophthalmology and other Latin-American congresses; however, some of their research lacked the proper statistical analysis and study design needed to be published in respected ophthalmology journals. After giving the lecture series, Stinnett said, “The gratitude and warmth of these residents will stay with me forever. ... What I gained from the experience was a new confidence in what I have to offer and a thrill from knowing that I provided a service. And, oh yes, I had some incredible food!”

Stinnett has been a member of the ASA for 35 years and has held several offices, including president of the Caucus for Women in Statistics and chair of the Committee on Women and Section on Statistical Consulting. She has organized and chaired several invited sessions at national meetings, including The Past, Present, and Future of Women in Statistics (1989), Women in Clinical Trials: Policy, Science, Statistics (1991), Training Statistical Consultants Using Videotaping and Coaching (1992), and Can a Statistician Earn a Living on Her Own? (1993). She also has made several presentations, primarily on the training of statistical consultants.

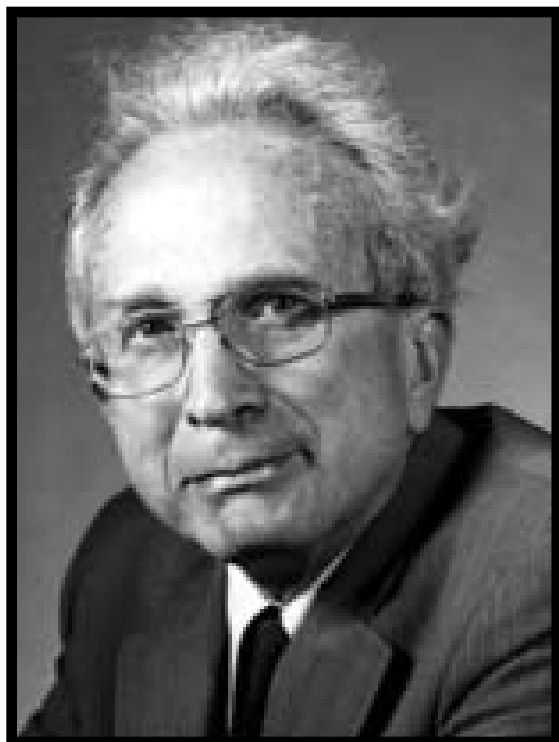
At the 1987 annual meeting, Stinnett participated in an invited session organized by Terry Smith. The session featured a live, unrehearsed role-play demonstration in which Stinnett played the part of the client and others played the consultant and coach. Zahn was the discussant. Both Stinnett and Zahn used the video of the session while teaching their consulting class, as did others, including a former student of Stinnett’s.

Along with Janice Derr, Stinnett was invited to present three all-day continuing education workshops on consulting, two of which were at the 1993 and 1994 Joint Statistical Meetings. In 1994, the two teamed up again to write an article for *CHANCE* magazine, titled “The Interesting Life of a Practicing Statistician.”

Throughout her education and career, Stinnett has learned the following:

- You can help to create a destiny by visualizing it.
- Believe in synchronicity. It’s a sign you are on the right path.
- If you feel that you are “right” for a job, insist on having it.
- Persevere. You could be “three feet from the gold.”
- Your worth is not the same as others’ opinions of you.

Finally, Stinnett has a few words of encouragement for recent graduates and those deciding upon a career path: “Don’t let setbacks discourage you; use what you learn from them to help plan your next steps. Don’t confuse a lack of success in a difficult situation with a lack of your value; just change the situation. Follow your interests even if they appear to be off the beaten path of statistics. It is the unique combination of fields of study that makes for a rich contribution.” ■



Jack Wolfowitz: Applying Mathematical Statistics to Practical Problems

This is an excerpt from Jack Wolfowitz's memorial, which was written by Lionel Weiss and published in The American Statistician in 1981.

Jack (Jacob) Wolfowitz was born in Warsaw, Poland, on March 19, 1910, and came to the United States with his family in 1920. He graduated from the College of the City of New York in 1931 and worked toward his PhD while supporting himself as a high-school teacher. He earned his PhD in mathematics from New York University in 1942.

In 1934, Wolfowitz married Lillian Dundes, who he remained committed to in marriage for the rest of his life.

In 1938, Abraham Wald came to Columbia University; it was then that Wolfowitz and he started their remarkable collaboration. Their first joint paper, "Confidence Limits for Continuous Distributions," was published in the *Annals of Mathematical Statistics* in 1939. Wolfowitz revered Wald, and after Wald was killed in a plane crash in 1950, a large photograph of Wald occupied a prominent place on Wolfowitz's office wall.

During World War II, Wald and Wolfowitz worked together on war-related research at the Statistical Research Group at Columbia University. In 1945, Wolfowitz became an associate professor at The University of North Carolina at Chapel Hill. In 1946, he joined the faculty at Columbia University, where he stayed until 1951. In 1951, he joined the department of mathematics at Cornell University. In 1970, he joined the department of mathematics at the University of Illinois at Urbana-Champaign. When he retired from the last position in 1978, he became distinguished professor at the University of

South Florida at Tampa, a position he held until he died on July 16, 1981.

As a teacher, Wolfowitz was unmatched in his ability to explain the intuition underlying the most complicated research results. His own drive toward intuitive understanding led him to many interesting results. An outstanding example of this was his investigation of why the maximum likelihood estimator works as well as it does in so many cases, an investigation that started in 1949 with “On Wald’s Proof of the Consistency of the Maximum Likelihood Estimate,” published in the *Annals of Mathematical Statistics*, and continued for most of the rest of his life.

It is interesting that during this investigation, Wolfowitz and Jack Kiefer found what seems to be the first example of a case that might arise in practice in which the method of maximum likelihood breaks down: It is the program of estimating μ and σ based on n iid observations, each with

$$\frac{1}{2\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right] + \frac{1}{2\sqrt{2\pi}} \exp\left[-\frac{1}{2}(x-\mu)^2\right],$$

which is discussed in “Consistency of the Maximum Likelihood Estimator in the Presence of Infinitely Many Incidental Parameters,” published in 1956 in *Annals of Mathematical Statistics*.

Wolfowitz’s research touched every important area of mathematical statistics and extended outside of mathematical statistics into such fields as probability theory, inventory theory, and coding theory. In this last field, he is considered as eminent a researcher as he is in mathematical statistics. A good account of his research, as well as a complete bibliography, can be found in *Jacob Wolfowitz: Selected Papers*, edited by Kiefer and published by Springer in 1980.

Most of Wolfowitz’s publications are highly mathematical, but much of his research has direct practical application. An example is the sequence of papers on the inventory problem, written with Aryeh (Arie) Dvoretzky and Kiefer, which appeared in *Econometrica* in April 1952, July 1952, and October 1953. These were pioneering papers in what is now a whole field of study; operations research departments give full courses in inventory theory.

Wolfowitz also felt strongly that the ultimate justification for research in mathematical statistics is its applicability to practical problems. In this connection, his 1967 paper, “Remarks on the Theory of Testing Hypotheses,” published in the *New York Statistician*, is particularly interesting. A few excerpts will illustrate the outlook expressed in this paper:

“I have written of the divorcement from reality of much of current research in mathematical statistics.”

“The practical statisticians who now accept useless theory should rebel and not do so any more.”

“What about the mathematical statisticians, especially the talented and mathematically productive among them? Most of the papers they write on testing hypotheses are, at their best, mathematically ingenious and difficult, of no general mathematical interest, and no lasting statistical importance.”

It is significant that Wolfowitz chose this non-technical article to be included in the volume of selected papers.

Wolfowitz’s research contains many asymptotic results. His attitude toward asymptotic theory was that it was merely a guide to the choice of appropriate statistical decision rules for moderate sample sizes, necessary because computations that are impractical for finite sample sizes often become relatively easy as sample sizes increase. Large-scale computer simulation is just becoming economically feasible, which will make it possible to evaluate statistical decision rules for small and moderate sample sizes. I think Wolfowitz would welcome such Monte Carlo investigations.

His honors include an honorary doctorate from the Technion in 1975, election to the National Academy of Sciences and American Academy of Arts and Sciences, and becoming a Fellow of the ASA, Econometric Society, International Statistical Institute, and Institute of Mathematical Statistics. He served a term as president of the Institute of Mathematical Statistics and was chosen as Rietz Lecturer and Wald Lecturer. In 1979, he was the Shannon Lecturer of the Institute of Electrical and Electronic Engineers. He gave invited addresses at numerous scientific meetings.

Wolfowitz read widely, traveled often, and kept himself informed about current events in all of the large nations and many of the smaller ones. A large university attracts visitors from all over the world, and Wolfowitz liked to get the points of view of such visitors. He was active in organizing protests against Soviet repression of minorities, intellectuals, and dissidents.

Wolfowitz enjoyed long walks in the countryside and welcomed companions on these walks. If all the walkers were professional colleagues, the conversation was often on technical matters, and several joint papers owed their origin to such walking discussions.

Wolfowitz had a profound influence on professionals all over the world through his teaching, published research, and lectures. For the foreseeable future, the development of several fields will reflect this influence. ■

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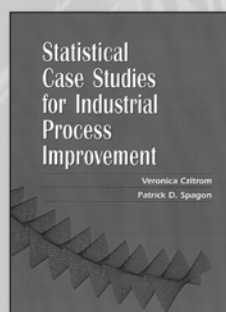
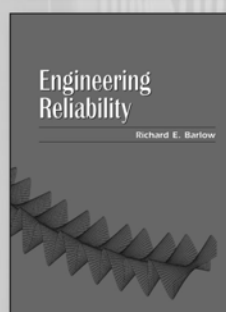
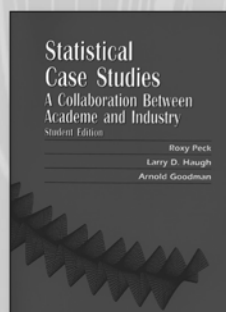
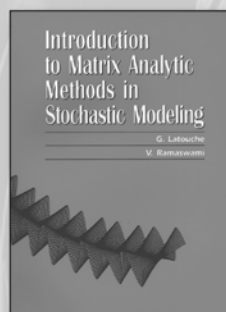
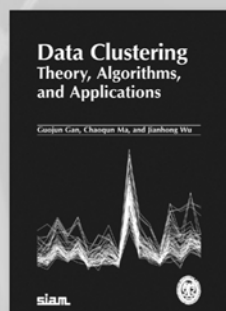
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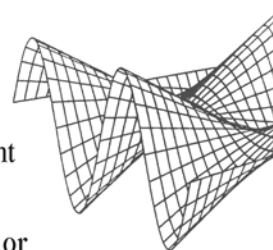


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9/10

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Never Say 'No'

I love statistics because of the vast array of problems that can be addressed using a probabilistic approach. Whether it's cellular biology, finance, or product improvements in industry, there are always completely new areas in which to dive. However, the academic and professional experiences are not just about getting the job done or getting the grade; they're about making connections, seeking new challenges, and always learning as much as possible.

I learned these quickly in my career as a statistician. In 2009, I graduated magna cum laude from the University of South Carolina, and I am currently a second-year PhD student in statistical science at Duke University. I've worked as a research assistant under Mike West, and I am a coauthor on a paper that has been fast-tracked into the *Journal of Computational and Graphical Statistics (JCGS)*.

My current research is a constant collaboration with biologists to nonparametrically understand dynamical systems using flow cytometry data. We have developed novel computational methods in mixture modeling using graphical processing units. I also am actively involved in consulting and will continue to seek new problems and experiences.

