

# STATISTICS

## Newsletter<sup>©</sup>

Volume 17, No. 1

Winter, 1998

### Chair's Message

by Don Emerling



Well, it's my turn to experience a "restructuring." "Restructuring" being one of the latest euphemism's for corporate downsizing. For years now it seems that every few months, someone I know in the Statistics Division has had to live through the trauma of a downsizing. Sometimes it has meant my friend or colleague has had to move on to another company, other times they have had to deal with massive change as their company struggles to succeed with fewer resources, but rarely with less to do.

I am fortunate (I think), I will still be with my company after the restructuring is complete. But many of my friends and associates will be going through a stress-filled process of finding a new place to work. I don't know where all of this will end up. There seems to be good economic news, yet companies continue to use downsizing as a primary strategy to remain competitive in the global economy.

Why do I go on about this...

In my last chair's message I offered a challenge, based on Bill Hunter's challenge years ago, for the members of the division to lead the efforts to influence our enterprises to adopt the philosophy of statistical thinking and the tools and methods of statistics. I believe there is an immediate and critical need for proactive strategies to make our enterprises competitive. I remember a talk given by Gary

Hammel where he argued that downsizing can't be a sustainable strategy. To paraphrase Dr. Hammel, "if companies continue to use downsizing as their primary strategy to remain competitive - sooner or later there will be a single worker who is the most productive SOB in the country."

Obviously, I believe a combination of statistical thinking and statistical tools & methods can be a sustaining strategy for our enterprises. I am really encouraged with the work being done in the Statistics Division to further our understanding of statistical thinking, its integration with statistical tools & methods, and its value to our enterprises.

As an example of this work, I'd like to review the results of the Long

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### Editor's Message

by Ralph St. John



This issue of the newsletter was going to contain lots of interesting anecdotes about the Fall Technical Conference. I roamed the halls and session rooms taking copious notes on my laptop. There were lots of interesting incidents, and I recorded as many as I could using my one-finger typing skills. Then on Saturday during the lunch break for the Long Range Planning meetings my laptop vanished. So you'll have to accept my apologies for the less than exciting coverage of the FTC. Nonetheless, there are lots of important items worthy of your attention in this newsletter.

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## EDITOR'S MESSAGE

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**Refereeing** of newsletter articles is a concern of some readers. This topic was discussed at the Stat Division Council meeting at the FTC (see minutes inside), and a policy was developed to address that concern. Not everyone will be happy with the policy, but we addressed your concerns and responded to them.

**"The Web"**. Those of you who are old enough to remember the movie "The Graduate" may remember a scene in the movie where Dustin Hoffman is at a cocktail party at Mrs. Robinson's house. A manufacturing V.P. type smilingly says to him "Plastics, my boy! The future is in plastics." That was true then, but today the same scene would find that V.P. saying "The Web, my man, that's where it's at!!" The Stat Division is heeding that advise. Mark Kiel has been working at upgrading our home page. We will be posting

material from old newsletters on the Web. Other initiatives are planned, but we need your help (see Help Wanted).

### Happy Birthday Stat Division!!

The Statistics Division is celebrating its 20th birthday this year. It seems like just yesterday that Bill Hunter called a meeting at the Annual Quality Congress in 1978 to let the 20 people who showed up know that ASQC had approved division status. Prior to that time C.P.I.D. had been the 'home' for those with an interest in statistics. I don't know if Bill foresaw the growth in the division (now over 10,000 members), the activities of the division (read about it in these pages), the leadership that this division provides to ASQ (We are the model for division management and division meeting organization), and our continuing focus on helping 'society' use statistics wisely and properly (see vision, mission, strategies and principles on page 2), but on our 20th birthday we did

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## Disclaimer

The technical content of material published in the ASQ Statistics Division Newsletter may not have been refereed to the same extent as the rigorous refereeing that is undergone for publication in **Technometrics** or **J.Q.T.** The objective of this newsletter is to be a forum for new ideas and to be open to differing points of view. The editor will strive to review all articles and to ask other statistics professionals to provide reviews of all content of this newsletter. We encourage readers with differing points of view to write to the editor and request an opportunity to present their views via a letter to the editor, as was done in the past issue. The views expressed in material published in this newsletter represents the view of the author of the material, and may or may not represent the official views of the Statistics Division of ASQ.

## Criteria for Basic Tools and Mini-Paper Columns

### Basic Tools

Purpose: To inform/teach the "quality practitioner" about useful techniques that can be easily understood, applied and explained to others.

Criteria:

1. Application oriented/not theory
2. Non-technical in nature
3. Techniques that can be understood and applied by non-statisticians.
4. Approximately three to five pages or less in length (8 1/2" x 11" typewritten, single spaced.)
5. Should be presented in "how to use it" fashion.
6. Should include applicable examples.

Possible Topics:

New SPC techniques  
Graphical techniques  
Statistical thinking principles  
"Rehash" established methods

### Mini-Paper

Purpose: To provide insight into application-oriented techniques of significant value to quality professionals.

Criteria:

1. Application oriented.
2. More technical than Basic Tools, but contains no mathematical derivations.
3. Focus is on insight into why a technique is of value.
4. Approximately six to eight pages or less in length (8 1/2" x 11" typewritten, single spaced.) Longer articles may be submitted and published in two parts.
5. Not overly controversial.
6. Should include applicable examples.

### General Information

Authors should have a conceptual understanding of the topic and should be willing to answer questions relating to the article through the newsletter. Authors do not have to be members of the Statistics Division.

Submissions may be made at any time to the Statistics Division Newsletter Editor. All articles will be reviewed. The editor reserves discretionary right in determination of which articles are published.

Acceptance of articles does not imply any agreement that a given article will be published.

## VISION

- Our customers' needs will be continuously anticipated and met.
- Our members will be proud to be a part of the Division.
- Our Division's operations will be a model for other organizations.
- We will be a widely influential authority on scientific approaches to quality and productivity improvement.

## MISSION

- Promote statistical thinking for quality and productivity improvement.
- Serve ASQ, business, industry, academia and government as a resource for effective use of statistical methods for quality and productivity improvement.
- Provide a focal point within ASQ for problem-driven development and effective use of new statistical methods.
- Support the growth and development of Division members.

## STRATEGY

- Our primary customers are Statistics Division members. Other key customers are:
  - Management,
  - Users and potential users of statistical methods for quality and productivity improvement,
  - Educators of the above customers.
- Our orientation to customers is customer focused.
- Our markets, within which we intend to offer products, are weighted as follows: greatest weight on intermediate statistical methods, nearly as much weight on basic methods, and much less weight on advanced methods.
- Our primary products are educational services.

## PRINCIPLES

- Focus on a few key things.
- Balance short-term and long-term efforts.
- Recognize that we exist for our customers.
- Value diversity (including geographical and occupational) of our membership.
- Be proactive.
- View statistics from the broad view of quality management.
- Apply statistical thinking ourselves (that is, practice what we preach).
- Uphold professional ethics
- Continuously improve

## CHAIR'S MESSAGE

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Range Planning meeting, held this October 18 - 20 following the Fall Technical Conference in Baltimore.

The group identified four key strategies to move us toward a vision of "Statistical Thinking Everywhere."

### 1.) **Design & Deliver Selected Useable Products.**

For this strategy we identified four possible tactical plans; 1.) Create a clearinghouse for statistical stuff – To provide our members and others with information that will help them get answers to frequently asked questions. 2.) Identify & start no more than three new publications – Identify and complete three or fewer publications in the next 18 months. 3.) Develop & disseminate the Newsletter's technical content – Develop a process to make past Newsletter technical content available on our homepage. 4.) Beef up our short courses – Increase the number and variety of short courses.

### 2.) **Demonstrate the Broad Application of Statistical Thinking.**

For this strategy, we identified one possible new tactical plan: Collect case studies – Provide a structure and process to collect case studies in broad areas of application, use them to market statistical thinking and influence key decision makers.

### 3.) **Integrate Statistical Thinking into Education Curricula.**

For this strategy, we identified one possible new tactical plan: Pilot "Pegasus" school's Statistical Thinking project – To demonstrate the application of Statistical Thinking in educational curricula by piloting in the Dallas area's "Pegasus" school.

