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**From the Senior Editor:**

Computers continue to push their way into our work and personal lives and SPES and Q&P are about to add to this change. This December issue will be the last one in a printed form that will be mailed to our members. Continuing difficulties with delivery of the newsletter and the increasing popularity of email as a form of communication has convinced both the SPES and Q&P boards to move to an electronic newsletter starting with the June 2002 issue. The exact details have not yet been worked out, but at a minimum, we will send both email and postcards notices that the newsletter is available on the SPES and Q&P Web sites. If practical, a pdf version of the newsletter will accompany the email notice.

The main reason for sending a postcard in June is that ASA cannot guarantee the completeness and accuracy of its email lists, since email addresses are voluntary, and there is no way to automatically update email lists as people change jobs. Both SPES and Q&P are encouraging their members to register their email addresses with ASA if they have not yet done so, and to make sure that the email address the ASA has for you is current. Registering and updating your email address with ASA can be done at the Members Only page of the ASA Web site.

Please feel free to contact me, or either of the associate editors if you have any questions or concerns about the changes in the SPES/Q&P Newsletter.

Pete Hovey

Message from the 2001 "Has-been" SPES Chair

Christopher Nachtsheim, University of Minnesota

Having just returned from Toronto, I must say that the Fall Technical Conference never seems to disappoint! Listening to such luminaries as Ray Myers, Norm Draper, John Cornell, Andre Khuri, and Doug Montgomery expounding on the past and future of response surface methodology was inspiring. It also brought me back a bit. As a graduate student at RPI in 1974, my first course in experimental design, from John Wilkinson, featured a "new" text on response surface methodology by Ray Myers. My first course in regression was out of Draper and Smith, taught by none other than Harry Smith. As a doctoral student at Minnesota, I was forced to memorize mixture experiments papers by John Cornell, while my department tried (in vain) to hire a youngster named Doug Montgomery as chair. Getting their perspectives in one session alone made the trip worthwhile! Thanks go to Connie Borrer for her part in putting together an outstanding program, and to ASA President Dick Schaeffer for a wonderful presentation at the Friday luncheon.

Future Sponsorship of the Fall Technical Conference

At a meeting of the sponsors of the FTC (SPES, STAT, and CPID), we discussed alternative models for a new sponsorship agreement. While no immediate changes are contemplated, Q&P indicated its willingness to assume a roll as a full sponsor in the future. In the meantime, they are willing to share in the duties and workload associated with being a sponsor. A proposal was made that Q&P participate in the development of the Technical Program beginning immediately. The SPES Executive Committee will review this proposal.

Funding Request

The FTC is just one of the three conferences and many successful activities that we sponsor. Among continuing and new initiatives that were approved at our executive committee meeting this summer were:

- Spring Research Conference, three \$400 Student Scholarships
- Fall Technical Conference Student Scholarships (\$400)
- Support for the Undergraduate Data Analysis Contest (\$250)
- Student stipends and discussion leaders for JSM luncheons (10 persons and five discussion leaders)
- JSM speaker awards (\$250)
- Support for continuing education at JSM for a student (\$250)
- Setting up an online membership survey mechanism (\$600)

2002 Leadership

In the spirit of continuous improvement, Chuck Bayne will be taking over the SPES Chair duties from me on January 1. It's good to be part of an organization with a steep gradient! One of my last remaining duties is to finish documenting activities for 2001 and passing "the baton" on to Chuck. The baton is in actuality a collection of four 4-inch binders, three of which were personally delivered to me a year ago in a grocery bag from Fred Hulting. In addition to Chuck, Bob Rodriguez takes over as Chair-Elect, Mark Vangel is Program-Chair Elect, and Linda Blazek is Secretary-Treasurer. Your Council of Sections representatives will continue to be John Cornell and Margie Nemeth, Will Guthrie is the Publications Chair, and Russ Lenth is Program Chair. Finally, Pete Hovey and Jim Rutherford continue as Senior and Associate Editors of this newsletter.

Election of Officers for 2003

I'm delighted to announce an outstanding slate for SPES positions in next spring's election:

For 2003 Chair-elect:

- Margie Nemeth (Monsanto)
- Dennis Lin (Penn State)

For 2003 Program-Chair-elect

- Derek Bingham (University of Michigan)
- Stan Young (GlaxoSmithKline)

For 2003-2005 Council of Sections Representative

- Janet Buckingham (Southwest Research Institute)
- Liz Schiferl (Lubrizol)

On behalf of SPES, I want to thank each of these highly qualified individuals for their willingness to serve! Whatever the outcome, we're in good hands for years to come.

Thanks

A year ago in this newsletter, I wrote that I would be happy if I could get through my term without doing harm to a wonderful organization. Thanks to the help lot of hard-working and dedicated volunteers, I may have avoided that. I want to thank each one of them for their outstanding work and continuing commitment to SPES.

Message from the Q&P Chair

Eric Lagergren, Kraft Foods

At the risk of getting a poor grade, I will list our 2001 Tactical Plan that appeared in the December 2000 issue of our joint newsletter.

2001 Tactical Plan

1. Improve communication of important Q&P activities such as conference programs to the membership. Publicize widely including Q&P Web site, Joint Q&P/SPES Newsletter, and *Amstat News*.
2. Develop an email list of Q&P Section members and a process for maintaining the list.
3. Use Q&P email list to notify membership of availability of the Joint Q&P/SPES Newsletter on the Web, piloting a transition to an electronic-only newsletter.
4. Expand Continuing Education to a committee and use financial incentives to expand the course offerings for next year.
5. Make the transition to electronic-only proceedings.
6. Begin a discussion of Q&P's role in adapting to the new quality landscape proposed by ASQ.
7. Continue support of and relationship with the Q&P Research Conference. Explore relationship with the Fall Technical Conference.
8. Develop a Web based body of knowledge for Six Sigma.