My desire to learn and gain experience has brought me to where I am today. When I finished high school, I didn't know what I wanted out of college. I applied to a local school, the University of South Carolina, because it offered a variety of programs and a good funding package. To pass the summer, I took a job with the Research and Development Center at Michelin North America. I started working

STATtr@k is a new *Amstat News* column geared toward people who are in a statistics program, recently graduated from a statistics program, or recently entered the job world. 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.

with the maintenance department and, by the end of the summer, I had developed a database management system for Michelin's internal training school. The connections I made that summer became the foundation for my career.

I learned my most important lesson as a young worker: Be open to new experiences and never say "no." I kept this in mind as I began the first semester of my undergraduate program. I claimed a double major in math and business in hopes of finding a good job upon graduation, but I quickly found much more. In my first semester, I took a calculus-based probability course with Joshua Tebbs. His course completely altered my career path and showed me how many interesting problems can be addressed with probability and statistics. After doing some reading and meeting with Tebbs, I changed my major to math and statistics.

The statistics department at the University of South Carolina provided an excellent group of advisers and teachers who helped me grow as a statistician; however, only a small portion of this growth came from the classroom. The time I spent in professors' offices, asking deeper questions, enhanced my appetite for learning. I actively attended seminars

and began to learn about new statistical methods on my own. An introductory lecture on Bayesian statistics sparked my interest, and I quickly delved into as much Bayesian statistics literature as I could find. The Bayesian approach answered many of the questions that baffled me with reasonable, probabilistic approaches.

After three years of undergraduate work, I graduated magna cum laude. I didn't have the job I expected; I had instead found a passion. This was a trend throughout my college career. I had entered thinking I would take courses, get a degree, and find a job. Instead, I gained a passion for learning and discovering new things. I embraced my "never say no" philosophy and was constantly exposed to and challenged with new ideas.

I am grateful for the several mentors who poured into me as I began my studies. Solid mentors and advisers are the key to success in any stage; always look for them. Mine provided me an outstanding learning environment and advised me as I explored aspects of statistics. My mentors helped ensure that most of my college expectations were well exceeded. I do wish, however, that I had become more actively involved in research with the university.



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I made up for my lack of university research experience through continued internships with Michelin North America's Research and Development Center. I was able to use these experiences to supplement my learning. I learned to think in terms of goals: What do I want, and how am I going to achieve it? In contrast to college, company internships pressed me to learn quickly and implement immediately. It was an exciting experience in which I thrived. Learning was at the core of my work, and I acquired knowledge for a specific goal.

During my internships, I took advantage of every opportunity to meet someone new and learn from the people with whom I worked. Experienced professionals surrounded me, and I gained as much information as I could from them. These people not only enhanced my personal growth, but they also helped open doors to new opportunities within the company. I returned to the company every summer until graduation, and I still keep in touch with the people I met there.

My work at Michelin also offered several viewpoints into the inner workings of a company. I was able to create much-needed tools for managers and designers, and I gained valuable skills as I learned to present these tools to them.

I also saw how research works in industry. My learning experience in industry was just as valuable as college. Michelin North America gave me the opportunity to meet great professionals, explore new ideas, and contribute to a greater purpose. I sometimes wish I had sought more varied research opportunities, but I know I was fortunate to work in a company that gave me such a diverse experience. In fact, it was my last summer internship at Michelin that was most influential in setting my current path.

That last summer, I worked for the company's head statistician. I was able to research new Bayesian methodology and investigate the advantages of using Bayesian logistic regression to stabilize the estimates in rare event

cases. This experience enhanced my passion for the methodology I had explored in school, and I decided to pursue it in graduate school.

During the application process, I was again struck by the value of my mentors. They took a personal interest in me and helped ensure I would be accepted to a school with the best fit. For me, this was Duke University. I had become completely engrossed in Bayesian statistics, and the department at Duke University is comprised of several leading experts in the field.

I was accepted and originally employed as a teaching assistant; however, a conversation with West about using graphics processors to obtain incredible computational speed quickly led me to a research assistantship. Our endeavors over the first year resulted in a publication in *JCGS*.

We are currently developing methodology to harness new statistical and computational methods to address label switching in mixture models and investigate more complex biological systems. As I continue my studies, my excitement for statistics grows. My graduate work has shown me new and interesting ways to address modern problems. Duke University has been a great place to do research, and my experiences here have been the best in my career. Everything I enjoyed about my undergraduate work is amplified in graduate school, and I get to do it all the time.

I know I have studied statistics for a relatively short time, but I've had the opportunity to connect with experts. I constantly strive to surround myself with mentors and colleagues. These are the people who will lead you to new experiences, and those experiences will flow into even more exciting experiences.

If you are not trying to do something you have never done before, I encourage you to reconsider. To me, what is most exciting about statistics is that there are so many applications. I can always learn more. Trust in your ability to learn and never stop. ■

Nuclear Engineering to Ultimate Frisbee

A Conversation with an Intern at the Energy Information Administration

Gabrielle Rossetti (GR), a student at Simmons College, served as a JPSM intern at the Energy Information Administration (EIA) during the summer of 2010. In this conversation with Janice Lent (JL), a mathematical statistician at EIA, Gabrielle talks candidly about her internship experience and how it helped shape her plans for the future.

JL: *Gabrielle, tell us a little about you.*

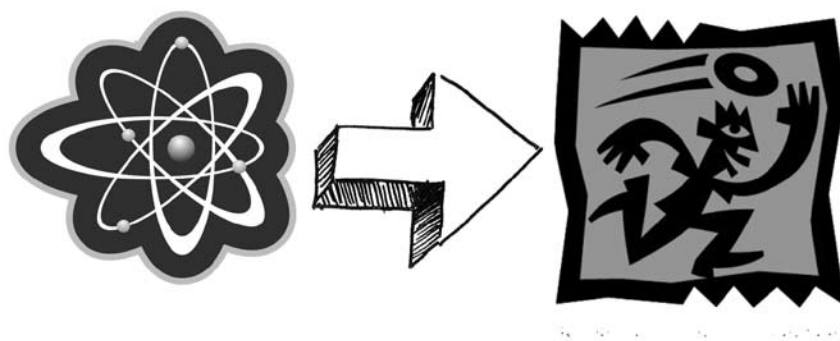
GR: I am from the northeast corner of Connecticut and attend Simmons College in Boston, Massachusetts. I will graduate in May with a bachelor's degree in economics and financial math and a minor in statistics.

I really love college and have tried to make the most of my experience in Boston. I've been a resident advisor for two years and will serve as a senior resident advisor when I go back to school in the fall. I am passionate about campus vibrancy and have been lucky enough to serve as class president all four years of college.

I am also a mentor with Strong Women, Strong Girls, a nonprofit driven to empower inner city girls in the third to fifth grades to become leaders. When I'm not learning, I like exploring, working out, spending time with my family and friends, and dancing.

JL: *Why did you decide to pursue a JPSM internship this summer?*

GR: I knew that I wanted to land an internship this summer. Luckily, I saw a JPSM poster on my professor's office door. The poster was enticing: a paid internship for me to do statistics all summer in Washington, DC, a city I had never explored. How could I possibly pass up an opportunity like that? I liked how the poster explained that the people who understand statistics—who can talk and write about the numbers—are the ones who help shape our world.



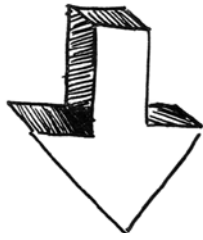
Last summer, I did a six-week internship at Boston University's Summer Institute for Training in Biostatistics and I really liked applying the concepts I had learned in my statistics class to real-world applications. I also formed strong relationships with the people in the program. I had a feeling that the JPSM program would give me an even broader experience with statistics and I liked the idea of meeting new people. I also really liked that I would be able to visit all of the federal statistical agencies. Getting the JPSM internship became an overarching goal for me last year—it was the one thing that I had to get.



Gabrielle Rossetti

JL: *Why did you decide to accept an internship at the Energy Information Administration (EIA)?*

GR: When I applied to JPSM, I wrote about my passion for education statistics and financial literacy. I initially thought my internship would be at an agency focused on those topics. When EIA offered me an internship, I will admit I was surprised; I had never thought of a career in energy. Nevertheless, I thrive on learning new things and the offer from EIA was appealing because I knew I would have the opportunity to delve into a completely new world—the world of energy.



“Explore a completely new field that you’ve never thought about before and don’t be afraid you won’t know everything—because you won’t.”

JL: *What aspects of the JPSM internship have been most valuable to you in achieving your goals for the summer?*

GR: I have been able to work on projects with many different colleagues in my group. This has enabled me to establish professional relationships. Through JPSM, I’ve also visited other federal statistical agencies. It has been helpful learning about different career paths and work experiences of federal employees. The other interns in JPSM have also played an important role in helping me achieve my goals this summer.

JL: *What aspects of working at EIA have you found most valuable?*

GR: EIA really takes an interest in their interns. Through the EIA weekly intern briefings, I’ve learned about the work of all the divisions in EIA and the different surveys they conduct. It complements what I’m learning about survey methodology through JPSM. We also get to go on field trips. For example, it was fascinating to see first-hand how they create electricity from solid waste when we visited a waste energy plant.

I also like the openness of EIA. I feel like I can stop and talk to anyone in the hall. It also seems like everyone at EIA really likes his or her job.

JL: *How would you describe the work environment in the EIA Statistics and Methods Group (SMG)?*

GR: My first week here, I realized that it was like a family. Everyone is really focused on their work,

but they don’t mind stopping to help someone else. There’s a strong sense of teamwork and professional collegiality. One thing that really struck me was the fact that an SMG staff member had cancer and the others were sending cards and going to visit her. I knew they were all thinking about her. There’s a real sense of connection here.

JL: *Do you think your experience this summer will influence your academic and career choices in the future?*

GR: Definitely. I’ve been taking Chinese for two years, and two people in this office speak Chinese. I’ve been able to talk to them about a possible trip to China. I think I’ll apply for a Fulbright scholarship to teach English in China, but after that, I think I’d like to come back and work at EIA. I’ve developed an interest in nuclear engineering, for one thing. At EIA, there’s a lot of flexibility to move around and explore new fields.

I also like the culture of EIA. I feel like I’ll be able to move up here, not just in terms of salary, but also in terms of my intellectual capabilities. Everyone here is always learning, and there is a lot of support for learning. It is similar to an academic environment in that sense.

JL: *What advice would you give to students who are considering applying for a JPSM internship?*

GR: Do it! I can honestly say this has been one of my best summers. The mixture of work, academic, and social life has been great. I have my weekends free to explore Washington and have fun with the other JPSM interns. I have free housing at GWU and I’m making money. It’s the perfect summer.

JL: *What guidance would you give to a student just beginning a JPSM internship?*

GR: Ask questions and be willing to take on everything. Delve into the experience and go beyond your comfort zone. Explore a completely new field that you’ve never thought about before and don’t be afraid you won’t know everything—because you won’t.

Also, be willing to make new friends. There are so many opportunities for you to meet people—an ultimate Frisbee team, a happy hour group, organized trips to the Nationals and DC United, planned lunches, and so much more.

Last, take advantage of your time in Washington, DC. Go to the free concerts at the Capitol, visit the Smithsonian museums, try new foods, run along the Potomac, explore! ■

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Taking a Chance on Statistics

ASA members explain the significance of statistics in their lives, careers

Peter Bruce, Founder and Owner of statistics.com

Winston Churchill once characterized the British plan for World War II this way: "It is a mistake to try to look too far ahead. The chain of destiny can only be grasped one link at a time."

Not the sort of career advice you generally give your kids, true, but it certainly characterizes my own situation. When I look back, I see no grand plan to my career path. On the positive side, I guess you could say I am a product of my own flexibility. I've used what I've learned to build my career and followed opportunities as they developed.