### 4.) **Develop a Vibrant Information and Communication System.**

For this strategy, we identified five possible new tactical plans: 1.) Develop & implement a Division measurement process – To develop a system of leading and lagging indicators that will be predictors and measures of Division

success. 2.) Develop & implement a member nurturing process – To retain & support the development of our members. 3.) Develop a marketing process – To market & sell Statistics Division products and services. 4.) Develop an internet/email communications system – To develop an electronic communications system to enable easier, faster communications between Division members, officers, etc. 5.) Develop an over-all web page strategy – Develop a strategy to take advantage of the world-wide web.

We will implement these tactical plans as we find people interested in making them happen. You can read more about these tactical plans and how you can help in this newsletter.

I hope you are as excited and encouraged by this work as I am. I believe the members of the Statistics Division have "the right stuff" to lead our government, industry, and academia to be more competitive in an ever-increasingly competitive world.

## EDITOR'S MESSAGE

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reflect on where we are heading at the Long Range Planning meeting in Baltimore. Please read the minutes of that meeting, read Don Emerling's column on the front page, and offer to be part of the division's future. If you do or don't agree with our direction **LET US KNOW**. If you agree, offer to help make it even better. If you disagree, offer to help change things for the better.

**Future issues.** We have two special issues of the newsletter planned for the next 12 months. Both of these special issues will focus on Statistical Thinking, one in the Healthcare Industry, and the other in Manufacturing in general. Stay tuned to this channel for details.

I'm excited about what the Statistics Division is doing. I like the people I'm working with...they're all volunteers yet they work very hard at making the division the best it can be. My thanks to all those people who help me serve in my role as newsletter editor. Your assistance and patience are greatly appreciated.

## HELP WANTED

**Assistant Newsletter Editor.** Can you write well? Can you organize other peoples' work? Are you interested in helping get newsletter articles posted on the Stat Division Web Page? Would you like to help improve the product you're reading right now? Please contact Ralph St. John ([rstjohn@cba.bgsu.edu](mailto:rstjohn@cba.bgsu.edu) or 419-372-8098).

**Assistant Webmaster.** Do you use the World Wide Web? Do you know HTML and JAVA (or would you like to learn)? Have you visited the Stat Division Page at <http://www.asq.org/StatDiv/>? Are you interested in helping improve the current home page? Please contact Mark Kiel ([markHK5409@aol.com](mailto:markHK5409@aol.com) or 708-841-0661).

**Section Liaison.** Do you belong to a section? Are you interested in helping your section learn more about Stat Division activities and products? Are you interested in helping the Stat Division learn more about the needs of your section? Then you could be a Section Liaison! Please contact J.L. Madrigal ([madriral@byu.edu](mailto:madriral@byu.edu) or 801-378-7357).

**1999 Annual Quality Conference.** We need volunteers to act as Paper Reviewers and Session Managers. Please contact Beth Propst ([Alpropst@aol.com](mailto:Alpropst@aol.com) or 630-443-8213).

**Potpourri.** We are undertaking initiatives in the areas of marketing, developing a portfolio of case studies, and building a 'clearinghouse' for things statistical. If you are interested in any of these areas, please contact Beth Propst.

# MINI PAPER

## A GRAPHICAL SUPPLEMENT FOR TEACHING MEAN AND STANDARD DEVIATION CALCULATIONS

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### Introduction

Teaching introductory Statistics (to students or co-workers) is a task faced by many readers of this newsletter. Often our 'students' are a mixed group with varied skills and experiences. Less apparently, they also have different preferences in learning, and respond differently to various teaching strategies. This article presents techniques for presenting some of the more simple calculations that may help some students by using their preferred learning styles, and may help others by asking them to stretch their understandings by considering new applications.

When presenting the sample mean, just before or just after having the class do the calculations with a calculator or computer program, an instructor may include an alternative graphical calculation. This alternative should challenge some students and enlighten others. Possibly, it would provide some understanding of learning preferences.

While presenting these calculations to professionals over the last year the range of comments was quite surprising. Comments have included "I can't imagine anyone at my company finding these techniques easier", "I think everyone at my company would enjoy learning this way", "You may have something there Frank", and "It's worth a try!" However, people generally tend to evaluate teaching techniques based on their own learning styles, so the reader may enjoy or not enjoy this article. Please, consider that your first reaction may be caused by a learning style bias rather the accumulation of your teaching experiences.

The author recommends that these techniques be mixed with other presentations. Exclusively using graphical techniques would cause some learners to struggle needlessly. Mixing the presentations will both challenge more 'students' and easily support more 'students'. More motivations for teaching in this manner are available on a web page at <http://silver.sdsmt.edu/~fmatejci/core.html>.

### Geometric Basics

A few geometric properties will allow us to calculate many common statistics. A simple ruler and a triangle are all that are required for the calculations. Graph paper is helpful, too. Most people readily interpret addition and subtraction geometrically by parallel lines end to end. Observe in figure 1  $XY = P$ , and  $P/X = Y$ . Figure 1 could be used as a definition of multiplication (i.e.  $XY=P$ ) and division ( $P/X=Y$ ).

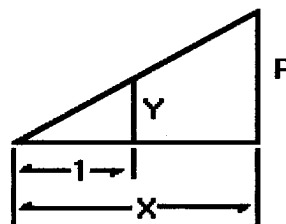


Figure 1:  $XY=P$   $P/X = Y$

Additionally, repeatedly using the Pythagorean Theorem performs a calculation useful in computing the standard deviation and other applications of sums of squares. Figure 2 illustrates this property for lengths A, B, and C.

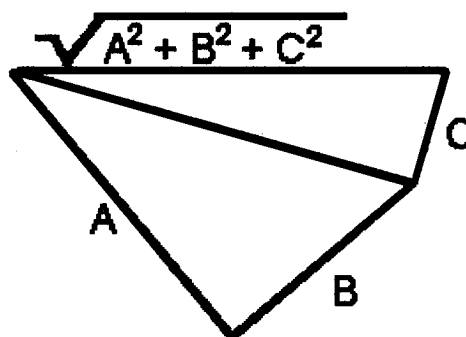


Figure 2: Repeated Pythagorean Theorem

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# MINI PAPER

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## A Short Example

To introduce calculations of the mean and standard deviation graphically, a sample of five (1.62 0.74 1.66 0.93 1.70) was taken from breaking strength test results for glass fibers given by Smith and Naylor (1987). To calculate the mean we use a plot sometimes used for CUSUM control charts. Plot the cumulative sum plot of the data as shown in figure 3 (Note: the observation number is the X-axis and the cumulative sum is the Y-axis). The final point is plotted at (5, 6.65), which is (the number of observations, the sum of the observed values). Using the division property shown in figure 1, calculate the mean as shown in figure 4.

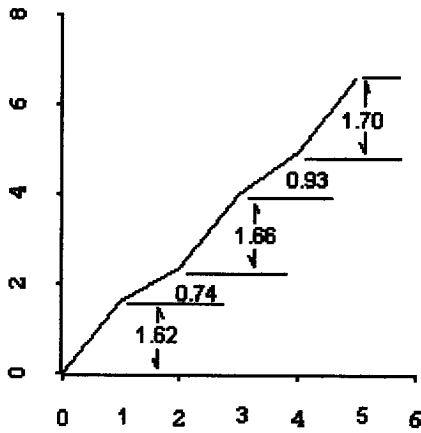


Figure 3: A cumulative sum plot

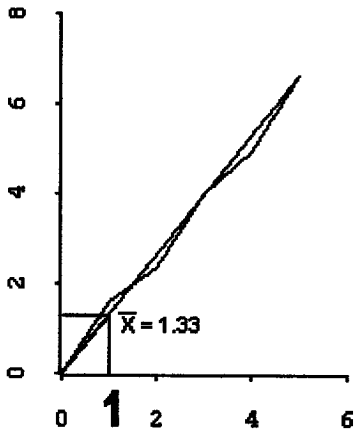


Figure 4: The sample mean

A useful step in calculating the standard deviation is to find the set of deviations from the mean. A convenient graphical way of performing this calculation is to plot all of the points as a function of their observation number, draw a horizontal line at the sample mean, and measure the distance from the points to the line. Figure 5 illustrates this calculation for our example data set.