I am very pleased to report that we have made great progress in meeting the objectives laid out in our Tactical Plan. And I would like to thank the entire Executive Committee for their hard work in meeting these objectives.

Electronic Communication

Several items in our Tactical Plan (1, 2, 3, and 5) deal with improving electronic communication with our membership. We have made great strides in working with the ASA to develop and maintain an email list of Q&P Section members and provide a means for communicating with them. Thanks to Karen Copeland, our Council of Sections representative, in leading these efforts. The ASA office is doing great work in this area under the leadership of Tom Devlin and Brian Yandell in developing ASA's Web capabilities and providing Sections with a mechanism for electronic communications. I expect to have a Section email list available very soon. Here is where we need your help. The list is only as good as the accuracy of the email addresses it contains. I strongly encourage you to check that your current email address is listed with the ASA. It will only a few minutes and you can check at the following ASA Web site (<https://www.amstat.org/membersonly/default.asp>). With this list in place we would plan to send you periodic updates of important section activities that may be of interest to you.

I am disappointed to report that as of this writing (November 2), I and many (or all?) of the Executive Committee have not received our June newsletter in the

mail. We are trying to track down what the problem is. I am wondering if any of you have received it either. Because of similar problems in the past, Q&P and SPES have decided to move to an all-electronic newsletter. An article appears elsewhere in this issue that describes this in greater detail. Basically we are planning to go to an all-electronic newsletter for the December 2002 issue. So once again I encourage you to check that your current email address is listed with ASA. We will send postcards to notify our membership. We strongly feel that we can deliver better service to you by moving to an electronic publication.

2002

I am very pleased to know that the Section will be in great hands under the leadership of our incoming chair, Fred Faltin. Fred did a great job leading our Strategic Planning meeting at the Quality & Productivity Research Conference in Austin and our Tactical Planning Meeting at the JSM in Atlanta. A major focus of next year's activities will be in exploring how we add value to our membership and reaching out to new members (outgrowths of Tactical Item 6).

Conferences

This year's Quality & Productivity Research Conference, cosponsored by Sematech, in Austin was a rousing success. I would like to thank Paul Tobias, the conference chair, and his team for putting on a such a great show. I would also like to thank Jeff Hooper, the chair of the steering committee, for his great work in leading this conference for so many years.

Thanks to Cheryl Jennings for assembling an outstanding program at this year's JSM in Atlanta. Also thanks to Steve Zayac and Tim Robinson for assembling a strong set of short courses for the 2001 JSM and for their good work in early preparations for the 2002 JSM in New York City. Tim Robinson recently joined the Continuing Education Committee and has done a great job (Tactical Item 4).

Geoff Vining (past chair), Fred, and I attended this year's Fall Technical Conference in Toronto and met with the sponsors of the FTC-ASQ Chemical and Process Industries Division, ASQ Statistics Division, and ASA SPES. The initial response of the FTC sponsors regarding Q&P Section participation at some level was quite favorable. Initial discussions involved possible Q&P Section involvement as a member of the Technical Program Committee or perhaps as a full fourth cosponsor. The cosponsors need to get feedback on this from their respective Executive Committees, and so we should have a clearer idea of where things stand by the end of the year and certainly by next year's FTC (Tactical Item 7).

Remaining Items from the Tactical Plan

ASA has already moved to electronic-only publication of the proceedings (Tactical Item 5). Angie Neff is leading the development of a Web based Six Sigma Body of Knowledge (Tactical Item 8). Angie will be developing a course on Six

continued on the following page

Message from Q&P Chair continued

Sigma to offer at Virginia Tech in the spring 2002 semester and feels that this material can be used to provide a good deal of content for the Web site. This is a large effort and if anyone is interested in helping out, please contact Angie (neffa@crd.ge.com).

Thanks

Once again I am very pleased with the progress we have made this year and that is due to the hard work of the members of our Executive Committee. You will find their names listed on the second to last page of the newsletter. I would like all of them very much. In particular I would like to thank our outgoing officers: Publications Officer Gwen Stimely, Program Chair Cheryl Jennings, and last but certainly not least, our Treasurer LeRoy Franklin. LeRoy is completing a three-year term and has done an outstanding job. Thanks LeRoy! I would also like to thank two of our incoming officers who have or will be stepping in before their official tour of duty. Will Guthrie, our elected Secretary for 2002-2004, stepped in June of this year and

has been a tremendous asset to the section and a big help to me personally. Thanks Will! Also, thanks to Mark Vandeven, our elected Publications Officer for 2003, who has kindly agreed to step in for 2002 as well. Finally I would like to thank my mentors, our past chair Geoff Vining, and past chair Tom Boardman, who have given me plenty of sage advice along the way. Thanks to both of you.

Get involved

I would be remiss if I did not make a pitch to all of you to get involved. If any of the activities I have described stirs your interest or if you have other ideas for what the section should be doing, please let us know. Believe me, Fred and I would love to hear from you! While I am sure we are all finding it more difficult to participate in professional society activities, the rewards are well worth it. You can have an impact on our section, work with a great group of people, and as my boss says if (or when) the grim reaper comes, it certainly does help to have a network of colleagues to count on!

I look forward to a productive 2002!

Joint Q&P/SPES Business Meeting, Newly-Elected Officers and Fellows Announced

William F. Guthrie Secretary, Q&P and Publications Officer, SPES

The Quality and Productivity and Physical and Engineering Sciences Sections' Annual Meeting was held on Tuesday August 7, 2001 at the Joint Statistical Meetings. At the meeting (and mixer!) the Chairs of the two Sections discussed current issues of interest to Section members including transition from a printed version of the Joint SPES/Q&P Newsletter to an all electronic version (see related article by Esteban Walker in this issue for more information). Feedback from members on this topic would be appreciated and can be sent to any of the current Section officers (<http://web.utk.edu/~asaqp/officers2001.html> and <http://www.amstat.org/sections/spes/Officers.htm>). For the electronic Newsletter to be successful it is also important for members to make sure that their email addresses are up to date on the ASA Web site. This can be checked and updated (securely) at <https://www.amstat.org/membersonly/default.asp> or by contacting Member Services at asainfo@amstat.org.