I am somewhat of an outlier in this profession. I don't have a degree in statistics or education, but I do have strong interests in both. My undergraduate degree is in Russian language from Princeton; my MA is in Russian studies from Harvard; and I earned an MBA from Maryland. Before coming to statistics, I worked on airline deregulation in the U.S. Transportation Department and served as a career U.S. Foreign Service officer for the better part of a decade.

My entrance into the field of statistics came in 1989, via software. I was at the University of Maryland, where I met Julian Simon. He had read a lengthy article about airline deregulation that I (and a coauthor) had written for the *National Review*. Simon (best known for bringing an economist's

perspective to demography and natural resource studies) was the originator of the scheme by which airlines must bid for volunteers to give up seats when a flight is overbooked. A provocative scholar, Simon championed the lonely view that the world is not over-populated and running out of oil and other natural resources in any meaningful sense. Perhaps his most famous foray into the public arena was his bet with Paul Ehrlich, a Stanford biologist, concerning the prices of various natural resources. Simon bet they would decline, while Ehrlich bet they would go up. Simon won.

In my MBA program, I took a liking to statistics. My professor, Frank Alt, thought I had an aptitude for the subject because I paid close attention in class, took few notes, and scored well on exams.

Simon showed me his own work on resampling—his 1969 text *Basic Research Methods in Social Science* had a compendium of permutation and bootstrap illustrations—and I caught the bug. Leaving aside the statistical advantages and attributes of resampling methods, their do-it-yourself nature was sheer fun.

Simon had invented a software program for these procedures, Resampling Stats, and I took on the further development and marketing of it. From that point, my statistics was mostly self-taught, aided by many lengthy sessions with Simon, developing resampling illustrations and documentation. Simon also was instrumental in guiding me in the establishment and growth of our small business. (Another of his accomplishments was authoring a best-selling text on setting up and running a direct mail business.)

My involvement with the ASA and its meetings and activities dates from that time. I taught introductory statistics courses with a strong resampling flavor at the University of Maryland. I also taught professional development courses in resampling statistics for the Institute for Professional Education and other organizations. After Simon died in 1998, I continued to market the Resampling Stats software, but I looked for further opportunities.

I began working part time at Cytel Software. I had met both Cyrus Mehta and Nitin Patel, owners of Cytel, at the Joint Statistical Meetings and other events over the years. Mehta was interested in implementing a direct mail campaign similar to those Simon and I created to market Resampling Stats software. (Direct mail and, now, certain forms of variable Internet offers represent the purest form of controlled experiments and, done properly, are excellent fodder for statisticians.)

There was some commonality between Resampling Stats and Cytel's StatXact software

“In my MBA program, I took a liking to statistics. My professor, Frank Alt, thought I had an aptitude for the subject because I paid close attention in class, took few notes, and scored well on exams.”

(though the audiences were completely different), and I worked with Patel on an NSF grant to fund development of an “urn sampler” program and curriculum. My relationship with Patel felt like part graduate student, part colleague. In my many sessions with him, I saw his white board constantly filled with ever-changing sets of equations. In the upper left was one fixed piece of advice: “With all thy getting, get understanding.”

The urn sampler name was later changed to box sampler because another collaborator could not dispel from her mind the association of urns with cremains. Later, I also partnered with Cytel to market an Excel-based data mining program, XLMiner, and reconnected with the University of Maryland, coauthoring a data mining text with Galit Shmueli of the business school (and Patel).

Meanwhile, I was casting about for something to do with the website statistics.com. I had obtained that domain in the early days of the Internet, but had been using it only as an adjunct to software marketing efforts. About 10 years ago, I built a data portal into it—a search directory of data sources. This was based on the “build it and they will come” theory and on the further theory that “if they come, you can make money.” The advent of Google quickly rendered the data search portal idea hopelessly obsolete, so I never tested that second theory. Finally, I came upon the idea of developing an online short course that, in terms of cost and convenience, would lie somewhere between existing professional development courses (2–3 days of all-day training in person) and simply getting and reading a book.

It was here that I turned from employee (in a software firm) to entrepreneur (starting and running an education business). It was not a “cold turkey” startup. For one thing, I had a customer list. But, it was the first time I was without a steady income, relying totally on what the new business could generate.

Valerie Troiano, who helped run the software business, took the leap as well and became the key operations person. We started with what we knew—resampling methods—and offered a four-week course taught by Phillip Good. The format was a



Peter Bruce

bit of a hybrid: all online, with scheduled dates for the term of the course, but no particular times that either instructor or student needed to be online. The courses worked well, and we expanded to data mining with two additional courses.

Through my Cytel ties, I had enlisted the help of the Center for e-Learning and Training (C-eLT) in Pune, India, a firm associated with Cytel. C-eLT employees, who are graduates of the University of Pune Statistics Department (and other universities), offer teaching assistance, grading services, and administrative help, allowing statistics.com instructors to focus on discussing statistics. This and students coming from diverse professional backgrounds made the model appealing for instructors. The number of courses grew, as did the number of noted statisticians who teach the courses.

I am now working with Bob Hayden (well known to the AP Statistics online community) to craft a state-of-the-art online introductory statistics course with a strong resampling-based inference component, complete with its own text and based on *Guidelines for Assessment and Instruction in Statistics Education*. We are in a good position to develop and teach many students with materials that reflect best statistical pedagogical practice.

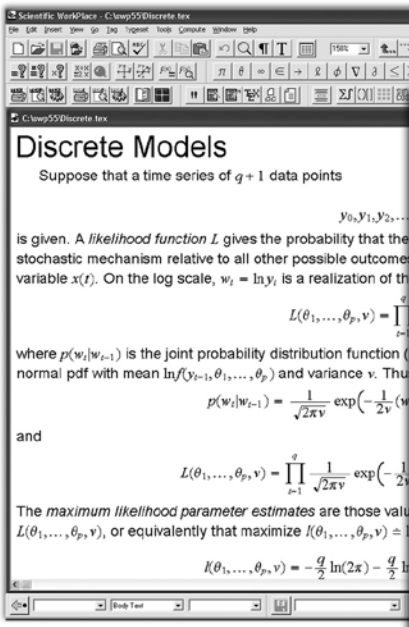
While I am an outlier in the field, I share common experiences with most statisticians. The ASA has been a significant institution to me; it has afforded opportunities for professional association and engagement that are all the more important to me as someone who lacks an academic "home base." Other statisticians whose stories you read in these pages point to the importance of mentors in their career development. Although I have not followed a traditional career path, connecting with mentors with diverse backgrounds has been an essential factor in my professional growth.

I also share with others in the statistics profession the ability to keep learning about fascinating new things. Of course, I have an unusually good vantage point for this, with the ability to poke my nose into any of the courses we teach that strike my fancy. The opportunities for continued learning are present in every profession, but, in statistics, once you are equipped with the fundamental tools of the profession, the entire range of human endeavor that involves data is at your disposal. Once I realized the guiding principle behind my work life has always been "close as few doors as possible," the choice of statistics seemed like a natural one. ■

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Jonaki Bose

Why Statistics?

I was asked to write this article and describe why I chose this profession, but the truth is I stumbled onto it and have never looked back.

I think many of us survey methodologists are fairly multifaceted. In India, I graduated from high school in the sciences, which means all I studied the last two years were mathematics, physics, chemistry, computers, and English. I needed a change and so, probably not entirely thoughtfully, completed a degree in communications from Purdue University. I also completed minors in math (my relaxation classes), French (so I could study in France), and art and design (I liked it). See a pattern emerging?

After graduation, I started looking for jobs in public relations and very quickly realized I needed a more quantitative job. But in those days—the pre-Internet era—it was not as easy to learn about available jobs. My gut told me I was better suited to a government job or a job in the nonprofit sector because of the sense of public service. But in what?

About 15 years ago, there was a federal recruitment program called Outstanding Scholars Program (OSP), which was open to college graduates with a minimum grade point average and allowed participants to be promoted at an accelerated rate. Once a week, the government printed a publication that listed all jobs, and, every week, I'd go to the library and apply for all the OSP jobs I could find. (It was a recession and I wasn't being too picky, even though I wanted a quantitative job.)

I applied to be a public relations specialist, writer, editor, etc., since those were the kinds of jobs listed. But, fate favored one bewildered 22 year old when a hiring freeze was lifted for a brief period at the National Center for Education Statistics (NCES) in the U. S. Department of Education in Washington, DC. I may be wrong, but I think they



“But a person’s professional path is not dictated by professional interests alone; there were other forces that led me to seek different employment.”

found out they could hire through the OSP program one Friday afternoon and did so in a hurry, because the next day—a Saturday morning—I had a message on my answering machine (okay, my parent’s answering machine) describing a new job opportunity. I still recall listening to the voice of my soon-to-be boss as she described the opening in her office. I marveled that such a job existed and went in for an interview that week. I was offered the job and a career was born.

I started working a set of universe data collections that collected nonfiscal and fiscal data at the public school, school district, and state levels. While it is true that working in an understaffed agency means workloads are heavy, it also means opportunities abound. I had a great supervisor who allowed me to flourish and make decisions. I dove headfirst into the world of administrative records, edit checks, imputations, federal statistical publication writing, and contracting and I loved it.

Not only did I enjoy my job, but I enjoyed hanging out with my coworkers and learned much from them. I didn’t really have anyone my age (or even within 15 years of my age) to befriend, but I went to lunch at the Irish Times every Friday with a group of people with varied interests (motor back riding, classical music, coin collecting, map collecting, woodworking, movies, singing, reading, beer) and a broad world view.

Why is this relevant? Because I think in every job I’ve had, I’ve gone in thinking I was there to work and then realized it is impossible to separate work from the people with whom you work. I don’t think one must socialize with coworkers to enjoy work, but having some kind of kindred connection, some kind of shared understanding of the work world does seem to have the power to strongly influence job satisfaction. From these career feds, I learned to be a better public servant, to always remember we are here to serve the taxpayers and not be swayed by the latest political or administrative agenda.

Despite enjoying my job, it was clear I needed further education to help plug the gaping holes in my knowledge base. I simply did not know enough. I talked to a lot of folks at NCES who had jobs that looked interesting to find out how they had gotten there. I found mentors who were willing to discuss my options with me. Ultimately, I decided to pursue a part-time graduate degree at the University of Maryland’s Joint Program in Survey Methodology while continuing to work full time. It turned out to be a great decision, since it complimented what I was doing at work and gave me the theoretical background I needed to understand the context in which the federal government conducts its surveys and the technical background I needed to be a better survey manager and methodologist.

I spent the next few years working on sample surveys at NCES—learning about the world of disclosure analyses, public-use file creation, and statistical standards; intricacies of designing surveys from the ground up; and conducting longitudinal studies. I was loaned to the Office of Management and Budget for several months and was able to get a bird’s eye view of the federal statistical system—how data collected by both statistical and nonstatistical agencies come together to form the often confusing tapestry of official statistics. Gradually, my gut told me it was time to seek out new adventures, and as hard as it was for me to leave my NCES family, I moved to the Bureau of Transportation Statistics (BTS), which is part of the U.S. Department of Transportation.

Working at BTS was a new experience. NCES is a long-established institution, existing in some form since the late 1800s, but BTS was only established in 1992. I learned some of the challenges faced by statisticians in an organization trying to justify itself to external constituencies, potentially being viewed as a competitor for resources by sister agencies, and having to provide a clear-cut mission to its own staff. The office I worked in was comprised of like-minded people who believed in the federal statistical system and high-quality surveys and data analyses. It was a fun period, during which I was able to work on a range of activities—a national survey of travel behavior, data analysis, disclosure issues, and improving the statistical aspects of the Department of Transportation’s surveys.

But a person’s professional path is not dictated by professional interests alone; there were other forces that led me to seek different employment. BTS was moving to a new site that would result in a total commute time of almost three hours a



Jonaki Bose

day. With two children under the age of 4 and a spouse who worked when I was at home and took care of the kids when I was at work, I knew I could not sustain those hours.