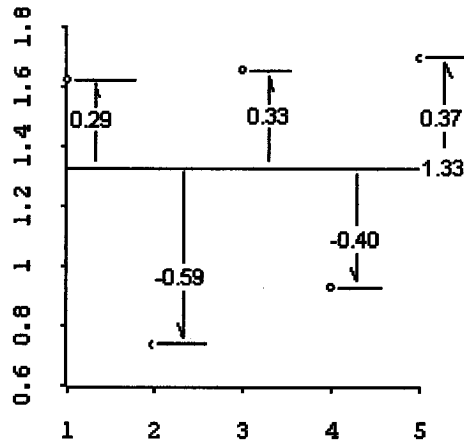


Figure 5: A deviation set calculation

Obtaining the square root of the sum of squares involves a number of steps for on a simple hand calculator, but is not much more difficult than obtaining a simple sum graphically. Repeated use of the Pythagorean Theorem applied to the deviation set for our sample is illustrated in figure 6. That is, the square root of the sum of each 'edge' squared is the length of the sixth (hidden) edge of fig. 6.

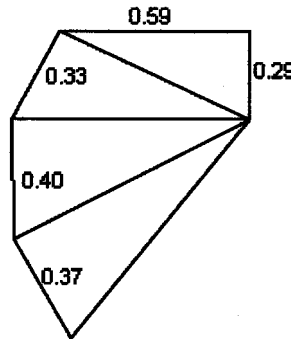


Figure 6: Repeated Pythagorean Theorem

The final step in obtaining the standard deviation is division by the square root of one less than the number of observations. This quantity may be readily tabled for students. Graphical methods may also be applied to obtain square roots of integers. For our sample we need to divide by 2, the square root of  $5 - 1 = 4$ . Figure 7 rotates the drawing from figure 6, and displays the division required for the final calculation of the standard deviation. Note: the vertical edge in the cluster on the right side of figure 7 has length corresponding to the sixth (hidden) edge in figure 6 (i.e. the square root of the sum of squares); the length of that edge is 0.92, and the length of

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the vertical edge in the middle of figure 7 is the standard deviation. Remember from the division property that we are calculating an 'average' sum of squares, so the standard deviation is the square root of the average sum of squares.

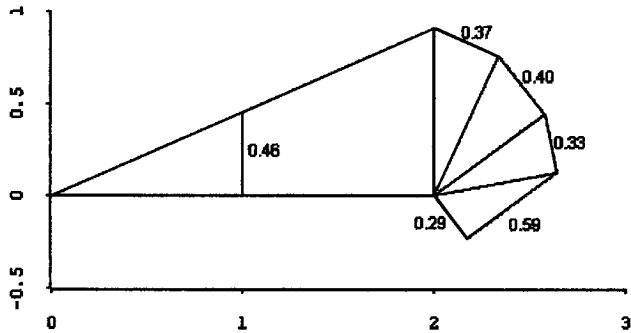


Figure 7: The sample standard deviation

The graphical calculations for the mean and standard deviation for the complete data set of 63 observations are included as figures 8 and 9. The precision problems of the graphical method show up readily in figure 8, (i.e. it's difficult to 'visually' determine the mean to more than about two places of precision); but since the mean is also the slope of the graph some other graphical techniques could overcome this problem. The precision problems are less evident in figure 9, but this data set may be too large for a convenient triangle and ruler hand calculation.

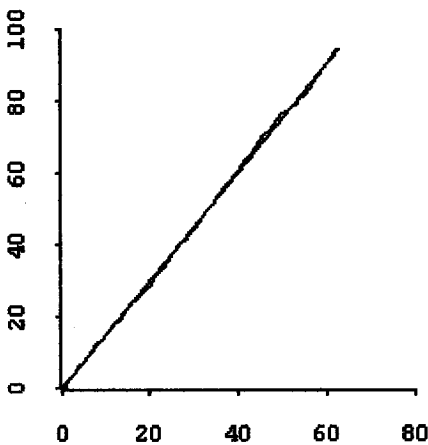


Figure 8: Mean of the full data set

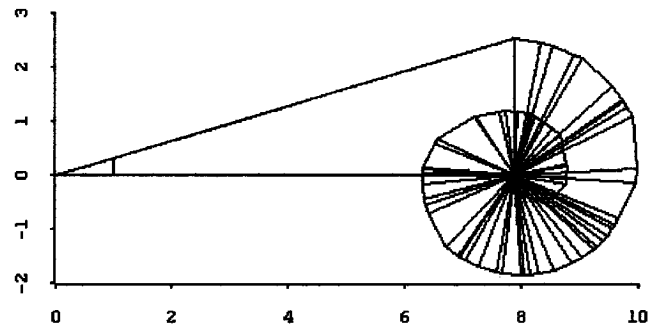


Figure 9: Standard deviation of the full data set

## Possible Extensions

The plots for the calculations may be made by computer programs. Computer plotting allows students to continue their use of the graphical methods for workplace applications such as inclusion in reports, individual investigations, and for presentation graphics. Moreover, common personal computers may rapidly produce the plots by steps, so that instructors may be aided in selecting problems for class use. The web page referred to earlier, <http://silver.sdsmt.edu/~fmatejci/kcqc-1.htm> contains just such detailed plots.

Reviewing formulas for statistics other than the mean and standard deviation in Basic Statistics, Statistical Quality Control, and Design of Experiment books reveals that these statistics may also be calculated by graphical methods similar to those in this article. A few geometric tools could be used to summarize, explain, and document much of the statistics commonly used in Quality. Technically, it would be possible to rewrite textbooks using only these geometric interpretations (and omitting formulas) to define the statistics, as was done in this article. Although we do not propose doing this, we believe that considering the geometric interpretations may enhance the understanding of those statistics.

## References

- Smith, R. L. and Naylor, J. C. (1987) A comparison of maximum likelihood and Bayesian estimators for the three-parameter Weibull distribution. *Applied Statistics*, **36**, 358-369.

# YOU DEN ADDRESS

## Contexts of Statistical Practice

Gipsie B. Ranney, Ph.D.



Views about what statistical problems are and how they ought to be addressed and views of the role of the statistician affect how the statistician frames his work and what specific theories and methods he brings to bear to conduct his work. During the quality movement of the past two decades, statisticians may have viewed their role to be teachers, writers, and consultants on the subject of quality in business. There may have been little focus on application of quality concepts to statistical practice. Statisticians can be seen as providers of products and services to customers. Products include publications on theory and methods; services include the teaching of statistics and consultation to clients. Lessons of the quality movement may be applied to statistical practice, just as they may be applied to any other business activity.

A variety of principles for improvement of quality have appeared in the past sixty to seventy years. Different leaders of the quality movement have adopted different definitions of quality and have made different assumptions about the purpose and scope of quality improvement activity. No attempt will be made here to discuss the broad spectrum of principles and lessons about quality improvement. Three themes will be reviewed: the systems view, the need for and ways to develop customer knowledge, and the use of a cycle of systematic learning and action for improvement.

Several authors have pointed out the importance of understanding and managing any organization as a system. To manage an organization as a system requires a clear understanding of the purpose of the organization and its parts. This includes an understanding of the need(s) the organization's products serve and the effects the organization has on the well-being of its beneficiaries — customers, employees, suppliers, investors, and the communities in which it operates. The components of the organization are interdependent, so that performance and

capability are the result of complex interactions among the components. The organization is continually changing and subject to the dynamics of its environment. A system does not operate as a sequence of disconnected actions and events. The effects of actions may be delayed and may be dispersed to distant locations. To manage wisely requires a broad, long-term view of the consequences of actions.

Some authors state that products or services that have a good and sustainable market serve fundamental needs of the customer. From this viewpoint, quality improvement is improvement of the match between the products or services provided and the needs served. An organization that expects to enjoy a good, sustainable market must develop knowledge about customers, their use of the product or service, and the needs served by the product or service.

One type of information that contributes to development of customer knowledge is feedback on customers' experience with existing products or services. Feedback is a report on what the organization has done in the past. It may alert the organization to problems that need to be corrected, but it doesn't provide sufficient information to determine what to do to sustain existing markets or create new ones. Additional knowledge is needed about former customers and potential customers who have not yet used the product or service. Studies of customers who have switched to a competitor's product, or have stopped using the product altogether, are needed to understand the reasons for those behaviors, so that the organization can take actions to prevent them. The most important source of information for improvement may be first-hand study of the customer in his system as he uses the product or service. How does the product or service actually perform in the hands of the customer and how could it perform better? This kind of customer research leads to ideas for

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redesign and for design of new products or services. Other market-oriented studies focus on potential customers who have not used the product or service to learn why they have not used the product or service and how they might be encouraged to use it in the future.