Rick Carlson, the Q&P Section's Baldrige Award Liaison announced that he is currently recruiting for new Baldrige examiners and asked any interested members to contact him at rick.r.carlson@healthpartners.com.

Current and new Section officers present at the meeting were also introduced. The winners of the most recent election to choose Section officers are in the grey box at the bottom of this page.

Visit the Section Web sites to get contact information for the new officers. As always the officers appreciate hearing from members so they can continuously update and improve Section services and keep the Sections responsive to members' needs.

The announcement and reception for new ASA Fellows was held simultaneously with the SPES/Q&P Annual Meeting so the newly selected Fellows could not attend. The members of the two Sections who were named Fellows in 2001 include Yasuo Amemiya, Dennis Boos, Michael R. Chernick, Thomas Mathew, William I. Notz, Gregory F. Piepel, and Geoff Vining. Congratulations to our new "Fellow" members!

The meeting concluded with the presentation of door prizes, including copies of Minitab and Design-Expert, books from SAS and John Wiley, Nabisco treats, the ever popular Pillsbury Doughboys, and many other nice prizes.

Office	Section	
	Q&P	SPES
Chair-Elect	Lonnie C. Vance, General Motors	Robert N. Rodriguez, SAS Institute Inc.
Program Chair-Elect	Christine M. Anderson-Cook, Virginia Polytechnic Institute	Mark G. Vangel, Dana-Farber Cancer Institute
Secretary	William F. Guthrie National Institute of Standards and Technology (NIST)	Linda W. Blazek, Hewlett Packard
Treasurer	Norma Faris Hubele, Arizona State University	
Publications Officer-Elect	Mark Vandeven, Kraft Foods/Nabisco	(Officer Serves by Appointment)

You Might Have Missed...

Esteban Walker

L. Prechelt and B. Unger, "An Experiment Measuring the Effects of Personal Software Process (PSP) Training," *IEEE Transactions on Software Engineering*, Vol. 27, May 2000.

This article summarizes a treatment versus control group study. The treatment group consisted of graduate students who took a PSP course, while the control group was composed of graduate students who had taken a component software in JAVA course. The article clearly presents the need for a carefully controlled study to evaluate the claimed benefits of PSP training. The groups were compared on a number of time measures, as well as output reliability for a programming task. The results are summarized primarily using side-by-side box plots. The raw data and additional details are available at <http://www.wipd.ira.uka.de/EIR/>. (reviewer: Robert Mee)

Albert H. Segars, Warren J. Harkness and William J. Kettinger, "Process Management and Supply-Chain at the Bose Corporation," *Interfaces*, Vol. 31:3, Part 1 of 2, May-June 2001, pp 103-114.

This interesting article provides an overview of The Bose Corporation's overall approach to process management. Particularly useful parts of the article include Figure 1 which shows "The path towards process linking at Bose" as characterized by defined states of process still building among functional areas. Other interesting displays include Table 1: Obstacles impeding coordinated process management, and Figure 2 which outlines the process for identifying, prioritizing, addressing and documenting recommendations or solutions. I think that many possible readers will find that the structured process appears a bit formal. Nonetheless, consideration of the approach taken at Bose will be of value to many attempting to create structured improvement processes for process management, or to improve existing process management processes. (reviewer: William C. Parr)

Scott Sedam, "Regarding TQM, 'The Rumors of My Death Have Been Greatly Exaggerated,'" *Professional Builder*, June 2001, pp 149-150.

This article discusses the reasons for the current economic problems in Japan and their relationship with the practice of TQM. It proposes that the economic

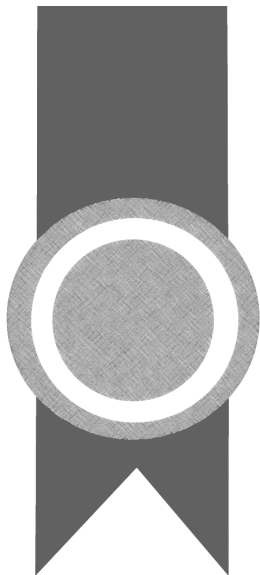
woes in the Japanese economy are mostly due to an outdated and rigid banking system. The author argues that the situation would be much worse if the Japanese had not been practicing the principles of TQM. The author mentions that, based on his knowledge of the Japanese banking system, Dr. Deming predicted Japan's current economic problems several years before his death. The author agrees with John Porter, the Harvard marketing guru, in that another reason why the Japanese lost their competitive advantage is that they spent too much time benchmarking the competition. (reviewer: Esteban Walker)

Richard S. Allen and Ralph H. Kilman "Aligning Reward Practices in Support of Total Quality Management," *Business Horizons*, May-June 2001, pp 77-84.

This article discusses the results of a survey of 100 individuals at different levels in a wide variety of organizations. The survey was designed to measure three aspects of the organization: level of implementation of TQM, reward practices, and performance. The level of implementation of TQM was measured using a scale based on the usage of traditional TQM practices like quality improvement teams, cross-functional planning, and customer satisfaction monitoring. The reward practices considered were of two types: monetary and nonmonetary. Indices for the two types of rewards were constructed. Finally, a company performance index was constructed using a combination of sixteen common performance indicators like net profit, revenue growth, and customer satisfaction. Using regression analysis including only "firms above the mean on the use of TQM language in their official statements," (n = 24) the authors found a significant positive correlation between both types of rewards and the performance index. Unfortunately, there are no scatterplots and no correlation coefficients or p-values are reported. There is an interesting discussion about the implementation of reward systems and several real examples of the use of monetary rewards. The authors advocate the use of monetary rewards, recognizing that this practice "runs counter to the generally accepted TQM wisdom espoused by Deming and other gurus." This is an interesting article whose practical value depends directly on the validity of the survey. (reviewer: Esteban Walker)