By sheer luck, a position opened at the Substance Abuse and Mental Health Services Administration, which is part of the U.S. Department of Health and Human Services and close to where I live. I now work primarily on the National Survey on Drug Use and Health (NSDUH)—a survey methodologist's heaven. (I'm embarrassed to write this with such enthusiasm, but it is true.) It is a large-scale national survey that collects data on substance use and mental health. It is a continuous data collection, and results are published annually. Trends are important for these data, which means we are very careful before implementing any kind of change. Any time we do introduce changes, we carefully study their effects.

So, 15 years and three government departments later, I am happily submerged in the world of federal statistics. All the agencies I have worked for have been small, which means I have evolved into a jack of all trades and a master of very little. I've gotten to work on survey design, questionnaire design, field staff training, data editing, imputation and weighting procedures, data file creation and dissemination, disclosure issues, and data analysis. I've gotten to volunteer with organizations such as the American Statistical Association and Washington Statistical Society. While I wouldn't quite call my professional life exciting, I would say I stay cheerfully engaged.

If this sounds like a recruitment piece, you might be right. It wasn't intended to be, but the opportunity to reflect has made me realize that working as a federal statistician can be extremely rewarding. There are many frustrations to overcome—the lack of staffing, the lack of understanding regarding the need for statistical quality, and the administrative illogic accompanying life in any large organization. On the flip side, staffing shortages mean we have the ability to define our jobs and be constantly challenged; there is no shortage of work and opportunities. And the sense of mission is always present; it is fortunate that at times of duress I can ask, “What would the best solution for the taxpayers be?” and use the answer to guide my actions. Not everyone has that luxury. All in all—reasonable pay and benefits, a clear mission, and interesting work makes the job of a federal statistician worthwhile. ■

ASA Hands-On Statistics Activity Competition Winners Announced

Ellen Gundlach of Purdue University was selected as the grand prize winner of the ASA Hands-On Statistics Activity Competition for her paper airplane activity in which students experience statistical concepts through making and flying various designs of paper airplanes. Her project will be featured at the ASA booth in October's USA Science and Engineering Festival on the National Mall in Washington, DC. Gundlach will receive \$750 and a trip for two to the festival.

Two activities received the gold medal prize. St. Olaf College students Ashley Petersen and Bryant Torkelson won for their entry teaching linear regression through a marble race machine and a chemical titration experiment. Statistics instructors Kathleen Nirei and Jim Rubasch of the K–12 'Iolani school won for their activity of Frisbee throws triggering tennis balls falling through a nail lattice to collectively form a bell-shaped distribution, and then linking that distribution to real-life applications. Each team will receive \$500.

Three projects received honorable mentions. Ivo Dinov and Nicolas Christou of UCLA won for their programs allowing students to explore ozone pollution data through a statistical lens. Proctor and Gamble statisticians Tom Filloon, William A. Brenneman, Michael D. Joner, and William R. Myers won for their collection of projects exploring conditional probability, estimation of unknown, the normal distribution, and the probability of consecutive infrequent events. Chamont Wang, a professor at the College of New Jersey, and students Michele Meisner and Meiyi Zheng won for their dynamic data visualization with the data coming from storm tracking, fraud detection, high-school graduation rates, and student exams.

Competition participants represented the ASA membership well: statistics teachers, undergraduate students, professors, industry statisticians ... Grand prize winner Gundlach is a continuing lecturer and course coordinator. While completing her degrees in chemistry (BS from Florida State University, MS from The Ohio State University), she realized the fun part of science for her is designing the experiments, analyzing the results, and explaining what those results mean, which as she put it, “is exactly what statisticians do!”

Torkelson begins studies this fall at the University of Minnesota College of Pharmacy. UCLA statistics professor Dinov is the chief operations officer of the Center for Computational Biology and director of the Statistics Online Computational Resource. He received a 2007 World Wide Web Gold Award.

The competition requested activities to attract students to the upcoming ASA booth in Washington, DC, and stimulate an interest in statistics. The winning projects can be found at www.amstat.org/outreach/hands-on.cfm. Because the quality was so high for all entries, those not chosen as winners were encouraged to adapt their entries for SStatistics Education Web (STEW), the online repository for K–12 statistics lesson plans, at www.amstat.org/education/stew.



Why Statistics? Why BLOG?

Short for *weblog*, the *Merriam-Webster Dictionary* describes a blog as a website that contains an online personal journal with reflections, comments, and hyperlinks provided by the writer. Recently, there has been an outcropping of blogs about statistics, so *Amstat News* asked a few statistical bloggers how they got started in both statistics and blogging.

BLOG: **FlowingData**

Name:

Nathan Yau

Current affiliation:

University of California, Los Angeles,
Department of Statistics

Degree(s), and from where:

Currently a PhD candidate at UCLA;
EECS BS from UC, Berkeley

Website:

<http://flowingdata.com>

When was FlowingData started?

June 25, 2007

Why did you start FlowingData?

I moved to Buffalo, New York, with my wife two years into my PhD. FlowingData was a way for me to kind of keep in touch with people who were also interested in statistics and visualization, because I've had to do the bulk of my studies remotely. Then, about a week into it, I found it was a great way for me to document my experiences as an intern and at workshops.

Has creating FlowingData advanced your career? If so, in what way(s)?

Definitely. Because my focus is in visualization, it's been a great way to get my work out there. If the work is good, it tends to spread, and, from there, people will at least know about what you're capable of. At this point, I'm still focused on finishing my PhD, but I've been able to freelance on the side, which is a good break from dissertation work every now and then. It's also been a great way to make contacts, simply because people follow what I do.

What skills did you have to learn to produce FlowingData?

I had already been into building websites before FlowingData, so I didn't have to learn much. I use

Wordpress, which is an open-source blogging platform. It's practically a one-click setup. Probably, most of my time in the setup was designing the site using something called themes. That is just my preference, though. There are a lot of free themes that you can download. I just like to customize when I can.

What is most interesting or challenging about maintaining FlowingData?

I can get so involved with maintaining the site that it distracts me from dissertation work, so finding that balance is tough sometimes. Especially in the beginning, I was always checking views and subscriber counts. However, now that the readership has grown to about 37,000, it's always fun to read comments and interact. I've found that a lot of the time, you can learn quite a bit from your readers, so it's not just you spouting off on your soapbox.

Where do you find the material you cover?

I subscribe to a lot of sites and blogs. I also use Twitter. In the beginning, I used to find everything myself through these sources, but readers also send in a lot of suggestions nowadays.

What, specifically, do you wish you had known when you started FlowingData?

Don't be afraid to put your work out there. If people like it, then great. If they don't, then you'll learn something. Either way, you benefit.

Whom do you rely on for technical support?

I do everything for the most part. If something is wrong with the server, I'll contact my web host and they'll usually take care of any technical issues right away.

What do you recommend students and new statisticians focus on outside of their coursework to advance in their careers?

Branch out into other fields. All of my best work experiences have come out of collaborations with people not in statistics. In all likelihood, you're going to be working with nonstatisticians in the end, and being able to communicate your results, analyses, and ideas to others is extremely important. Plus, when you work with people outside your comfort zone, you end up learning way more than if you were to stay inside your circle. From what I've seen, employers really appreciate that well-roundedness.

What is the one website you can't go a day without visiting?

Information Aesthetics [<http://infosthetics.com>]. It's the first visualization-related blog I ever read. ■

Name:
Andrew Gelman

Website:
www.stat.columbia.edu/~gelman/blog



BLOG: Statistical Modeling, Causal Inference, and Social Science

I studied math and physics at MIT. To be more precise, I started in math by default. Ever since I was two years old, I've thought of myself as a mathematician, and I always did well in math class, so it seemed like a natural fit.

But, I was concerned. In high school, I'd been in the U.S. Mathematical Olympiad training program and met kids who were clearly much better at math than I was. In retrospect, I don't think I was as bad as I'd thought at the time. There were 24 kids in the program, and I was probably around #20, if that, but I think many of the other kids had more practice working on Mathematical Olympiad-type problems. Maybe I was really something like the 10th best in the group.

Tenth-best or 20th best, I reached a crisis of confidence around my sophomore or junior year in college. At MIT, I started right off taking advanced math classes, and, somewhere along the way, realized I wasn't seeing the big picture. I was able to do the homework problems and do fine on the exams, but something was missing. Ultimately, I decided the problem was that, in the world of theoretical math, there were the Cauchys, the Riemanns, etc., and then there was everybody else. I didn't want to be one of the "everybody else." Unfortunately, I didn't know about applied math at the time. At MIT, as elsewhere I imagine, the best math students did the theory track.

I was also majoring in physics, which struck me as much more important than math, but of which I felt I had even less of an understanding. I did well in my classes and reached the stage of applying to physics graduate schools. (It was MIT. I didn't have many friends and I didn't go on dates, so that gave me lots of time to do my problem sets each week.)

“I sat in on two classes. One was deadly dull and the other was ... exciting from Day 1.”

In fact, it was only at the very last second in April of my senior year that I decided to go for a PhD in statistics, rather than physics.

I had some good experiences in physics, most notably taking the famous Introduction to Design course at MIT. Actually, that was a required course in the mechanical engineering department, but many physics students took it, too. I also worked for two summers doing solid-state physics research at Bell Labs. We were working on zone-melt recrystallization of silicon and, just as a byproduct of our research, discovered a new result (or, at least it was new to us): that solid silicon could superheat to something like 20 degrees above its melting point before actually melting. This wouldn't normally happen, but we had a set-up in which the silicon wafer was heated in such a way that the center got hotter than the edges, and, at the center, there were no defects in the crystal pattern for the melting process to easily start. So, it had to get really hot for it to start to melt.

Figuring this out wasn't so easy—it's not like we had a thermometer in the inside of our wafer. (If we did, the crystalline structure wouldn't have been pure and there wouldn't have been any superheating.) We knew the positions and energies of our heat sources, and we had radiation thermometers to measure the exterior temperature from various positions. We knew the geometry of the silicon wafer (which was encased in silicon dioxide), and we could observe the width of the molten zone.

So what did we do? What did I do, actually? I set up a finite-element model on the computer and played around with its parameters until I matched the observations, then looked inside to see what our model said the temperature was at the hottest part of the wafer. Statistical inference, really, although I didn't know it at the time.

When I came to Bell Labs for my second summer, I told my boss I'd decided to go to graduate school in statistics. He was disappointed and said that was beneath me, that statistics was a step down from physics. I think he was right (about statistics being simpler than physics), but I really wasn't a natural physicist, and I think statistics was the right field for me.

Why did I study statistics? I've been trained not to answer why questions, but rather to focus on potential interventions. The intervention that happened to me was that I took a data analysis course from Don Rubin when I was a senior in college.

MIT had few statistics classes. I'd taken one of them and liked it, and when I went to a math professor to ask what to take next, he suggested I go over to Harvard and see what they had to offer.

I sat in on two classes. One was deadly dull and the other was Rubin's, which was exciting from Day 1. The course just sparkled with open problems, and the quality of the 10 or so students in the class was amazing. I remember spending many hours laboriously working out every homework problem using the Neyman-Pearson theory we'd been taught in my theoretical statistics course. It's only by really taking this stuff seriously that I realized how hopeless it all is. When, two years later, I took a class on Bayesian statistics from John Carlin, I was certainly ready to move to a model-based philosophy.

Anyway, to answer why I studied statistics, I'll say because Rubin's course was great. I was worried that statistics was just too easy to be interesting, but Rubin assured me that, no, the field has many open problems and I'd be free to work on them. Indeed, I have.

Statistical Modeling, Causal Inference, and Social Science

Why did you start the blog Statistical Modeling, Causal Inference, and Social Science?