To bring about sustainable change for improvement, an organization needs to use a cycle of systematic learning at all levels. The PDSA (Plan, Do, Study, Act) cycle described by Deming encompasses activity that not only accomplishes improvement, but simultaneously builds the organization's capability to learn and increase the rate and scope of improvement. The PDSA cycle is oriented more toward building knowledge and making change for sustainable improvement than the problem-solving procedures referred to as PDCA (Plan, Do, Check, Act). Its use includes prediction of the effects of change and revision of the theory that produces the prediction when pertinent data indicate a need for revision. Its use also includes reflection on the process of learning, so that the organization becomes more adept at building and effectively using improvement knowledge, thereby improving future performance and competitive position.

Surely statisticians are as interested in improving the quality of their services as any other professional group or organization. What constitutes good practice in a technical sense rightfully receives continuing attention. Some of the broader issues and dilemmas of practice extend beyond the technical realm into interactions with the client.

A lot has been said about consultation on a specific study. The best possible situation for the statistician is to be called in at the beginning, so that he may design the study to suit the client's needs. The statistician needs to discover how the client will use the results of the study, since the intended use governs sound design and methods of interpretation. The statistician has a responsibility to advise the client about the limitations of a study and to clarify the steps necessary to ensure that useful results will be obtained. A frequent lament in these discussions is that the sta-

tistician is too often called in too late and can only explain that the design already used was not suited to the intended purpose and the results of the study will be flawed by failures in design and execution.

To improve future studies, the statistician may believe that the client needs to make fundamental changes in methods of posing questions, conducting studies, and building knowledge. The client may need to make changes in methods to develop and test products, or to deal with variation in production, or to conduct market research. To make such changes may require considerable investment of time and resources by the client and the visible benefits may be delayed. The statistician sees longer term objectives for the client — better ways of thinking and conducting business.

The statistician's view of what is best for the client may differ from the client's expectation that the statistician will arrive, solve his problem, and disappear. The client wants a solution to his problem, not suggestions about how he might change his way of doing business. The statistician is faced with the dilemma of whether to bow to the client's wishes or to insist that more fundamental issues of business practice should be addressed, so that future statistical work will not be so flawed or difficult and so that the client will be able to effectively improve future results. The statistician knows that if he insists that the client ought to address the fundamental issues, the client can seek the apparently easy solution somewhere else and there is always someone around who is willing to provide it. The statistician struggles with the issue of adhering strictly to his view of what constitutes good practice, particularly when he knows that the alternatives — software packages and ill-equipped purveyors of tools — may lead to misuse of methods and disappointing results that do damage to the reputation of statisticians and their products. The statistician finds himself trying to decide how to make the best of a bad situation.

Another issue of concern is the image of the statistician. In a recent article in *Amstat News*, Jon

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Kettenring wrote, “This brings us back to one of the continuing bugaboos: our image. Irwin Gutman has reached the conclusion that we need to downplay the word, statistics. I say this reluctantly, but after much thought... the PR that goes along with *statistician* is just awful.”

All of these issues — being called in too late, dealing with the client’s view of the role of the consultant, facing the client’s ability to buy expedient but flawed alternatives, having a bad image — can be seen as crosses to bear or as indicators of opportunities to rethink the statistician’s role, products, and relationships with customers.

The context of consultation is the system within which those products and services are delivered. A purpose of the efforts of a statistician is that he should bring benefit to the system affected by his actions, so that the underlying needs of the client are met by the service. New insights may be gained by thinking about how the client’s system will benefit over the long term, as well as what benefits can be brought to the client in the short term. The underlying need served by statistical consultation might be seen as more knowledgeable actions. From this viewpoint, when the statistician sees fundamental changes that need to be made to bring about longer term improvement, he should not abandon them in the face of the client’s desire for quick relief from his problem. Instead, he should adopt a strategy to help the client with his perceived need as much as possible within the boundaries of good practice, so that future opportunities to advocate improved practice can be created. A skilled physician might be a good model for study in this regard. The patient presents himself to the physician wanting a cure for his current ailment. The physician recognizes that the ailment is due to poor health habits, but he treats the current ailment and tries to give the patient some relief. His longer term objective is to help the patient see how his life style has contributed to his condition and to help him change for improvement of health. The statistician might reasonably adopt this kind of view of his practice, use his experiences to improve

his practice, and contribute to the body of knowledge for improvement of practice. He might practice the PDSA cycle for improvement of practice.

To effectively learn for improvement, the statistician needs to discover how his own methods affect the client. In writing about system thinking, Senge identified a barrier to learning he called “the enemy is out there” — the tendency to see problems as created by someone else and the inability to see one’s own role in creating them. In thinking about interactions with a client, there may be a temptation to interpret the experience as one in which failures and flaws are due entirely to faults of the client. Study of his own role in the system of interactions with the client and his effects on the client’s behavior could give the statistician new insights about how to be more successful with the client.

Some statistical practitioners in a company told about how a statistician from a university had spent the summer there working on a problem they had identified. The statistician developed a method to deal with the problem. When asked how the method had worked, their response was, “We didn’t use it. We didn’t understand it at all.” Although one could fault the clients in this story for not insisting that the statistician work with them until they understood the method well enough to use it, one can also fault the statistician for not checking for understanding and continuing to work with the client until there was understanding. One quality characteristic of statistical services might be whether the plan for a study, or the discussion of findings, or the description of how to use a method is designed to be understood by the user.

Even though the statistician may have no intent to establish a long term relationship with a client or to influence more fundamental changes in the client’s system, his work nevertheless affects the client’s system and affects the efforts of others who will work with the client in the future. At the least, his work should not do damage. One could identify some

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attributes the statistician's services ought to possess to lay a foundation for future work and not do damage. Any methods or results provided to the client should be suited to the purpose and should be accompanied by instructions and clearly defined boundaries for appropriate use. These attributes coincide with what any consumer might expect from the producers of products and services he purchases.

The statistical practitioner needs to gain a clear understanding with the client of the purpose of any study, and he needs to know something about the client's level of knowledge. What the client knows determines the methods that might be appropriately used. For example, the client may ask for help to improve the quality of the output of a process. The client may believe he understands quite well the factors that affect the output and how to adjust those factors, and he seeks a method to keep the output from drifting away from a target. He may need a well-designed engineering or statistical feedback system that effectively distinguishes signal from noise to keep his process on target. But it may be that the client knows far less about his process than he thinks he knows, so the knowledge required to design a beneficial feedback system is missing. If the client does not know much about the mechanisms that affect his output and he is seeking improvement, rather than maintenance of a status quo, the client could benefit from use of Shewhart control charts and designed experiments to build knowledge for improvement.

Ensuring that the method suits the purpose requires that the practitioner know something about the efficacy of a method in a given context. If his practice consists of arriving, delivering a method, and departing without seeing the method in use, he may not develop this knowledge. If he relies on the literature to judge efficacy, he may be misled. For example, some of what appears in the literature about Shewhart control charts is incorrect. Some writers have said that Shewhart control charts are inappropriate for application due to the existence of serial correlations in process results. Shewhart charts are

designed to take advantage of possible serial correlations or other systematic effects to gain insight into the structure of variation and to take appropriate action on the mechanisms that produce the variation. If a qualified statistician collaborates with the client to define the methods of obtaining and forming subgroups of process data to address specific questions about the structure and sources of variation, the insights gained from Shewhart control charts can be used to produce improvements.

The statistical practitioner should ensure that the client understands the limitations of any proposed study and that any inferences from a study are conditional on the materials and conditions available at the time of the study. The practitioner should clarify with the client any differences between the population available for study and the population of interest. The population of interest and the population available may be mutually exclusive. The available population may be material already produced and the population of interest may be what will be produced in the future, or the sample may consist of results from prototypes or items produced in a laboratory and the population of interest is items to be made in a production environment. Under these circumstances, the client needs to understand that application of the results to the population of interest is the responsibility of experts in the subject matter. Extrapolations that rely on subject matter knowledge are not the statistician's area of expertise or responsibility. Performance characteristics of statistical procedures, such as levels of confidence, do not apply to extrapolations outside the sampled population or the conditions of a study.