SPES Awards for Outstanding Presentations Announced

William Li, Awards Chair, University of Minnesota



The Section on Physical and Engineering Sciences is pleased to announce the results of its annual Outstanding Presentation competition for papers given at the 2001 JSM in Atlanta. These awards are based on audience evaluation of papers contributed to SPES-sponsored sessions at the Joint Statistical Meetings. The purpose of the awards is to encourage continuous improvement in the presentation of statistical information by recognizing at least some of the truly excellent talks given each year in SPES sessions. The winners will receive cash awards as part of their recognition. \$100 will be awarded for best presentation,

\$50 will be awarded for runner-up, and \$25 will be given for honorable mentions. Certificates will also be awarded. The awards this year, which will be presented at the SPES mixer during the meetings in New York City, are:

Outstanding Presentation Award to **Dr. William Meeker**, of the Iowa State University, for his SPES Contributed Paper presentation, "Use of Sensitivity Analysis to Assess the Effect of Model Uncertainty in Analyzing Accelerated Life Test Data".

Runner-Up Outstanding Presentation Award to **Dr. James Mays**, of the Virginia Commonwealth University, for his SPES Contributed Paper presentation, "Small-Sample Model-Robust Confidence Intervals in Regression".

Honorable Mention Outstanding Presentation Award to **Dr. Joseph Cavanaugh**, of the University of Missouri - Columbia, for his SPES Contributed Paper presentation, "Self-Similarity Index Estimation via Wavelets for Locally Self-Similar Process".

Honorable Mention Outstanding Presentation Award to **Dr. Thomas Ferryman**, of the Battelle Memorial Institute, for his SPES Contributed Paper presentation, "Cluster Analysis of Digital Flight Data for the Aviation Performance Measurement System".

Honorable Mention Outstanding Presentation Award to **Dr. Gregory F. Piepel**, of the Battelle Pacific Northwest National Laboratory, for his SPES Contributed Paper presentation, "A Component Slope Model for Mixture Experiments".

Honorable Mention Outstanding Presentation Award to **Dr. Stephan Sain**, of the Southern Methodist University, for his SPES Contributed Paper presentation, "A Mixture Approach for Multivariate Response Regression Trees".

I would also like to thank **Dr. Wayne Nelson** who helped with the data collection for the awards the Indianapolis meetings. Without the help of dedicated volunteers, the SPES awards program would not be possible.

If you would like to see your name listed among the SPES Outstanding Presentation Award winners next year, just start sharpening your speaking skills for New York City! If you would like to help with the data collection for the Presentation Awards at future meetings, please contact me at wli@csom.umn.edu or 612-625-6841. Volunteers will be recognized on the SPES Web site and in the Newsletter. Your involvement would be much appreciated.

SPES Roundtable Wrapup-2001 JSM

Russ Lenth, University of Iowa

SPES sponsored five roundtable luncheons at the Atlanta meetings, and they were all well attended. The food was good, too.

For the second year, we sponsored two student attendees at each table. This scholarship program is quite successful and I think it is appreciated by the students. My experience was that the student attendees contributed actively to the discussion and brought in fresh perspectives.

A special word of thanks goes to Doug Nychka, who stepped in at short notice to serve as moderator at one of the tables.

Here is a summary of the luncheon topics, leaders, and student scholarship winners.

1. Applications of Functional Data Analysis; Leader: Doug Nychka, National Center for Atmospheric Research; Student scholars: Vera Bulayevskaya, University of Minnesota; Ping Ma, Purdue University.

2. How to View Dispersion Analysis Results from Unreplicated Fractional Factorial Experiments; Leader: William Brenneman, Procter and Gamble; Student scholars: Paula Johnson, Virginia Tech University; Susan Simmons, University of South Carolina.

3. Publishing Statistical Applications; Leader: Bill Notz, Ohio State University and Editor of *Technometrics*; Student scholars: Leming Qu, Purdue University; Marco Ferreira, Duke University.

4. Bayesian Hierarchical Modelling for Industrial Applications; Leader: Shane Reese, Los Alamos National Laboratory; Student scholars: Ed Boone, Virginia Tech University; Veerabhadran Baladandayuthapani, Texas A&M University.

5. Statistical Issues in Product Warranty and Reliability; Leader: Lonnie Vance, General Motors; Student scholars: Wade Davis, University of Missouri; Brooke Fridley, Iowa State University.

Congratulations to the student scholars, and many thanks to the moderators. Mark Vangel will be organizing luncheons for the New York meetings, and we can look forward to more lively discussions there.



Joint Statistical Meetings

August 11–15, 2002
New York City, New York

Key Dates for JSM 2002:

March 1, 2002— Hotel reservation form available online

April 1, 2002—Audiovisual requirements deadline

April 1–May 1, 2002—Revisions can be made to abstracts

May 1, 2002—Preliminary Program available online

May 15, 2002—Registration materials available online

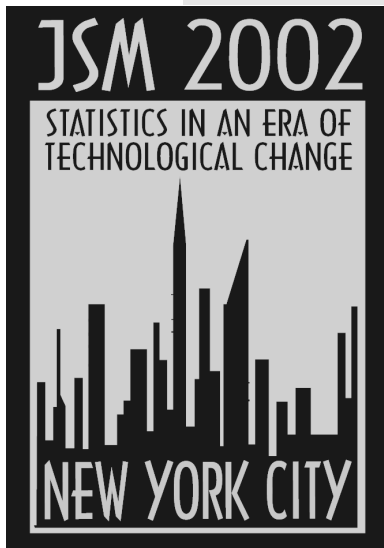
June 1, 2002—Draft manuscripts due to session chairs for all regular and topic contributed papers and any invited papers with discussants

July 5, 2002—Last day for early bird registration forms to arrive at the office

July 6, 2002—Advanced registration fees apply

July 19, 2002—Hotel reservations and advanced registration deadlines

July 20, 2002—On site registration fees apply



If you have questions, contact 703-684-1221 ext. 145 or email meetings@amstat.org

2002 Quality & Productivity Research Conference Draft Agenda

Tentative Conference Theme: Quality of Design for Products and Processes

◆ Tuesday, 4 June ◆

All day workshop, 0830-1700 (separate registration fee). Topic and speaker(s) to be determined.