Why did I start a blog, considering that I started my PhD studies in 1986 and didn't start blogging until nearly two decades later? I started my casual Internet reading with *Slate* and *Salon* and, at some point, followed some links and read some blogs. In late 2004, my students, postdocs, and I decided to set up a blog and wiki to improve communication in our group and to reach out to others. The idea was that we would pass documents around on the wiki and post our thoughts about each other's ideas on the blog.

Where do you find the material you cover?

I figured we'd never run out of material because, if we ever needed to, I could always post links and abstracts of my old papers. (I expect I'm far from unique among researchers in having a fondness for many of my long-forgotten publications.)

What happened? For one thing, after a couple months, the blog and wiki were hacked (apparently by some foreign student with no connection to statistics who had some time on his hands). Our system manager told us the wiki wasn't safe, so we abandoned it and switched account names for the

blog. Meanwhile, I'd been doing most of the blog posting. For a while, I'd assign my students and postdocs to post while I was on vacation, but then I heard they were spending hours and hours on each entry, so I decided to make it optional, which means that most of my co-bloggers rarely post on the blog. Which is too bad, but I guess understandable.

What is most interesting or challenging about maintaining this blog?

Probably the #1 thing I get from posting on the blog is an opportunity to set down my ideas in a semi-permanent form. Ideas in my head aren't as good as the same ideas on paper (or on the screen). To put it another way, the process of writing forces me to make hard choices and clarify my thoughts. The weakness of my blogging is that it's all in words, not in symbols, so, quite possibly, the time I spend blogging distracts me from thinking more deeply about mathematical and computational issues.

Has creating this blog advanced your career? If so, in what way(s)?

At times, blogging has motivated me to do some data analyses that have motivated me to do new statistical research.

There's a lot more I could tell you about my blogging experiences, but, really, it all fits in a continuum with the writing of books and articles, meetings with colleagues, and all stages of teaching (from preparation of materials to meetings with students).

One thing that blogging has in common with book and article writing is that I don't really know who my audience is. I can tell you, though, that the different blogs have much different sets of readers. My main blog has an excellent group of commenters, who often point out things of which I'd been unaware. At the other blogs where I post, the commenters often don't understand where I'm coming from and all I can really do is get my ideas out there and let people use them how they may. In that way, it's similar to the frustrating experience of writing for journals and realizing that sometimes I just can't get my message across. On my own blog, I can go back and continue modifying my ideas in the light of audience feedback.

My model is George Orwell, who wrote about the same (but not identical) topics over and over, trying to get things just right. (I know that citing Orwell is a notorious sign of grandiosity in an author, but, in my defense, all I'm saying is that Orwell is my model, not that I have a hope of reaching that level.) ■



BLOG:



Junk Charts

Name:

Kaiser Fung

Current affiliation:

Sirius XM Radio and New York University

Degree(s), and from where:

MPhil (Cambridge), MBA (Harvard), BSE (Princeton)

Website:

<http://junkcharts.typepad.com>

When was Junk Charts started?

July 2005

Why did you start Junk Charts?

Initially, to create a reason to write regularly. I was pleasantly surprised to find a community devoted to good graphical presentation; the readers are what keep me going. It's a lot of work, though.

Has creating Junk Charts advanced your career? If so, in what way(s)?

It certainly helped convince McGraw-Hill to pick up *Numbers Rule Your World*, and I'm sure readers recognize my way of thinking, so if they are looking for people with my skill set, they can approach me, although I have not pushed the website in this way.

“My blog is competing with hundreds of other blogs for the attention of readers, and many bloggers put up several posts per day.”

What skills did you have to learn to produce Junk Charts?

How to build and nurture a community of readers

What is most interesting or challenging about maintaining Junk Charts?

Biggest challenge is how to maintain the regular flow of posts. Because most of my posts are substantive analyses, they take hours—if not days—to write. My blog is competing with hundreds of other blogs for the attention of readers, and many bloggers put up several posts per day.

Where do you find the material you cover?

With my topic, I can pick up material from my everyday reading. I must thank my readers profusely

for sending me materials; their submissions really make my blogging life a lot easier!

What, specifically, do you wish you had known when you started Junk Charts?

It has all been a positive experience for me.

Whom do you rely on for technical support?

I troubleshoot myself, and, for knotty questions, I go to tech-savvy friends. The blogging software is set up for anyone to be able to start a blog.

What do you recommend students and new statisticians focus on outside of their coursework to advance in their careers?

Communications skills, how to make an argument to a nontechnical audience, how to use graphics effectively to bring home your message

What is the one website you can't go a day without visiting?

There are many, but Andrew Gelman's blog [www.stat.columbia.edu/~gelman/blog] is a must-read for statisticians. ■



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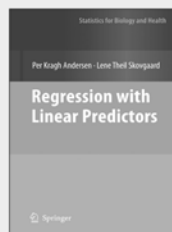
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P. K. Andersen, L. T. Skovgaard, University of Copenhagen, Copenhagen, Denmark

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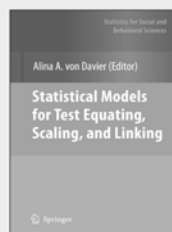
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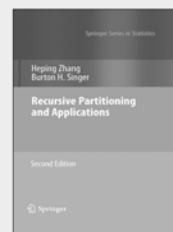
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K. Lange, University of California, Los Angeles, CA, USA

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Recursive Partitioning and Applications 
H. Zhang, Yale University, New Haven, CT, USA;
B. H. Singer, Emerging Pathogens Institute,

New York, NY, USA

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Where Are Your Colleagues ...



Graphic by Val Nirala, ASA Publications Coordinator



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"I work as a biostatistician in the pharmaceutical industry and use statistics to analyze clinical trial data ..."

Robin Fowler

Simpson County Bd. of Ed.
Franklin, KY

"I provide students a look at introductory statistics and give them an opportunity to earn college credit."

Richard J. Kruscio

University of Kentucky
Lexington, KY

"I design medical studies and clinical trials with specialization in dementia ..."

William Mawby

Michelin Americas Research Corp.
Greenville, SC

"I manage a group of statistical/mathematical experts who support project work throughout the company."

Joan G. Haworth

ERS Group
Tallahassee, FL

"I use statistical analysis to find patterns (or lack of patterns) in employment data and other economic data ..."

**And What Are
They Doing?**

Statistics Ready for a Revolution



Next Generation of Statisticians Must Build Tools for Massive Data Sets

Mark van der Laan, Jiann-Ping Hsu/Karl E. Peace Professor in Biostatistics and Statistics at UC Berkeley, and Sherri Rose, PhD candidate at UC Berkeley

The statistics profession has reached a tipping point. The need for valid statistical tools is greater than ever; data sets are massive, often measuring hundreds of thousands of measurements for a single subject. The field is ready for a revolution, one driven by clear, objective benchmarks by which tools can be evaluated.

The new generation of statisticians must be ready to take on this challenge. They have to be dynamic and thoroughly trained in statistical concepts. They have to work effectively on an interdisciplinary team and understand the immense importance of objective benchmarks to evaluate statistical tools. They have to produce energetic leaders who stick to a roadmap, but who also break with current practice when necessary.

Why do we need a revolution? Sadly, 99.99% of all data analyses are based on the application of so-called parametric (or other restrictive) statistical models that assume the data-generating distributions have specific forms. Many agree that these models are wrong. That is, statisticians know linear or logistic regression models and Cox

proportional hazards models are specified incorrectly. But, they still use them to draw conclusions and then hope these conclusions are not too wrong.

The original purpose of a statistics model was to develop a set of realistic assumptions about the probability distribution generating the data set (i.e., incorporating background knowledge). However, restrictive parametric models are almost always used because standard software is available. These models also allow the user to obtain p -values and confidence intervals for the target parameter of the probability distribution, which are desired to make sense out of data.

Unfortunately, these measures of uncertainty about our estimates are even more susceptible to bias than the effect estimates. We know that for large enough sample sizes, every study—including ones in which the null hypothesis of no effect is true—will declare a statistically significant effect.

Some practitioners will tell you they have extensive training, are experts in applying these tools, and should be allowed to choose the models to use in

response to the data. Be alarmed. It is no accident that the chess computer beats the world champion in chess. Humans are not as good at learning from data and easily susceptible to beliefs about those data.

For example, an investigator may be convinced his or her data have a particular functional form, but if you bring in another expert, his or her belief about the functional form may differ. Or, many models may be run, dropping variables that are non-significant in each model. While this is common, it leaves us with faulty inference.

With high-dimensional data, not only is the correct specification of the parametric model an impossible challenge, but the complexity of the parametric model also may increase so that there are more unknown parameters than observations. The true function also might be described by a complex function not easily approximated by main terms.

For these reasons, allowing humans to include only their true, realistic knowledge (e.g., treatment is randomized, such as in a randomized controlled trial, and our data set represents

an independent and identically distributed observations of a random variable) is essential.

What about machine learning, which is concerned with the development of black-box algorithms that map data (and few assumptions) into wished objects? Indeed, this is in contrast to using misspecified parametric models, but the goal is often the whole prediction function, instead of particular effects of interest.

Even in machine learning, however, there is often unsupported devotion to beliefs. In this case, to the belief that certain algorithms are superior. No single algorithm (e.g., random forests, support vector machines, etc.) will always outperform all others in all data types, or even within specific data types (e.g., SNP data from genomewide association studies). One can't know a priori which algorithm to choose. It's like picking the student who gets the top grade in a course on the first day of class.

The concept of a model is also important. We need to be able to incorporate true knowledge in an effective way. In addition, we need such data-adaptive tools for all parameters of the data-generating distribution, including parameters targeting causal effects of interventions on the system underlying the data-generating experiment. The latter typically represents our real interest: We are not only trying to sensibly observe, but also to learn how the world operates.

The tools we develop must be grounded in theory, such as an optimality theory, that shows certain methods are more optimal than others. For example, one can compare methods based on mean squared error with respect to the truth. It is not enough to have tools that use the data to fit the truth well. We also require an assessment of uncertainty, the very backbone of statistical learning. That is, we cannot give up

on reliable assessment of uncertainty in our estimates.

The new generation of statisticians cannot be afraid to go against standard practice. Remaining open to, interested in, and a developer of newer, sounder methodology is perhaps the one key act statistics students can perform. We must all continue learning, questioning, and adapting as new statistical challenges are presented.

The science of learning from data (i.e., statistics) is arguably the most beautiful and inspiring field—one in which we try to understand the very essence of human beings. However, we should stop fooling ourselves and actually design and develop powerful machines and statistical tools that can carry out specific learning tasks.

There is no better time to make a truly meaningful difference. ■

Applet Fun

Below are a few websites with collections of applets and other resources to help teach and learn statistics.