The notion of a "random experiment" or a "conceptual population" that could be generated by repetition of the same procedure is one that is easily stated but may be rarely justified. If the study's results are to be used both to describe existing materials, items, or conditions and to extrapolate to other materials, items, or conditions, then the statistician should clarify to what kinds of use levels of confidence or

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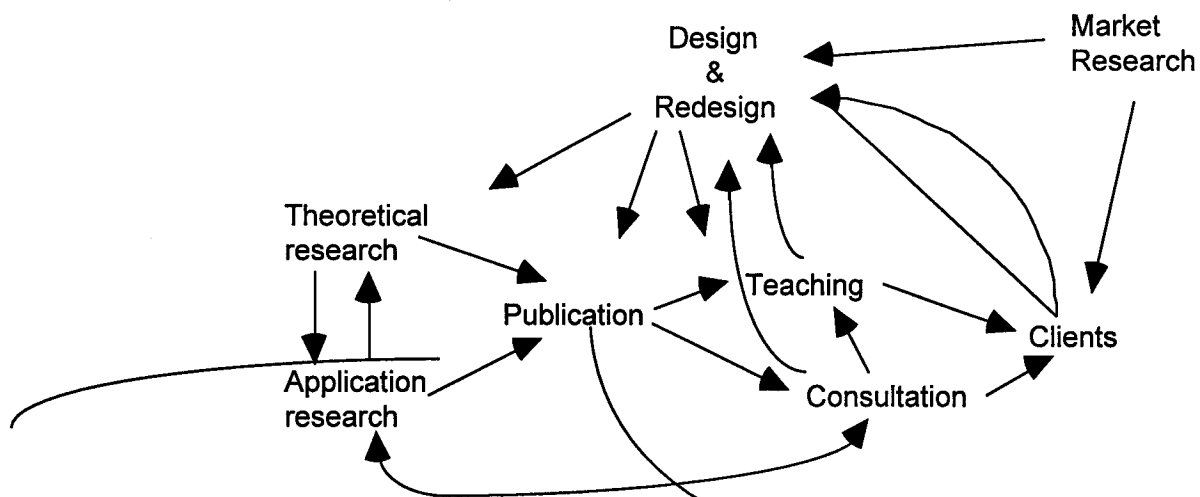
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standard errors apply and to what uses they do not apply. To help to prevent unjustified use of statistical inferences from a study, the statistician should state the assumptions and limitations of the inference in the client's language and should urge the client that these qualifiers should accompany the inferences wherever they go. If the boundaries of statistical inference are not clarified, then failures of unwarranted inferences can lead clients to believe that statistical methods are not useful, or even misleading. The statistical practitioner should also be careful to convey to a client that statistical methods and data analyses are only inputs to decisions; they do not make decisions. The client needs to understand that no statistical manipulation or method thinks or absolves him of the responsibility to use his knowledge and judgment in decision-making.

The practitioner should help the client understand the limitations of statistical methods, but he should also promote the use of sound and beneficial methods. For example, the practitioner should promote the use of sound methods of conducting cus-

tom surveys. He should explain that low response rates destroy the ability to describe the sampled population and assess the accuracy of the description. He should try to dispel the mistaken notion that similar demographics in respondent and non-respondent groups is sufficient to assume non-respondents would give the same kind of responses as respondents. He should explain the differences between probability samples, judgment samples, and convenience or haphazard samples and how levels of confidence and standard errors apply to probability samples. He should emphasize that the value of survey information is a function of the investment in survey design and execution. A poorly designed survey may have a lower purchase price than a well-designed survey, but cost of use of the results may be far greater.

Consultation is linked to other aspects of statistical practice: research, publication, and teaching. Statistical practice as a whole may be seen as a system that provides the context for all of the activities of statisticians. Figure 1 provides one view of the system of statistical practice.



**Figure 1**  
**Statistical Practice Viewed as a System**

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In Figure 1, research leads to publications used in teaching and consultation. Experiences from consultation provide inputs to research. Market research is focused on understanding needs of clients and identifying markets for statistical practice. Design and redesign is focused on changing concepts, methods, and tools of practice to improve future practice. Inputs from teaching and consulting experiences and from studies of clients' use of statistical theory and methods are used in design of new methods of practice. Time-related aspects of the interdependencies in the system are not illustrated well in Figure 1. Students from other disciplines, both in academic programs and in seminars and short courses, are future clients for consultation. Teaching of statistics majors affects future teaching of non-majors and future consultation. Consultation with clients in the present affects future opportunities to consult and to promote good practice. With this view, the various roles of statisticians as researchers, teachers, and consultants cannot be seen as disconnected, nor can the actions of today be disconnected from the conditions of practice in the future.

Instruction of people in other disciplines affects the environment the statistician encounters in practice and provides a way to create future markets for good practice or to destroy them. This matter should be of concern to statisticians, since it affects their future and the future of their profession. Viewpoints vary on the purpose of statistics instruction for people in other disciplines. One view is that the aim should be less to make them statisticians and more to help them become wiser consumers of statistical information and be able to recognize situations when the advice of a statistician would be helpful. Some instruction in statistical theory and methods is required to accomplish this. Both the content and methods of instruction affect the outcome.

Examination of references to statistical theory and methods in the literature and textbooks of other disciplines provides observations of the outcomes of past statistical instruction. Use of the central limit theorem provides an example. It is included in most applied statistics courses and texts. What do people

from other disciplines learn about the central limit theorem? Cursory examination of texts in another discipline for references to the central limit theorem turned up the following statement:

Control charts are really sampling distributions because we are plotting sample statistics, and from the central limit theorem we know that sampling distributions are normally distributed.

This statement displays an amazing misunderstanding of the terms used. The statement was not obtained from a probability sample of some population of textbooks, but it does illustrate that there is at least one widely used text in another discipline that misinforms the reader. This particular book is in its seventh edition. In the author's experience, this example is not an exception. The central limit theorem is widely used in practice and instruction in other disciplines to justify use of the normal curve as a model without any reference to the assumptions that need to be met for appropriate use. Use of statistical methods when the assumptions are not even approximately met, followed by disappointing results, can contribute to a belief that statistical methods are not useful. This example illustrates an area for improvement of statistical instruction. When statistical models are presented, they should be accompanied by discussions of circumstances in which they might be appropriately used and by examples of misuse. The discussions should be designed to be understood in practical terms.

A comment from Hahn and Meeker provides another example of an area of statistical instruction that could be improved.

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The common textbook statements ‘Assume a random sample (or a simple random sample) from the population of interest’ and ‘Assume a sample of independently and identically distributed observations from a normal distribution’ are overly simplistic. Because these assumptions are so frequently glossed over, analysts tend to ignore them in practice. Unfortunately, these easy-to-state assumptions often provide only a crude approximation to reality, and if not met can result in seriously flawed conclusions.

One sees standard errors and levels of confidence quoted extensively for results obtained by methods that could never be described as random sampling. The abuse of the term “random sample” appears to be widespread. Virtually any set of numbers, no matter what their origin, is used in inference as if the numbers were a random sample. Use of the term “random sample” assumes adherence to prescribed methods for obtaining data. If these methods are not used, the performance characteristics of methods of inference, such as levels of confidence, cannot be relied upon. Students should be taught how to select a probability sample and should be shown methods that cannot legitimately be called random sampling.

When instruction consists primarily of mathematical manipulation using statistical formulas, there is strong emphasis on the existence of sampling error and how to take sampling error into account in inference. In practice, sampling error may be the most trivial of sources of error. Statistical studies may be more likely to fail in their intent due to other causes, including poor design, problems with data collection and measurement, and failure of the sampled population or condition to coincide with the population or condition of interest. Students need to learn that application of statistical theory and methods does not start with data that magically arise from an unknown source by use of methods that are also unknown. When students learn nothing of the effects of study design and execution on the quality of results, they do not understand the need to call a qualified statistician to consult on the design and execution of statisti-

cal studies. Instruction should include strong emphasis on methods to obtain data.

Statistical models provide insight into the nature and sources of variation and provide a basis for experimentation. The presentation of models as incontrovertible natural law may lead students to believe that results that fail to fit the model are illegitimate and should be thrown away so that they will not contaminate the results. Students should understand that outliers in data may provide the most important opportunities to learn and to construct more useful theories and models. Outliers are not just annoyances to be thrown out so that we can get on with describing the “norm.” Instruction should convey that the aim is not to force the data to fit the model, but to gain insight into the messages contained in the data.