◆ Wednesday, 5 June ◆

Time	Room A	Room B	Room C
0730-0830	Sign-in and Continental Breakfast		
0830-1000	Introduction, welcoming remarks		
1000-1030	Break and Refreshments		
1039-1200	Invited Session 1	Contributed *	Contributed *
1200-1330	Lunch		
1330-1500	Invited Session 2 - Tutorial		Contributed *
1500-1530	Break and Refreshments		
1530-1700	Invited Session 3	Contributed *	Contributed *
1700-1730	Invited guest presentation: George Box		
1730-2000	Mixer and Dinner honoring George Box, Mary Natrella & Q&P Scholarship winners		

◆ Thursday, 6 June ◆

Time	Room A	Room B	Room C
0730-0830	Continental breakfast		
0830-1000	Invited Session 4	Contributed *	Contributed *
1000-1030	Break and Refreshments		
1030-1200	Invited Session 5	Contributed *	Contributed *
1200-1330	Lunch		
1330-1500	Invited Session 6-Tutorial		Contributed *
1500-1530	Break and Refreshments		
1530-1700	Invited Session 7	Contributed *	Contributed *

◆ Friday, 7 June ◆

Time	Room A	Room B	Room C
0730-0830	Continental Breakfast		
0830-1000	Invited Session 8 -Tutorial		Contributed *
1000-1030	Break and Refreshments		
1030-1200	Invited Session 9	Contributed *	Contributed *
1200-1330	Lunch		
1330-1500	Tour(s)—to be arranged		

*Or additional invited sessions

Tentative Invited/Tutorial Sessions

John Brewster (U of Manitoba), Organizer	Split-plot experiments and related topics
Galit Shmueli (CMU), Organizer	Statistical Process Control
Shari Kraber/Pat Whitcomb (Stat-Ease), Organizers	Nonmanufacturing applications of DOX
Don Holcomb/Dennis Millette (Honeywell), Organizers	Six Sigma in Design
Roger Hoerl (GE), Organizer	Six Sigma for Business Processes
George Runger, ASU	Data Mining Tutorial
Dan Rivera, ASU	A Tutorial on EPC from the Engineer's Perspective
Jennie Se, ASU	A Tutorial on AI and Neural Networks with Applications
Geetha Rejavalu (Motorola), Organizer	Life sciences applications of quality improvement methodology
David Drain (Intel), Organizer	Automated process control
David Drain (Intel), Organizer	?????
Cheryl Jennings (Motorola), Organizer	Six Sigma and Performance Excellence
Dennis Millette (Honeywell) and Doug Montgomery (ASU), Organizers	Quality improvement in the supply chain
Dennis Millette (Honeywell) and Doug Montgomery (ASU), Organizers	Multivariate analysis

There are several other individuals that have been asked to organize invited sessions, so there may be 2-4 additional sessions to include.

Q&P Proposed Courses for the 2002 JSM

Tim Robinson

Robust Parameter Design for Product/Process Improvement

Presenter: C. F. Jeff Wu, University of Michigan

This one-day course will be based on the textbook coauthored by the instructor. The short course notes will be made available to the participants. The book contains many new methods not found in existing textbooks, and covers more than 80 data sets and 200 exercises. The tools covered in the course include a quick review of modern methods for fractional factorial designs (i.e., minimum aberration criterion for optimal factor assignment, orthogonal arrays, analysis strategies), variation reduction, robust parameter design for product/process improvement, modeling strategies and layout techniques, extensions to experiments with dynamic characteristics, and a discussion of the limitations of Taguchi's signal-to-noise ratios. The course will cover basic tools and illustrate them with data from real experiments. There will be time reserved for questions and discussions.

Using WinBUGS for Bayesian Analysis of Industrial and Physical Science Data

Presenters:

William Guthrie, National Institute of Standards and Technology and Richard Evans, Iowa State University

Bayesian inference has a growing role in the analysis of industrial and physical science data. The WinBUGS software makes the Bayesian analysis of many applied problems accessible to practitioners. The course is designed to provide practitioners with the tools (Bayesian modeling, WinBUGS, convergence tests, Monte Carlo, etc.) necessary to use Bayesian inference for applied problems. Participants in the course will learn the basics of Bayesian modeling and inference using Markov chains generated with the WinBUGS software. The philosophy of the course is to provide some underlying theory, but primarily focus on solving "real world" Bayesian data analysis problems using a series of real examples (from collaborations with scientists and engineers). No knowledge of Bayesian inference is required, but the participant should have practical data analysis experience. This course is based on a short course given at the National Institute of Standards and Technology.

Statistical Methods for Reliability Data

Presenters: William Meeker, Iowa State University and Luis Escobar, Louisiana State University

2002 Spring Research Conference on Statistics in Industry and Technology

Derek Bingham

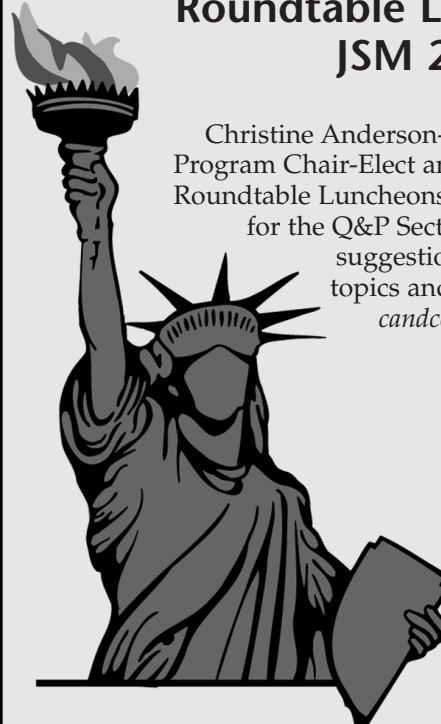
The preparations for the 2002 Spring Research Conference on Statistics in Industry and Technology are well underway. The 2002 SRC will be held May 20–22 at the University of Michigan, Ann Arbor, Michigan. The conference Web page has just been launched and can be found at <http://www.stat.lsa.umich.edu/src>.