ASA Section on Statistical Education

www.amstat.org/sections/educ/applets.html

www.amstat.org/sections/educ/statedlinks.html

ASA Education Useful Sites for Teachers

www.amstat.org/education/usefulsitesforteachers.cfm

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Saturday, November 21

Short Course 1: Statistical Design of Sequential Clinical Trials in R

8:00 AM-5:00 PM *Instructors: Scott Emerson and Daniel Gillen*

Short Course 2: The Use of Genetic Marker Data in Clinical Trials

8:00 AM-5:00 PM *Instructors: Bruce Weir and Patrick Heagerty*

Sunday, November 22

Short Course 3: Data Monitoring Committees: A Practical Approach

8:00 AM-5:00 PM *Instructors: Susan Ellenberg, Thomas Fleming and David DeMets*

Short Course 4: Statistical Evaluation of Markers for Classification and Prediction

8:00 AM-12:00 PM *Instructors: Margaret Pepe and Holly Janes*

Short Course 5: Practice Issues in the Conduct and Reporting of Large-Scale

1:00-5:00 PM Clinical Trials: The Women's Health Initiative Experience

Instructors: Garnet Anderson and Holly Janes

SYMPOSIUM

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Monday, November 22, 8:00-10:45 AM: Biomarkers: Role in the Design and Interpretation of Clinical Trials

Ross Prentice (keynote): *Biomarkers as Mediators of Clinical Trial Results: The Women's Health Initiative Clinical Trial*

David DeMets: *Role and Potential of Surrogate Outcomes*

Laurence Freedman: *Nutrition Biomarkers in Chronic Disease Prevention Research*

Steve Self: *Biomarkers in Vaccine Development and Evaluation*

Monday, November 22, 11:00 AM-12:30 PM: Issues in Multi-Regional Clinical Trials (MRCT)

Janet Wittes: *Multi-Regional Clinical Trials: To Whom Do Their Results Apply?*

Invited Panel: *Overview: Issues in Multi-Regional Clinical Trials*

Monday, November 22, 1:45-5:45 PM: Biomarkers: Issues in Individualized Therapy

Robert O'Neill (keynote): *Recent Developments in the Use of Clinical Trials to Support Individualizing Therapies: A Regulatory Perspective*

Margaret Pepe: *Metrics for Quantifying and Comparing Markers Used for Treatment Selection*

Dan Sargent: *Biomarkers in Phase II Trials: Why, When, How?*

Rich Simon: *Clinical Trials for Predictive Medicine: New Paradigms for Design and Analysis*

Bruce Weir: *Using SNPs to Characterize Genetic Effects in Clinical Trials*

Lon Cardon: *Frontiers Beyond Patient Selection for Enhanced Efficacy*

Tuesday, November 23, 8:00 AM-12:55 PM: Safety

Robert Temple (keynote): *Past, Present and Future of Product Safety Assessments*

Thomas Fleming: *Identifying and Addressing Safety Signals in Clinical Trials*

Christy Chuang-Stein: *Quantitative Risk/Benefit Assessment*

Jesse Berlin: *Meta-analysis and Other Strategies for Pooling, Not Drowning, including T2DM Interventions and ESAs*

Invited Panel: *Overview: Issues in Identifying and Addressing Safety Signals*

More Symposium and Short Course information available online at: symposium.biostat.washington.edu

Business/Industry Offers Dynamic Environment for Statisticians

Roger W. Hoerl, GE Global Research

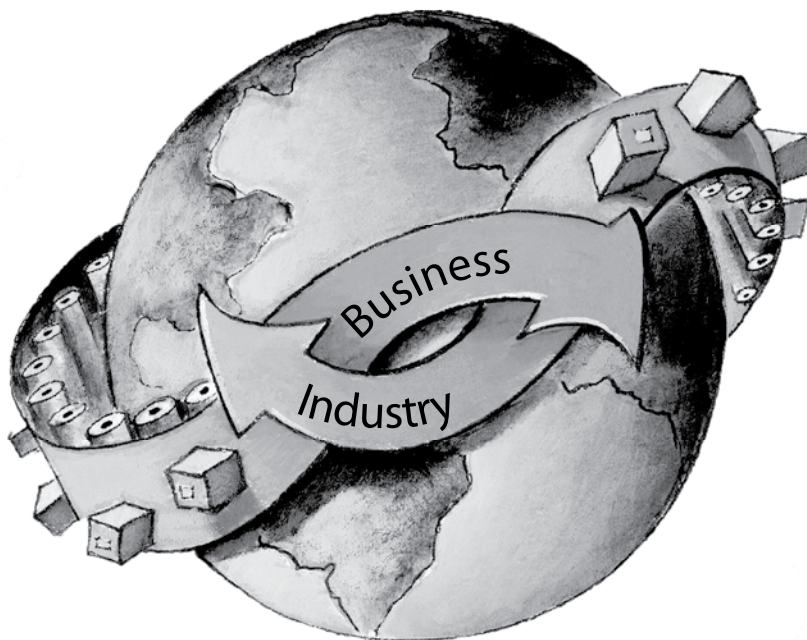
Do statisticians in business and industry have a sexy job? Steve Lohr—in an August 5, 2009, *New York Times* article—made some remarkable statements about career opportunities for statisticians in business and industry. He quoted Hal Varian, chief economist at Google, as saying, “I keep saying that the sexy job in the next 10 years will be statisticians. And I’m not kidding.”

The statistics profession has had profound impact in diverse areas, including health care, the environment, conducting the census, and education. Perhaps less visible has been the significant effect statistics has had within business and industry—the private sector. Nonetheless, this effect has been real and noteworthy, and business and industry affords statistics students another viable career option.

The Rich Legacy of Statistics in the Private Sector

One noteworthy early development in the private sector is the work of Walter Shewhart at Western Electric, a manufacturer for Bell Telephone, in the 1920s. Shewhart realized the importance of reducing variation to improve business processes and developed the concept of “special” and “common” causes of variation, as well as the control chart as a method to distinguish between the two. While his original methods may seem basic—or perhaps even simplistic—today, Shewhart was a deep thinker who was significantly influenced by the philosopher C. I. Lewis. He also had a strong technical background in physics and mathematics, which led him to become a founding member and president of the Institute for Mathematical Statistics (IMS) and a president of the ASA.

Among those affected by Shewhart’s work, especially his unique philosophy of how to apply statistical methods, was W. Edwards Deming, another statistician with a physics background. Deming helped apply Shewhart’s methods (and inspection sampling) to U.S. munitions production during World War II. After the war, Deming promoted the application of Shewhart’s methods and the philosophy underlying them to peacetime industry—both in the United States and abroad. (He had significant influence in Japan, where he received the Order of the Sacred Treasure, Second Class, from the emperor.)



Throughout the next few decades, the application of statistics within industry grew exponentially. This growth included—but went well beyond—statistical quality to include applications in product and process design, marketing, and process improvement. Early pioneers include Dick Freund at Kodak; Mavis Carroll at General Foods; Harry Smith at Procter and Gamble; Truman Koehler at American Cyanamid; Art Hoerl (yes, my father), Bob Kennard, and Don Marquardt at DuPont; Otto Karl at 3M; Mike Free at Smith, Kline, and French; Joe Ciminera at Merck; and Horace Andrews at Swift and Company.

At some point, the distinction between industry and business applications became blurred. The traditional stereotype of “smokestack industry” faded when such high-tech industries as computer chip manufacturing, biotech startups, and software (Microsoft, Google, etc.) became critical components of the economy and began hiring statisticians. For example, my employer—General Electric—makes about a third of its profits from financial services. However, it also makes aircraft engines, power generators, and locomotives, not to mention

GE Healthcare. The statisticians in our group at GE Global Research might work on molecular pathology one day, aircraft engine reliability the next, and risk analysis of financial portfolios a week later. Should we be categorized as business or industry?

In the past couple of decades, noteworthy business and industry trends have included the emergence of data mining to analyze massive data sets, growth in financial applications of statistics—particularly in risk management—and Six Sigma (more recently, Lean Six Sigma), which is a statistically based improvement methodology. We could add the more recent emergence of statistical challenges in developing Internet search engines (e.g., Google), but our time is limited.

The reason for the development of data mining is obvious: Nobody had terabyte data sets in the 1960s! With digitization of many business processes, such massive data sets are becoming more common, as everything from credit card bills to gasoline purchases tend to be electronically recorded and stored. The opportunities for mining this data, often for marketing purposes, are numerous. One obvious example is Amazon analyzing previous purchases by customers to suggest what books or music they might want to purchase in the future.

Of course, the pharmaceutical industry has hired large numbers of statisticians in the private sector since the 1960s. This broad arena warrants its own article, however.

As more financial transactions became digitized, portfolios became larger, and derivatives (complex financial instruments such as collateralized debt obligations) became commonplace, the need to develop complex and numerically challenging risk models grew.

While not the focus of this article, some speculate one reason for the financial collapse in late 2008 is that the complexity of the financial instruments exceeded analysts' ability to understand and model them. In any case, the market for quantitative scientists ("quants") who could model the risk of complex portfolios grew and numerous disciplines with mathematical foundations stepped in to fill the void—physics, quantitative finance, applied mathematics, and, yes, statistics.

In his book *Competing on Analytics: The New Science of Winning*, Thomas Davenport provided a convincing argument that the ability to effectively analyze and use information would be a deciding factor, separating winners and losers in business. While the financial markets are down at the time

of this writing, financial services are critical to the global economy, and it is clearly just a matter of time before they come back.

Six Sigma was launched in the 1980s when Motorola was having its lunch eaten by foreign competition in the electronics market. It needed to dramatically improve the quality of its products and significantly reduce the costs just to stay in business. There were too many data-oriented process improvement problems to attack using solely professional statisticians, so Motorola decided to develop a systematic methodology for process improvement using primarily statistical methods and teach it to large numbers of employees.

However, rather than simply teaching people various statistical methods and hoping they figured out how to effectively use them, Motorola developed a generic four-phase methodology (measure, analyze, improve, control—or MAIC) that linked and sequenced the tools, creating an overall approach to problemsolving that could be applied to just about anything. It worked.

GE and other companies subsequently adopted the methodology and enhanced it. GE added a "define" stage at the beginning to ensure problems were properly identified and scoped, and others began to add productivity approaches from lean manufacturing. This resulted in the current Lean Six Sigma, which primarily uses the DMAIC approach (D for define).

Billions of dollars of economic benefit have been documented, and while perhaps no longer in its heyday, Lean Six Sigma is still alive and well. An interesting question to ask is why Six Sigma has succeeded for so long, especially given that it has invented no new statistical techniques. I believe the answer provides a glimpse into the dynamic environment for business and industrial statistics now and in the future.

Our Dynamic Environment Brings New Challenges and Opportunities

I think Six Sigma has been successful due to the following:

- It attempts to get "everyone in the game," rather than relying solely on professional statisticians.
- It is led from the top and supported by organizational infrastructure (budgets, managerial review, defined responsibilities, etc.). In

other words, it is embedded into the business system, rather than being a stand-alone, purely technical initiative.

- Through the DMAIC process, it integrates and sequences various statistical tools into an overall approach to improvement, rather than simply providing a laundry list of tools. In practice, few complex problems can be solved with one statistical tool used in isolation.
- It focuses on process improvement—root causes—and reducing variation. These are key elements in statistical thinking, which provides an overall philosophical context for use of statistical methods.

Interestingly, I think these attributes tie in well with some of the changes that have taken place in the environment of most statisticians working in the private sector. The major changes include the following:

- Explosion of the Internet and computer science in general, leading to radical changes to the global economic environment
- Proliferation of low-cost, or even free (R), easy-to-use statistical software
- Extension of longstanding global competition (We have recently seen the emergence of a low-cost market for providing statistical services. This market is often located in developing countries with lower cost structures, but which also have good educational systems for mathematical sciences and the English language.)
- Expansion of Six Sigma “black belts,” finance quants, data miners, and others who can, or at least claim they can, perform high-level statistical analyses
- Growing consensus that there needs to be a greater emphasis on statistical thinking—the philosophy of why and where statistics should be used to make an impact—to augment our historical emphasis on the methods, themselves

The net result of these changes has been the “democratization” of statistics, whereby anyone with a computer connected to the Internet has access to data and software that allows him or her to do statistical work. It therefore has become virtually impossible for us, as professional statisticians, to “own statistics.”

While some statisticians may look upon these changes as the glass being half-empty, I tend to look at them as the glass being half-full. If others are able to perform basic statistical tasks for themselves, professional statisticians can be freed to some extent to do higher-level statistical work, allowing us to provide true leadership to our organizations. Of course, we will need to make significant changes in the way we do our work, as well as what we view as our work, to take advantage of this situation; inaction on our part will likely result in less influence.