It is doubtful that courses in watered-down probability and use of statistical formulas and tables touch any of the preceding issues. The following problem was taken from a widely used statistics text for engineering and science majors:

A random sample of light bulbs was selected and their life lengths were measured. The results were .... Produce a 95% confidence interval for the average life length of bulbs made by this company.

The problem provides no information about the sampling frame nor the method of selection and there is no description of the average to be estimated except the phrase “made by this company.” The problem appeared in a section of the text devoted to use of the  $t$  distribution to construct confidence intervals. Ten numbers were provided in the problem. The problem was probably constructed to drill students in calculating an average and a standard deviation, determining degrees of freedom, and finding a tabular value of  $t$  for the stated level of confidence. The damage done by thoughtless problems constructed for the purpose of arithmetic drill, but purporting

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to be practical or relevant, is immeasurable. If mathematical drill is required, it should be conducted as mathematical drill. Applied statistics texts and courses should not include problems that encourage incorrect applications of a method.

Instruction in statistics affects future statistical practice. If an individual has a bad experience with statistical instruction, he may be lost as a potential customer in the future. If the experience inspires his curiosity and convinces him that statistical ideas are worth pursuing, he may become a loyal customer of statistical concepts and methods. To teach effectively calls for knowledge of theory, experience in application, and the ability to construct situations of inquiry. Teaching requires some understanding of cognitive processes and some ability to diagnose learning barriers. The effective teacher needs to design approaches to instruction that will enable students from different backgrounds at different stages of cognitive development to have a chance to learn.

If instructors are sent into the classroom to teach with no training in instruction, they may copy the methods of their instructors without questioning the boundaries of applicability of those methods. They may believe that teaching consists of presenting material, rather than engaging the student in experiences and inquiries that generate the need to learn something about statistical theory and methods. Lack of instruction of instructors in effective methods to teach can lead to a bad experience for their students and contribute to a bad reputation for the subject matter.

The attitude of the teacher has important effects on the quality of instruction. If instruction of people from other disciplines is seen as a necessary evil rather than an important part of statistical practice, the outcome of instruction cannot be expected to be good. We may excuse ourselves from having a role in poor performance in statistics courses by students from other disciplines by using the rationalization that students in other disciplines are not capable of learning. A comment about education from Tolstoy provides a different view:

Every teacher must...by regarding every imperfection in the pupil's comprehension, not as a defect of the pupil, but as a defect of his own instruction, endeavor to develop in himself the ability of discovering new methods.

To produce effective teachers of statistics, formal coursework in instruction might be considered as an important element of a graduate level education in statistics.

The producers of statistical theory, methods, publications, consultation and instruction are statisticians. As is the case with other products and services, responsibility for innovation and improvement belongs to the producer. First-hand study of performance of existing services, such as performance of methods in use, is an important source of information on questions relevant to improvement of statistical theory, methods, and practice. How do clients actually use data and interpretations of data? Who, by level and function, uses statistical methods? Are the methods suited to the use and the user? If a recommended procedure was put into place in the past, is it still being used? If not, why not? What unmet needs exist? What kinds of new methods are needed? What are the important quality characteristics of concepts, methods, teaching, and consultation? These are subjects for systematic study, rather than just the gathering of anecdotal information. Other studies would deal with performance of methods in use. How have the analyses from studies been borne out or not borne out by subsequent results and why? Information gained could be important input for research on new methods. A source of insight into methods of consultation would be studies of similar kinds of professional practice. Methods used in the practice would be studied to identify those that might be beneficial to statistical practice.

Use of sound statistical theory and methods would constitute innovation in many areas of business. Studies of adoption of innovations have identified factors that affect the degree and rate of adoption,

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such as relative advantage — financial and social costs and benefits, communicability — how easily the innovation can be explained and its benefits illustrated, compatibility — congruence with existing norms, values, and structures, pervasiveness — numbers of aspects of the system affected by the innovation, and reversibility — whether the innovation can be adopted on an experimental basis and reversed without serious consequences. Understanding the factors that affect adoption and the barriers to adoption of sound statistical practice could provide insight into how to provide better instruction, publication and consultation.

The practice identified by the terms statistics and statistician may, indeed, have an image problem. At best, a change of names would be a temporary solution if the factors that contribute to the image remain unchanged. The reputation will eventually follow the practice, no matter what the name. A system view leads us to conclude that statisticians must have a role in creating the reputation of their work. A relevant quotation may be:

The right to be consulted is earned, and re-earned, by demonstrating the capacity to be helpful.

Reflection on the statistical community's contribution to its own image through interactions with clients and students could be a valuable source of insight.

Surely the statistical community is well-suited to participate in the design and conduct of research on consumers and potential consumers of their products and services and to systematically build knowledge for improvement of practice. Much may have been done, but there is opportunity for further improvement. Study of statistical practice as a system offers an opportunity to take more informed action to change the reputation of the statistical community by changing the reality of its practice. This may call for thinking far outside the boundaries of the community's current construction of the situation. There is no doubt that the statistical community has a desire to bring benefit to its customers. The method is the fundamental issue to be addressed. Lessons from the quality movement may provide helpful guidance.

## References

- Deming, W.E. (1994). **The New Economics**, Cambridge, MA: Massachusetts Institute of Technology Center for Advanced Engineering Study, second edition.
- Hahn, G.J. and Meeker, W.Q. (1993). Assumptions for Statistical Inference, **The American Statistician**, vol. 47, no. 1, 1-11.
- Wiener, Leo, ed. (1967). **Tolstoy on Education**, Chicago: University of Chicago Press.
- Langley, G.J., Nolan, K.M., Nolan, T.W., Norman, C.L., and Provost, L.P. (1996). **The Improvement Guide**, San Francisco: Jossey-Bass.
- Walton, Richard E. (1975), The Diffusion of New Work Structures: Explaining Why Success Didn't Take, **Organizational Dynamics**, winter issue.
- Senge, P.M. (1990). **The Fifth Discipline**, New York: Doubleday.
- Kettenring, Jon (1997). The Birth, Life, and Death of Statistics Departments, **Amstat News**, no. 245, 9-10.

## 1998 Midwest Biopharmaceutical Statistics Workshop: Call for Papers

This is a call for papers to be presented during the workshop's poster sessions. The theme of the workshop is "Resampling Methods", but presentations are not limited to that topic. The meeting will be held May 18-20, 1998 in Muncie, Indiana. The deadline for abstracts is April 18, 1998. Financial assistance is available for students who wish to make presentations. For further information please contact Kim Perry ([ktperry@am.pnu.com](mailto:ktperry@am.pnu.com) or 616-327-8511).

## WWWEBBING AROUND

Our Webmaster Mark Kiel has been working very diligently at upgrading the Statistics Division's World Wide Web home page. The URL of that page is <http://www.asq.org/StatDiv/>. Those of you who have visited the current home page recognize the amount of work that has gone into creating the current page, and you realize how much better the page could be. Shortly after you read this, a new version of our home page will be installed. It will have updated information about Division activities, officers, meetings and shortcourses of interest to our members, back issues of articles which have appeared in the newsletter, and anything else that our members express a need to have available there. Mark is currently searching for an assistant to help him provide the best product we can (see elsewhere in this newsletter).

Not too many people have responded to my "Best" Web Page challenge. So I guess we'll forget the competition and simply pass on the web news as it comes in. Someone who probably felt we needed to 'lighten up' sent in these two URLs:  
<http://info.business.utah.edu/~bebrblf/statjoke.html> (editor: I love the sample size story), and  
<http://www.business.utah.edu/~bebrblf/mathjoke.html>

## GORDON RESEARCH CONFERENCE

**Statistics in Chemistry and  
Chemical Engineering**  
Salve Regina University, Newport, Rhode Island  
June 28-July 3, 1998

The Gordon Research Conference, which has met annually since 1951, is designed to foster the exchange of new ideas among researchers and workers in statistics, chemistry and chemical engineering. Outstanding statisticians and chemometricians present current work on methods of potential relevance for chemists and chemical engineers, while chemists and engineers present real-life problems and proposed solutions. The conference is designed to maximize the interaction between the different groups.