SRC02 will feature a keynote address by Sir David Cox on Challenges in Industrial Statistics and several plenary sessions by distinguished speakers from industry and academia. Invited sessions are currently being finalized, and there is a call for contributed paper submissions. There will be pre- and post-conference workshops. Program information will be updated on the Web site as it is finalized, so please check it often!

As in past years, the invited program attempts to strike a balance between areas of traditional interest to SRC attendees and important emerging areas in industrial and technology applications. In 2002, invited sessions include, to name a few, design of experiments, drug discovery, analysis of large data sets, machine learning, classification and clustering, internet traffic modeling, reliability, process control and warranty data analysis. We hope to see you in Ann Arbor in 2002.

Roundtable Luncheons at JSM 2002

Christine Anderson-Cook is the Program Chair-Elect and is organizing the Roundtable Luncheons for the JSM 2002 for the Q&P Section. Please send suggestions for roundtable topics and/or speakers to candcook@vt.edu.



Computer–Aided Response Surface Designs for Prediction

Bradley Jones
SAS Institute

Christopher J. Nachtsheim
University of Minnesota

Standard response surface designs, such as central composite designs and Box-Behnken designs, are the work-horses of response surface experimentation. Since the pioneering works of Box and Wilson (1951), and Box and Behnken (1960), these designs have clearly proven their utility. They were developed for fairly standard situations where the response surface of interest can be reasonably approximated by the second-order polynomial and the experimental region is regular. Among the advantages of these designs are: good efficiency for parameter estimation, good efficiency for response prediction, ease of blocking, adaptability to sequential experimentation and good projection properties.

Alternative strategies for experimentation are sometimes needed when such standard designs cannot be directly implemented. The use of computer-generated designs is a now well-established alternative when non-standard experimental situations are encountered. Such situations include the presence of irregular (highly constrained) design regions (e.g., mixture experiments), the uses of nonstandard and/or nonlinear models (e.g., mixed qualitative and quantitative factors), nonstandard sample sizes, design augmentation, and when focus on a particular criterion is justified. (See Lucas, 1990, and Cook and Nachtsheim, 1990, for a related discussion).

Most software for computer-generated design employs the D-optimality criterion. Simply stated, these programs generate a design matrix X that maximizes $|X'X|$ subject to any existing design space constraints. D-optimal designs maximize the precision with which parameters are estimated. In our view, the preoccupation with D-optimality is appropriate for first-order models and in screening situations. The experimental goals in such situations often concern the identification of active factors, and hence parameter estimation is key. Our purpose here is to review the use of a very flexible alternative criterion, the integrated variance of prediction, for use in such response surface settings. A good technical reference is Welch (1984). A few software packages now provide I-optimal designs; the graphics below were developed using JMP.

Often preceded by factor screening, response surface experimentation is generally undertaken to model the response. The objective may be to determine optimum operating conditions, to determine regions in the design space where the response falls within an acceptable range, to develop feedback-control models, and so on. Focus here is clearly on precise estimation of the response, as opposed to factor screening and/or precise estimation of the parameters. This leads naturally to the integrated (or average) mean square error criterion,

where R , the *region of interest* need not coincide with X , the design space. Letting $v_R = \int_R dx$ denote the volume of R and taking (WLOG) $v_R = 1$, we have:

$$\begin{aligned} I &= IMSE(\hat{Y} | X, R) = v_R^{-1} \int_R \{E[\hat{Y}(x)] - E[Y(x)]\}^2 dx \\ &= v_R^{-1} \int_R VAR[\hat{Y}(x)] dx + v_R^{-1} \int_R \{E[\hat{Y}(x)] - E[Y(x)]\}^2 dx \\ &= \text{Average Variance} + \text{Average Bias}^2 \\ &= \bar{V} + B^2 \end{aligned}$$

If the quadratic assumption is tenable, the bias component will be small and a design can be constructed to minimize the first term. If $f'(x)$ denotes a row of the X matrix corresponding to factor combinations x , then:

$$\begin{aligned} I &= \bar{V} = v_R^{-1} \int_R f'(x)(X'X)^{-1}f(x)dx \\ &= \text{Trace}[(X'X)^{-1}v_R^{-1} \int_R f(x)f'(x)dx] \\ &= \text{Trace}[(X'X)^{-1}W_R] \end{aligned}$$

Where W_R is a moment matrix that is independent of the design and can be computed in advance. Designs that are optimal by this criterion are referred to as I-optimal or V-optimal designs.