For example, rather than being confined to consultative roles—passively providing advice on other people’s problems—or doing narrow technical tasks that may eventually be outsourced to others, we have the opportunity to help shape our organization’s use of statistical thinking and methods. We also can assume leadership in identifying innovative ways to use statistics and then lead the resulting projects. We have the opportunity to focus on the big, unsolved problems facing our organizations as equal collaborators on teams, rather than being bogged down on routine analyses that have been farmed out to us. Six Sigma took advantage of the democratization of statistics to achieve unparalleled results, and I think our profession can, too. In my opinion, such opportunities make our profession more exciting, not less.

Opportunity Is Knocking

We inherit a rich legacy of statistics affecting business and industry, one that goes back at least to the 1920s. While many of the specific problems have changed, important challenges remain. In particular, the environment for statistics in the private sector today is dynamic, requiring real change on our part. Significant new leadership opportunities exist for those who can extend beyond the limitations of traditional roles. If you are looking for a challenge and would like to have the opportunity to develop and apply your leadership skills, consider business and industry as a career option. Opportunity is knocking. ■

Getting a Job: What Distinguishes You?

Jeffrey Larson Keller and Daniel J. Sargent

The Mayo Clinic Division of Biomedical Statistics and Informatics (BSI) is home to more than 175 statisticians—approximately 30 with a PhD, 55 at the MS level, and 90 at the BS level. Our primary function is to collaborate with and provide services to Mayo Clinic investigators. To do this, biostatisticians apply, develop, and teach statistical principles related to study design and conduct and analyze and interpret the results of medical research.

BSI recruits top statisticians at all levels. Expectations for these positions focus on sound statistical knowledge, computer programming, and experience with software packages for data management and statistical analysis. In addition, excellent communication skills, both oral and written, are required.

There is intense competition for talented people. What does



it take to be one of the top candidates? We look for students with hands-on experience working with real data and important problems in the real world. We look for students who have gained experience through previous work, extracurricular activities, volunteering, and internships, in addition to the experience gained through their program of study. Candidates are evaluated and ranked based on academic and work history as summarized in their CV/résumé and letters of recommendation. They are further evaluated through a carefully constructed interview process. We expect candidates to be engaged and able to describe to us in detail their education and experience.

Most of our top candidates are based in university programs that have a strong blend of theory and applications. With the proliferation of statistical software and the numbers of people receiving basic statistical training, biostatisticians are no longer just number crunchers; they must play key strategic roles as members and leaders on research teams.

We look for people who can understand customer needs and communicate in the customers' language. Has the student had to write project reports and present those reports to a client audience? Clear written and oral communication, as judged from the perspective of the audience, are critical skills. As statisticians, it is important that we can describe what we have done and what it means in understandable terms.

Our ability to communicate effectively is crucial. That ability includes listening, talking, writing, and reading. In biomedical research, we are often working with colleagues who have varying backgrounds and quite possibly little knowledge of statistics, including physicians, scientists, residents, fellows, engineers,

programmers, data managers, and project managers.

It is not enough for us to be able to design studies and analyze data. We must summarize the information in the language of our collaborators and clients. They are looking to us to turn data into information. We must convey statistical thinking to people who may not be interested in statistical methods, only the appropriate conclusions that may be drawn from their data. Communication skills are foundational in successful consulting work. How are you developing your communication skills?

Biostatisticians typically manage many projects at a time, so the ability to manage oneself when setting priorities, delegating, and meeting deadlines is critical. The ability to follow through on commitments stems from the ability to know what to say yes to, how to negotiate, and when to say no.

Students have had many opportunities to practice meeting deadlines and managing their time. We ask specific questions about experience in this regard, and the successful applicant will provide a response other than "I worked around the clock for an extended period of time." We want people who can manage their commitments in a fashion that sustains their energy over time.

Teamwork among statisticians and across multidisciplinary groups is now the norm. The days of a statistician alone in an office working in isolation are gone. Meeting with clients and colleagues is critical to gain other perspectives and generate and refine ideas.

Project management and project leadership skills, including project planning and meeting facilitation experience, will set an applicant apart. Have you developed partnerships and coalitions

“What does it take to be one of the top candidates? We look for students with hands-on experience working with real data and important problems in the real world.”

to achieve results? Have you led a team and been a team member? Have you experienced team and group dynamics? This experience often comes from working on class projects; many times, we see these skills demonstrated through extracurricular or volunteer activities. Being an officer in a student organization or leading a team with Habitat for Humanity, for example, gives an indication of experience in leading a team or group focused on specific goals and objectives.

One of the hallmarks of successful statisticians is a curiosity and desire for knowledge. We are at our best when we behave like detectives on an unsolved case, following up on important clues and being persistent as we track leads to become more informed about an event (or series of events).

Initially, asking good questions and listening are more important than having answers and talking. Statisticians, like all people, are dangerous when they think they have access to the best data and know the truth; this is when we stop listening to others and become deaf to other points of view and input. We become better consultants and collaborators when we are fully engaged and interested in the discipline of our client or collaborator. Just as we might bemoan a clinical researcher's lack of statistical knowledge, they might wish we knew more about their field. Movement toward each other

Jeffrey Larson

Keller has worked at Mayo Clinic for more than 20 years and is currently manager of research operations in the Division of Biomedical Statistics and Informatics. He has been involved in the recruitment and placement of hundreds of statisticians.

Daniel J. Sargent,

professor of biostatistics and oncology at Mayo Clinic, is the group statistician for the Cancer and Leukemia Group B and director of Cancer Center Statistics at the Mayo Clinic Comprehensive Cancer Center.

along that continuum heightens the productivity of any collaboration. Many of our most successful statisticians are publishing first and senior author papers in the nonstatistical fields of their collaborators.

A commitment to quality is absolutely essential. While in school, a 95% score on an exam will likely be rewarded with an A. In the medical environment, however, even 99% is a failing grade. That does not mean mistakes are never made, but that we have a commitment to quality and systems and a culture in place to discover and analyze mistakes as close to the source as possible. When in an environment such as at Mayo Clinic, where research may be practice-changing, it is our responsibility to make sure the studies conducted and results published are

as close to flawless as possible.

Regardless of one's rank or role on a project, we expect employees to speak up when they see something is not right or have questions about what is going on. We will ask for examples of when you have had to speak up in this fashion. It is through this questioning and exchange of ideas that we move toward excellence.

Most of us like to work with positive people. One of Mayo's supervisors of the BS-level statisticians famously adheres to the maxim of hiring for attitude. What that means is that when presented with two candidates with similar skills and background, we will select the candidate with the more positive outlook, which creates a work force with a more positive outlook. We are not seeking an optimist who might be blind to real obstacles, but someone who

sees the challenges and has the confidence and drive to step forward in spite of those obstacles. We will want to hear about your experience in this regard.

A good internship can help you develop and demonstrate many of the qualities we have outlined here. BSI maintains a strong internship program, with more than a 25-year history. Positions are advertised in *Amstat News* and online, along with many other outstanding internship opportunities.

One of the primary benefits of an internship program is the positive effect it has on recruitment. We currently have former interns as permanent employees at all levels, including two of our four section heads. In our recruitment efforts, we elevate a candidate's ranking if they have experience as an intern, were exposed to real-world problems, and had the opportunity to work on projects with experienced statisticians. A successful internship or series of internships can mean the difference between getting an interview or a job.

Newly graduating statisticians cannot be expected to possess all the skills and competencies we have discussed, but there should be evidence that they are moving in that direction. What is the evidence in your history that distinguishes you from others with a similar academic background? If the evidence is weak, start today to strengthen your credentials and reputation as someone who gets things done and can be counted upon.

This is the information age. We are hiring for the ability to turn data into meaningful information by collaborating with our clinical colleagues, allowing that information to transform the delivery of care to patients at Mayo Clinic and around the world. We need the best you have to offer. ■

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Challenging Statistics Problems

The **RAND Statistics Group** is seeking PhD 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 and regional studies; to conduct research on statistical methods; to consult; and to teach. **RAND** projects pose novel challenges in analysis, design, sampling, measurement, and computing. Location options include Santa Monica, CA (**RAND**'s headquarters) and Washington, DC. For more information, please visit www.rand.org/statistics/.

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

Application deadline is December 15, 2010 and applications must be submitted online at www.rand.org/statistics/jobs.html and reference **Job ID 2690**. Please submit cover letter, CV/resume, statement of research interests and consulting experience, and writing sample. Three letters of reference and graduate transcripts (if degree received after 2007) should be sent to: **RAND Corporation**, Attn: Susan M. Paddock, Ph.D., Head, Statistics Group, 1776 Main Street, Box 2138, Santa Monica, CA 90407-2138. Questions may be emailed to Susan_Paddock@rand.org.

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California

■ Stanford University, junior faculty appointment in statistics. Assistant professor, tenure track, in either applied or theoretical statistics. See stat.stanford.edu for more information. Send application letter, CV, graduate transcripts, three letters of recommendation and at most one reprint to: Faculty Search Committee, Department of Statistics, Stanford University, 390 Serra Mall, Stanford, CA 94305-4065. Applications received by January 10, 2011, are guaranteed consideration. Stanford University is an equal opportunity employer and is committed to increasing the diversity of its faculty. It welcomes nominations of, and applications from, women and members of minority groups, as well as others who would bring additional dimensions to the university's research and teaching missions.

Colorado

■ National Jewish Health, Denver, Colorado. Assistant professor in division of biostatistics and bioinformatics. Responsibilities include collaboration with multidisciplinary clinical research groups. Some teaching is part of the promotion process. Doctorate in statistics/biostatistics and experience with genetic and pathway analysis required. Missing data and clinical trials experience a plus. Interested candidates should send their CV to Sandi Uno at unos@njhealth.org. EOE.

District of Columbia

■ Three-year contract (renewable). Assistant professor position for fall 2011. Primary responsibilities: teaching, research, and service. Experience and/or interest in research collaboration will be considered favorably. PhD in

Chair: Department of Biostatistics and Computational Biology

The University of Rochester School of Medicine and Dentistry, Rochester, New York, invites applications and nominations for Chair of the Department of Biostatistics and Computational Biology. The department is one of the top ranked NIH-funded Medical School Departments of Biostatistics in the country. Current faculty include 21 tenured (or tenure-track), 7 affiliates, and 7 non-tenure track positions. Major funded research programs emphasize biostatistics, clinical trials and computational genome and systems biology. The department serves as a vital component to the University of Rochester Clinical and Translational Science Institute. It is central to fulfilling the promise of the Medical Center's Strategic Plan to transform the conduct of clinical and translational research and is key to development of quantitative approaches in biomedicine. The Department has long-standing doctoral and master's programs and a number of graduates have achieved high distinction in the profession.

The ideal candidate will be a leader with strong academic credentials who is committed to growing the research and educational programs and who thrives in a collaborative environment of scholarship and mentorship. The candidate must hold a Ph.D. in biostatistics or a related field and must qualify for the rank of full Professor at the University of Rochester School of Medicine and Dentistry.

Interested applicants should submit a letter of interest with a curriculum vitae to: Robert Holloway, MD, MPH, Chair, DBCB Chair Search Committee, c/o Sharon Kubiak, Manager, Candidate Administration Services, University of Rochester Medical Center, Box 706, 601 Elmwood Avenue, Rochester, NY 14642. Phone: 585-275-1018. E-mailed applications are welcome; send to Sharon_Kubiak@urmc.rochester.edu.

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statistics or a closely related field and demonstrated excellence in teaching required. Visit www.gwu.edu/~stat. Send application, CV, and 3 recommendation letters to Search Committee, Statistics Department, George Washington University, Washington, DC 20052. Screening starts 2/15/2011; applications accepted until position filled. The George Washington University is an affirmative action/equal opportunity employer.