The program, highlighted by a presentation by George Box ("Feedback Control for S.P.C."), is posted at the web site: <http://www.grc.uri.edu/progra~2/stats.htm>  
Sijmen de Jong, Unilever Research Labs, P.O. Box 114, 3130 AC Vlaardingen, The Netherlands, is the conference chair and he may be contacted via email at [Sijmen-de.Jong@unilever.com](mailto:Sijmen-de.Jong@unilever.com) or fax at +31 (0) 10 460 5671.

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# Annual Quality Congress '98

## Workshop on Improving Work Flow

Did you know there are two types of important process variation - variation in the quality of the output and variation in the quantity of the output? Do you know how to properly manage component processes so that quantity of the output is increased? Do you know how to apply Theory of Constraints to focus on those processes that are bottlenecks? If you answered 'no' to any of these questions then do not miss the Statistics Division sponsored workshop at the May, 1998 AQC. This upcoming workshop is titled "How to Use Theory of Constraints to Improve Work Flow" and is being taught by Tim Fuller of Fuller & Associates. The purpose of this workshop is to enable students to identify and apply simple but powerful methods to improve the performance of their total organizations.

The workshop will consider the difficulties of managing production, and also discuss the feasibility, cost, and time of overcoming these difficulties. Interactive simulation exercises and case studies will be used to identify fundamental causes for organizations not achieving needed system output. Further investigation of simulations will

demonstrate how managers are forced to compromise between meeting customer requirements and minimizing costs, and the impact on output if every manager is trying to maximize efficiency measures. Solutions to these problems will be derived by demonstration of the Theory of Constraints using a five-step focusing process. Instruction in this process will enable workshop participants to identify and exploit the constraints in a system.

The course will be offered as an AQC pre-conference workshop and promises to be highly informative, interactive, and of great benefit to all who attend. Don't miss your chance to participate; sign-up along with your 1998 AQC registration.

**The Annual Quality Congress (AQC) will be held May 4-6, 1998 in Philadelphia, PA. Details about programs and registration can be obtained from ASQ.**



## Lynne Hare Receives ASQ Statistics Division Hunter Award

The 1997 William G. Hunter Award was presented to Lynne B. Hare on October 16 at the 1997 Fall Technical Conference (FTC) in Baltimore, MD. The Statistics Division of the American Society for Quality (ASQ) established the Hunter Award in 1987 in memory of the Division's founding chair to promote, encourage and acknowledge outstanding accomplishments during a career in the broad field of applied statistics. The attributes that characterize Bill Hunter's career - consultant, educator for practitioners, communicator, and integrator of statistical thinking into other disciplines - also characterize Lynne's career.

Lynne Hare is Chief, Statistical Engineering Division, National Institute for Standards & Technology. Prior to his current position Lynne worked as an independent consultant in applied statistics and quality management, a director and manager at Thomas J. Lipton Co., a visiting professor at Rutgers University, a consulting statistician at CPC International, Best Foods Division and as a Group Leader in statistics at Hunt-Wesson Foods, Inc. He is a Fellow of ASQ and ASA. He is chair of the Quality and Productivity Section of ASA and was chair of the Statistics Division of ASQ in 1988-89. He has also served on several other ASQ committees and review boards. He is currently chair of the Ellis R. Ott Scholarship Award Committee, which is administered by the Statistics Division. Dr. Hare received his Ph.D. in Statistics from Rutgers University. Since the award was made, Lynne has accepted a position with Nabisco, Inc.

Lynne made these remarks in accepting the award at the FTC:

Bill Hunter emphasized the human side of statistics. He developed and expounded statistical methods, and he made the discipline come alive. Bill got involved with the community by sharing his extensive knowledge in statistics and quality management. Many know of his accomplishments with the City of Madison. Bill's successes made people thirst for more."

"Bill also linked statistical methods to other-than-usual applications of research and quality control/quality improvement. He did this by maintaining a grand process view, seeking sources of variation, and using data - the right amount of the right kind of data - to effect improvements. These three components form the basis of Statistical Thinking. In Statistical Thinking, as in so many other areas, Bill was years ahead."

"Bill also acknowledged help. Likewise, I thank the ASQ Statistics Division, specifically the Statistical Thinking Team who, as I am, are students of Statistical Thinking, and the Statistical Engineering Division at the National Institute for Standards and Technology for helping me to learn and grow. Thank you.

**Nominations for the 1998 Hunter Award** must be received by June 30, 1998. Criteria correspond to the attributes discussed in the first paragraph above. Information and forms for nominations for the 1998 award are available from the William G. Hunter Award Committee Chair:

Galen C. Britz  
3M Center, Building 220-9W-08  
St. Paul, MN 55144  
Phone: 612-736-6499  
Email: gcbritz@mmm.com



**HAPPY TWENTIETH BIRTHDAY,  
STATISTICS DIVISION !!**

# ASQ STATISTICS DIVISION COUNCIL MEETING OMNI INNER HARBOR HOTEL

Baltimore, MD

7:30 pm - 9:30 pm

Wednesday, October 15, 1997

## I. GENERAL

- Revisions to the Agenda:** None
- Review Mission, Vision, Principles, Strategy, Ground Rules:** Don Emerling
- Approval of previous Council minutes:** Approved by Council vote.
- Membership Report:** Accepted by Council vote.  
Statistics Division membership as of September 30, 1997, stands at 9607.  
This figure compares to 9932 for the same period last year, and 12410 for 1995.  
A member nurturing and retention tactical plan is recommended.
- Treasurer's Report:** Approved by Council vote.
1. Division coffers are up approximately \$16,000 from last year, due to increased membership dues. The division has been deficit spending the past couple of years in order to drive its "Statistical Thinking Everywhere" vision and tactical plans.
  2. Newsletter costs continue to be the single largest Division expense.  
Three regular quarterly Newsletters will be published with Division news, Mini Papers, Case Studies, etc. A "Special Publication" will be published each Spring, based on the topic presented at the Statistics Division-sponsored AQC session, or the AQC pre-conference Short Course.
  3. Four- \$5000 Ott Scholarships were awarded in 1997 from among 35 applicants.

## II. RECOGNITION

- McDermond Award:** Beth Propst reports that ASQ has accepted our application for Level III McDermond Recognition.
- Recognition:** Mel Alexander - FTC Short Course Chair - good job!

## III. INFORMATION SHARING

- Long Range Planning:** Don Williams explained that the Division conducts a Long Range Planning session every three years to set its strategy for the next 5 years. The previous LRP was held three years ago in Orlando. This year's LRP will immediately follow the Baltimore FTC. Galen Britz will facilitate.
- Saturday, Oct. 18: Review current strategies.
- Sunday, Oct. 19: Identify new strategies and/or tactical plans.
- Monday, Oct. 20: Begin work to develop Tactical Plans that can be completed in 12-18 months.

**Conference Update:** Mel Alexander, FTC Short Course Chair, reported that we had 6 people attend the "DOE in Health Care" short course and 38 attendees at the "How to Apply Statistical Thinking" short course.

Other conference chairs: Susan Albin - 1997/98 FTC Program Chair  
Marcey Abate - 1998 AQC Short Course Chair  
Dick Kleinknecht - 1998 AQC Session Chair

**Web Site:** See attached Webmaster Report. The Statistics Division webpage went on-line at the 1997 AQC. The URL address is <http://www.asq.org/statdiv/>.

**Division Activities:** Publications Committee - No activity since the 1996 FTC. Will be addressed at the Long Range Planning session.

FTC Scholarships - Scholarships were awarded to 5 students to attend the 1997 Fall Technical Conference in Baltimore; however, two of the awardees later declined due to their inability to attend the conference.

Hunter Award - Dr. Lynne Hare will receive the Bill Hunter Award at this year's FTC.

Standards Committee - The Statistics Division "inherited" 3 additional Standards to shepherd: 'Q3' - Inspection of Isolated Lots; 'S2' - Introduction to Attributes Sampling, and ANSI Z1.4 & Z1.9 - the ASQC equivalent to the discontinued MIL STDS 105E & 414.

Operating Manual - Sections 3.18, 3.18.1, and 3.18.2 have been updated for the following revised job descriptions: "Membership Chair", "Regional Councilor", "Section Liaison".

Fall Edition Newsletter - Should be published and mailed later this week.

Operational Calendar - The Officers created an operational calendar listing due dates for each of their (and respective Committee) responsibilities.