Examples

One Factor

It is well known that for $x \in R$, the I-optimal design tends to place less mass at the extremes of the design space than does the D-optimal design. As a simple example, consider one-dimensional quadratic regression for $n = 12$. The D-optimal design for a quadratic model puts one third of the runs at each end of the range of interest and one-third of the runs in the middle. The I-optimal design puts one fourth of the runs at each end point and one-half in the middle. In this case, the D-optimal design places two-thirds of its mass at the extremes; for the I-optimal design, this proportion is 50%.

continued on page 8

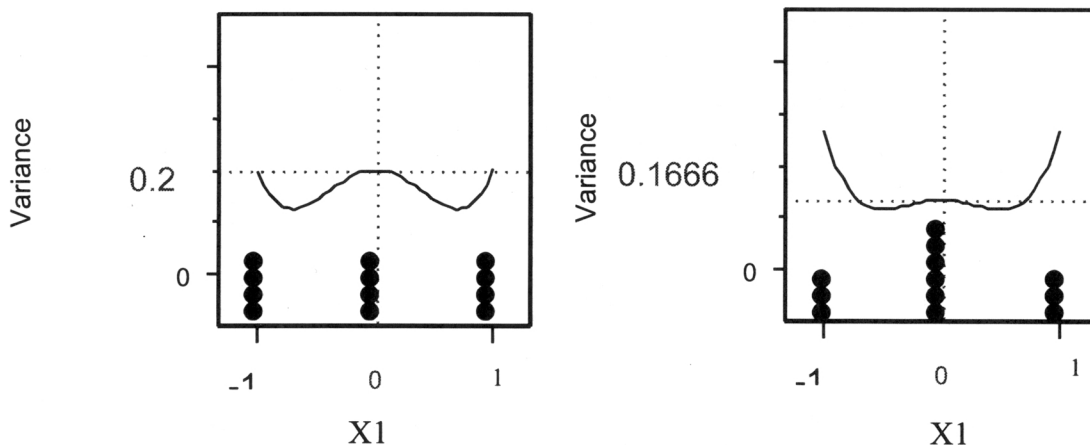


Figure 1. Prediction profiles for 12 run D-optimal (left) and I-optimal (right) designs for one-dimensional quadratic regression.

Figure 1 shows a side by side comparison of the D- and I-optimal designs mentioned above for one-dimensional quadratic regression with $n = 12$. The variance function for the I-optimal design is less than that for the D-optimal design in the center of the design space; the converse is true at the edges.

Three Factors

In higher dimensions, we see similar patterns. It's interesting to note, for example, that an I-optimal design for three factors and $n = 16$ on a cube is *none other than the central composite design* with two center-points.

We compare three designs for fitting a full quadratic model using 13 runs. The D-optimal and I-optimal designs are listed in Table 1. In this example, we also consider a slightly modified Box-Behnken design. Usually the Box-Behnken design for three factors has 15 runs and three center points. We remove two center points so that we can compare the three designs directly.

Profile plots of the variance function are displayed in Figure 2. (on the following page.) These plots show slices of the variance function as a function of each factor, with all other factors fixed at zero. The I-optimal design has the lowest prediction variance at the center. Note that there are two center points in this design.

Figure 2. Variance profile plots for 13 run I-optimal (row 1), D-optimal (row 2), and Box-Behnken (row 3) designs for full quadratic model at center point.

The D-optimal design has no center points, and its prediction variance at the center of the factor space is almost twice the variance of the I-optimal design. The variance at the vertices of the D-optimal design is not shown. It should be noted however that the D-optimal design predicts better than the I-optimal design near the vertices.

The Box-Behnken design is the only classical response surface design available for this sample size. Its variance is nearly three times larger than the I-optimal design near the center of the factor space and nearly twice as large as the D-optimal design near the vertices.

Comments

As software for the design of experiments grown in sophistication and availability, so has the ability of experimenters to match the design chosen to the goals of the experiment. The integrated variance criterion is often relevant for response surface situations. As always, one need not rely entirely on a single criterion. For example, if an experiment is to be conducted in stages, a fractional factorial design might serve as a first-stage design. Following factor screening, the experiment can be augmented via the integrated variance criterion to produce a "composite" design that is effective for prediction.

Run	13-run D-Optimal Design			13-run I-Optimal Design		
	X1	X2	X3	X1	X2	X3
1	-1	-1	0	-1	-1	0
2	-1	-1	1	-1	0	-1
3	-1	0	-1	-1	0	1
4	-1	1	-1	-1	1	0
5	-1	1	1	0	-1	-1
6	0	-1	-1	0	-1	1
7	0	0	1	0	0	0
8	0	1	0	0	0	0
9	1	-1	-1	0	1	0
10	1	-1	1	1	-1	0
11	1	0	0	1	0	0
12	1	1	-1	1	1	-1
13	1	1	1	1	1	1

Table 1. 13 run I- and D-optimal designs for full quadratic model.