Florida

■ The University of Miami Miller School of Medicine/Sylvester Comprehensive Cancer Center is seeking a biostatistician with statistical expertise in clinical trials design and analysis, multivariate analysis, longitudinal and generalized linear models, experimental design, and high-dimensional data. Requirements: PhD in biostatistics or statistics. 5+ years



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Faculty Positions in Biostatistics

The Department of Biostatistics at the University of North Carolina at Chapel Hill is seeking applications for two Tenure Track positions in Biostatistics, with specialization in (1) survey methodology in health science research or (2) infectious disease research methods, beginning in Summer or Fall 2011. Appointments will be in Biostatistics in UNC's Gillings School of Global Public Health. Applicants are sought at Assistant, Associate, or Full Professor rank, depending on professional experience and accomplishment. Applicants should have broad research and teaching interests and the ability to engage in both collaborative and doctoral dissertation research.

For Position (1), a doctoral degree in Biostatistics, Survey Methodology, Statistics, Social Statistics, or equivalent, along with leadership experience in population-based research studies, is required. Moreover, the successful candidate will provide two types of leadership within the Department of Biostatistics, as: (i) head of the Department's curriculum in survey research methods, and (ii) Director of the Department's Survey Research Unit, which collaborates with investigators doing population-based research by offering assistance with design, data gathering, and analysis. For Position (2), a doctoral degree in Biostatistics, Statistics, or equivalent is required; and the successful candidate will provide biostatistical leadership in the UNC Center for Aids Research.

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To apply, use the electronic submission website <http://jobs.unc.edu/2500232> and upload PDF versions of your CV, cover letter, and research and teaching statements. Please state which of the position(s) you are applying to. Candidates must also arrange for four letters of recommendation to arrive via email at bseagrov@bios.unc.edu and subsequently in hard copy to:

Faculty Search Committee
c/o Betsy Seagroves
Department of Biostatistics
CB #7420, McGavran-Greenberg Hall
University of North Carolina at Chapel Hill
Chapel Hill, NC 27599-7420

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postdoctoral experience. Computing skills should include SAS, R, and other standard software. Apply online: www.careers.med.miami.edu. EOE.

Indiana

■ The Department of Applied and Computational Mathematics and Statistics of the University of Notre Dame is seeking associate and assistant professors of statistics at the tenured- and tenure-track levels. The successful applicant must have a doctorate in statistics, biostatistics, or a closely related field and a record of success in both research and teaching. Applicants should visit <http://acms.nd.edu/job-opportunities> to learn more and to apply for the positions. Notre Dame is an equal opportunity employer, and we particularly welcome applications from women and minority candidates.

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Massachusetts

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Faculty and Staff Positions

Department of Biostatistics

University of Arkansas for Medical Sciences

UAMS

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The Department of Biostatistics at the University of Arkansas for Medical Sciences is accepting applications for the following positions:

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Ohio

■ The Ohio State University Statistics Department invites applications for tenure-track assistant professor position beginning autumn quarter 2011. PhD in statistics/biostatistics and excellence in teaching and research required. Interest in methodological research with application to biomedical sciences is desirable. Send vitae, three letters, and graduate transcripts to: Shili Lin, Department of Statistics, Ohio State University, 1958 Neil Avenue, Columbus, OH 43210. To build a diverse work force, Ohio State encourages applications from minorities,

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■ Position: To develop an accredited school of public health and in support of the Environmental Health Sciences Center, the Department of Public Health at Oregon State University seeks a tenure-track assistant/associate professor of biostatistics. To see full position announcement and to apply, go to www.hhs.oregonstate.edu/jobs. To be considered, you must apply online at Oregon State University posting #0004931. Oregon State University is an Affirmative Action/Equal Opportunity Employer and has a policy of being responsive to dual-career needs.

Pennsylvania

■ Senior Consultant, Eddystone, PA. IHS, a leading global source of critical information and insight, is hiring a senior consultant to provide instruction and guidance to developing analysts, lead problemsolving on highly complex issues, and manage a small team of 1+ professionals. Master's or PhD in economics and 5 years relevant experience required. To apply, please visit www.ihs.com and search under REQ #1020524. EOE.

Tennessee

■ Eastman Chemical Company is a leading, global company of people who make a difference in everyday life. We offer extensive possibilities for talented and innovative people to enjoy career paths filled with success and personal growth. Eastman currently has an open position for a statistician. Qualified candidates should submit their résumé online at <https://eastman.taleo.net/careersection/10000/jobdetail.fil?lang=en&job=00001886>. Eastman is an equal opportunity/affirmative action employer. ■

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NISS Seeks Deputy Director

To continue expanding its scale, impact and relationships with the statistical sciences community, NISS seeks to appoint an energetic, visionary individual as its Research Triangle Park—based Deputy Director. This person will also serve as Associate Director of the Statistical and Applied Mathematical Sciences Institute (SAMSI), and may in addition hold a faculty appointment at one of the Research Triangle universities.

The principal responsibility of the Deputy Director of NISS is to *expand and diversify the NISS research program*. The Deputy Director will play a leadership role in creating high-impact cross-disciplinary and cross-sector projects addressing major societal problems such as health, education and sustainable energy; working with NISS affiliates and others to form research teams built on strong participation from the statistical sciences community; securing the necessary resources; and carrying out the research.

The Deputy Director will also *oversee and build the NISS–SAMSI relationship*, emphasizing the role of NISS in stimulating SAMSI programs and realizing the potential of NISS projects catalyzed by SAMSI programs.

The Deputy Director will work closely with the Director, the Associate and Assistant Directors, and the Board of Trustees to *further develop NISS along multiple other dimensions*, including the affiliates programs; communications; key relationships between NISS and industry, government and academia, both within and beyond the statistics community; and attracting foundation support for NISS activities.

The Deputy Director will report to the Director. Criteria for the position include a Ph.D. in the statistical sciences or a related discipline; a strong record of scientific activity and creativity; experience in assembling, generating funding for, and managing cross-disciplinary, multi-organization collaborations; superb communication skills; and passion for NISS to lead the statistics community in serving the nation.

The goal is to fill the position as of July 1, 2011. Applications, expressions of interest and nominations should be sent to DDSearch11@niss.org. Both NISS Director Alan Karr and search committee chair Jessica Utts may be contacted at this e-mail address with questions. Applications should consist of a letter of interest, CV and names of five references. Review of applications will begin in October, 2010 and continue until the Deputy Director is appointed.

NISS is committed to recognizing and nurturing merit, talent, and achievement by supporting diversity and equal opportunity in all of its activities. NISS does not discriminate against employees or applicants for employment on any legally recognized basis, including, but not restricted to, race, color, religion, gender, national origin, age, physical or mental disability, veteran status, or uniformed service member status. NISS seeks and welcomes applications from women and members of historically underrepresented groups.

July 2010

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Awards: awards@amstat.org

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Fellowships and Research Programs: farf@amstat.org

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Meetings: meetings@amstat.org

Membership/Member Services: asainfo@amstat.org

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General Information

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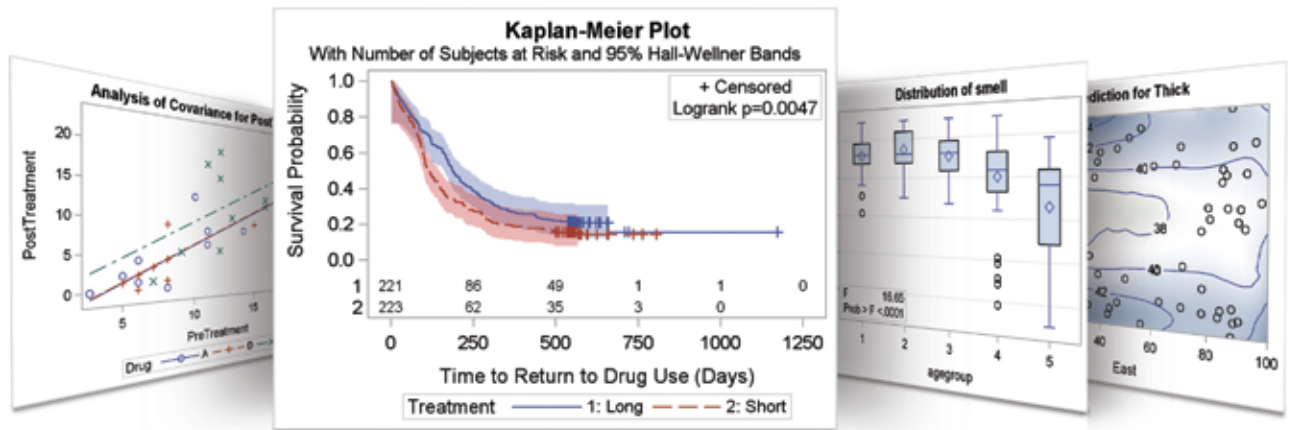
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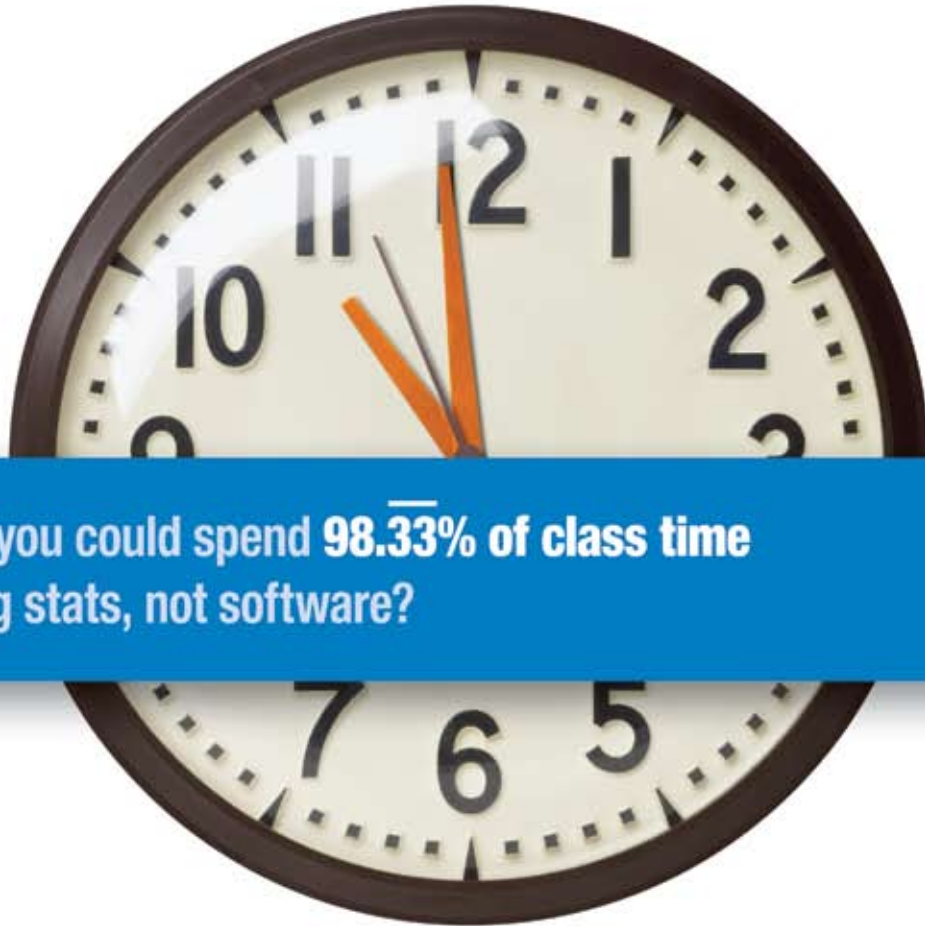
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