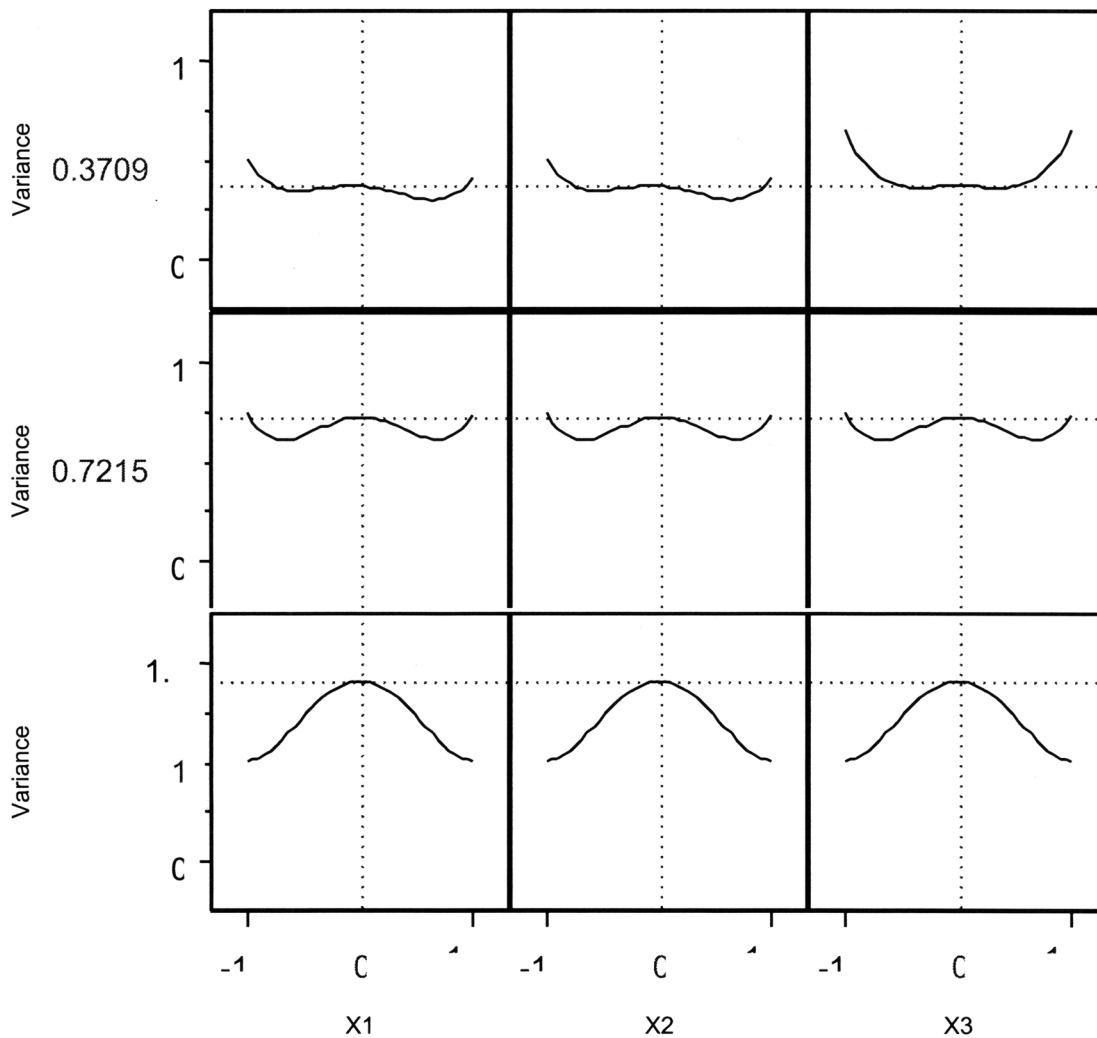


Figure 2. Variance profile plots for 13 run I-optimal (row 1), D-optimal (row 2), and Box-Behnken (row 3) designs for full quadratic model at center point.

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2002 JSM SPES Invited Program

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SPES will be the primary sponsor of three invited sessions at the 2002 Joint Statistical Meetings in New York City. One of the sessions is organized by the Chemometrics Committee. SPES will also likely cosponsor other invited sessions sponsored by other ASA Sections. Following are the sessions sponsored by SPES.

Experimental Design and Dimension Reduction in Gene Expression (Microarray) Data (Chemometrics Invited Session)

*Organizer/Chair: David Gruben, GlaxoSmithKline
Pharmaceuticals*

The massive amounts of data that can be generated by microarray techniques are considered.

Speakers:

David Rocke and Parul Purohit, UC-Davis
Bin Yu and Rebecka Jornsten, UC-Berkeley
Kathryn Kerr, University of Washington

Design of experiments and linear models: A session in memory of Oscar Kempthorne

*Organizer/Chair: John Stufken, NSF and Iowa State
University.*

Oscar Kempthorne passed away on November 15, 2000. He has made lasting contributions to the fields of statistics and genetics, and has always been a tremendous inspiration for many researchers and students in these areas. The session will exhibit current research in two areas of statistics where Kempthorne has had a great impact: Design of Experiments and Linear Models.

Speakers:

David A. Harville, IBM
Rosemary A. Bailey, University of London
Ching-Shui Cheng, UC-Berkeley

Statistical Signal and Image Processing

*Organizer/Chair/Discussant: Prem Goel, Ohio State
University*

Many key aspects of the digital signal and image processing problems rely on the use of statistical reasoning. Pattern recognition has long been studied in relation to many different (and mainly unrelated) applications, such as remote sensing, computer vision, automatic target recognition, signal processing, wireless communications, and machine learning. Statistical approaches involve signal detection (hypothesis testing) and estimation, and decision making for k-action

problems (pattern recognition). However, the models are based on the knowledge of the underlying physical phenomena for the signals/images under study. In addition, trade-offs between the optimality and computational complexity of the inferential procedure are real issues. These areas are a definite source for interesting and complex problems for Cross-disciplinary Research between Statistical Scientists and Electrical and Computer Engineers.

Speakers:

Anil K Jain, Michigan State University
Robert Nowak, Rice University
Anuj Srivastava, Florida State University

Call for Regular and Topic Contributed Papers for SPES

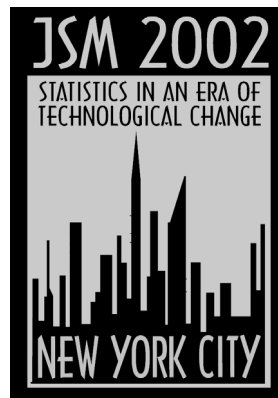
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Members are encouraged to submit contributed papers for the SPES program at the 2002 Joint Statistical Meetings (August 11-15 in New York City). Abstracts may be submitted online beginning December 1, 2001, and the deadline (which is firm!) is February 1, 2002. Keep an eye on *Amstat News* or the ASA Web site (www.amstat.org) for announcements and details.

SPES also has the opportunity to sponsor any number of Topic Contributed Sessions.

These have fewer speakers (five, or four plus a discussant) than regular contributed sessions, and are organized around a specific topic. They have a higher profile than regular contributed sessions, and are listed separately on the program. We already have two in the works: one on computer experiments, organized by Mike Trossett at William and Mary; and one on analysis of high-energy physics data, organized by Chuck Bayne at Oak Ridge National Laboratories.

Additional ideas for Topic Contributed Sessions are strongly encouraged. For example, if you plan to put in a contributed paper, consider others who could speak on a similar topic (preferably, people at other institutions who would present somewhat contrasting approaches). If you have ideas or want to organize such a session, please contact me as soon as possible: russell-lenth@uiowa.edu or 319/335-0814.



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