**Letter from Bill Woodall:** Dr. Woodall has written a letter to Don Emerling suggesting that our Newsletter MiniPapers be "refereed" prior to publishing in the Newsletter, or that a disclaimer be added to the Newsletter stating that the submissions have not been formally reviewed. Dr. Woodall's letter stems from a recent MiniPaper on EWMA Control Charts where he expressed some differences of opinion with the Minipaper's author.

Janice Shade (past Newsletter Editor) explained that while no official policy or procedures exist for paper reviews by the Newsletter Editor, she regularly sought outside counsel on materials she was not certain of. Such informal reviews have generally been practiced by her predecessors.

Consensus of the Council is that the Newsletter is not a technical journal, that we encourage and invite dialogue, and while we do not want to publish erroneous materials, neither do we want to submit articles to an official "refereeing" process.

Ralph St. John (incoming Newsletter editor) suggested that we add an "Disclaimer" to the MiniPapers and Basic Tools stating that the Newsletter seeks to foster discussion and creation of ideas and potential solutions to problems. In order to facilitate and expedite this discussion, papers may not always be refereed. Readers with different opinions are encouraged to express their views by writing letters to the editor for inclusion in the next newsletter.

The Newsletter Editor will continue to have technical papers reviewed with other professionals before publishing, whenever possible. A disclaimer will be added to every issue stating that technical content may not have been refereed, and that the material may not represent the official view of the Statistics Division.

Respectfully Submitted,  
Robert H. Mitchell  
Secretary

# LONG RANGE PLANNING SESSION ('LRP IV')

Baltimore, Maryland • Omni Inner Harbor Hotel

October 18-20, 1997

## AGENDA

### Saturday, October 18

**Review the "Orlando LRP (1994) Session"**

All

**Discuss possible changes to Mission, Vision, Strategies**

All

Proposed Vision: "Statistical Thinking Everywhere"

Suggestions for **Vision** alterations:

1. We need to agree whether Statistical Thinking encompasses tools/methods.
2. Have Vision statement include reason why.
3. Vision statement should include Venn diagram.
4. Keep current Vision; use "Statistical Thinking Everywhere" as our tagline.

Suggestions for **Mission** statement revision:

1. Change ...productivity improvement... to performance improvement (better alignment with non-mfg.).
2. Change ...tools... to methods.
3. Drop ...problem-driven... from Mission statement.
4. Add to the end of each of the 4 bullets: ...make a jubilant customer.
5. Change ...quality and productivity... to quality, productivity, and performance...
6. Can it be shortened?
7. Combine bullets 1 & 2.

Suggestion for **Strategy**:

Market Weighting chart-Change x-axis label from "Statistical Methods" to "Products & Services".

**Member Survey report and analysis**

Don Williams

1. The Newsletter is the #1 reason members join Stat Division.
2. Members want more Case Studies, more Mini papers.
3. Some members have asked for a "Member Forum".
4. Members want more local conferences and short courses.
5. Members desire a larger electronic presence.
6. We also need to anticipate our members needs; for example, no-one asked for Statistical Thinking philosophy.
7. We have been losing a net 300 members/year the last 4-5 years; we need a member nurturing and retention program.

**Review Current Tactical Plans**

**Review: Have a Strong, Vibrant Division Infrastructure**

Don Emerling

1. We have had numerous brainstorming sessions towards creating a Division Dashboard (i.e. balanced scorecard).
2. We have a good organizational design. We have made some minor modifications: revised Regional Councilor job description; created the Section Liaison position.

**• Need to identify leading indicators of division health.**

**Review: Design and Deliver Selected, Useable Products**

Nancy Belunis

1. This strategy transformed from 1 tactical plan to "Improve the How To... Series", to 5 related bite-sized tactical plans.

- 2. A Publications Committee was formed:
  - Acquisitions Coord      Briefings Editor
  - 2 "How To" Editors      Publications Chair
- **Did not do a good job of grounding the Committee in Stats Div. culture. Publications Committee has since been dissolved, to be addressed at this LRP.**

**Review: Broad Application of Statistical Thinking**

Lynne Hare

- 1. Reviewed the history of presentations and publications.
- 2. A "How To" booklet is currently in the works.
- **The tactical plan leader (Roger Hoerl) recognized early on that the complexity of this plan required good strategic planning and deployment.**

**Review: Integrate ST2 into Educational Curricula**

Don Williams

- 1. Form Alliances; ID other organizations
  - Checked into 20+ similar-interest groups
- 2. Ready- Fire- Aim approach
- 3. Four opportunities identified at Cincinnati AQC
- 4. Focused on "Virtual Academy" development at Chicago AQC
- 5. Demo'd "Virtual Academy" at Orlando AQC; two modules were presented, looking for interested members to submit additional modules.
- **Not clearly stated, not "actionable"**
- **No overall project plan**
- **Need a Virtual Academy Chair**

**Define Strategy versus Tactics**

Galen Britz

- 1. How do we create a "sense of urgency"?
  - A. In lack of competition we need passion.
  - B. We must be intrinsically motivated
- 2. We appear to have 2 different types of Strategies:
  - A. Strategy as defined by Roger Hoerl
  - B. Deployment strategies
- 3. Our tactical plans need to be more specific, with a 12-18 month actionable project timeline.

**Look for missing strategies**

All

Don Emerling (Chair), Don Williams (Chair-Elect), Beth Propst (Past Chair), and Galen Britz (Facilitator) performed an Inter-Relationship Diagram on the four Strategies developed at Orlando relative to the Vision of ST2:



Discovered two apparent missing strategies: "Identify Key Decision Makers" and "Develop a Vibrant Communication/Information System".

The LRP attendees then conducted an Inter-Relationship Diagram on this expanded set of Strategies:

<u>IN</u>	<u>OUT</u>	<u>STRATEGY</u>
7	0	Statistical Thinking Everywhere
2	5	Design & Deliver Selected, Useable Products
0	4	Have a Strong, Vibrant Infrastructure <b>Key Driver</b>
2	4	Demonstrate the Broad Effectiveness of ST
4	2	Integrate ST into Educational Curricula
5	1	Drive Applications of ST
4	3	Influence Key Decision Makers
1	6	Vibrant Communication/Information System

**Sunday, October 19, 1997**

**Multi-vote to identify top 4-5 Strategies**

<u>VOTES</u>	<u>STRATEGY</u>
98	Design & Deliver Selected, Useable Products
73	Vibrant Communication/Information System
64	Demonstrate the Broad Effectiveness of ST
41	Integrate ST into Educational Curricula
28	Have a Strong, Vibrant Infrastructure

**Develop new 5-Year Plans**

All

1. Breakout Groups for the top 4 voted Strategies
2. Brainstorm tactics
3. Do an Inter-Relationship Diagram to prioritize the tactics
4. Develop detailed 12-18 month tactical plans
5. Develop a dependency map (project timeline)

**Identify New Tactical Plans**

All

**Design & Deliver Selected Useable Products**

- Create a Clearinghouse of Statistical Stuff
- Identify and start no more than 3 new publications
- Develop and disseminate Newsletter technical content
- Beef-up our Short Course offerings; more variety

**Demonstrate Broad Application of Statistical Thinking**

- Collect additional case studies
- Market Statistical Thinking
- Expand the theory of ST
- Assist in the discovery process for new applications
- Maintain the integrity of ST
- Examine new publishing options

**Integrate Statistical Thinking into Education & Training**

- Pilot the "Pegasus" project

**Develop a Vibrant Information & Communication System**

- Develop a Webpage policy and strategy
- Develop and implement a member nurturing process

**Have a Strong and Vibrant Division Infrastructure**

- Committee re-alignment

**Action Plan:** Seek interested Statistics Division members to participate and lead these new tactical plans. Advertise in Newsletter and on Webpage.

Respectfully Submitted,  
Bob Mitchell  
Secretary

# 53rd Midwest Quality Conference

Sept. 24-25, 1998  
Wichita, KS

## Call for Papers

Papers are requested for the 1998 Midwest Quality Conference, which has the theme "Challenging the Millennium — Leaping into the Future". We seek proposals for 1 to 2 hour presentations for tracks on:

**QUALITY PAYOFFS**, How we assess the value and benefits of quality initiatives;

**WORKING TOGETHER**, How we are working together in new and innovative ways;

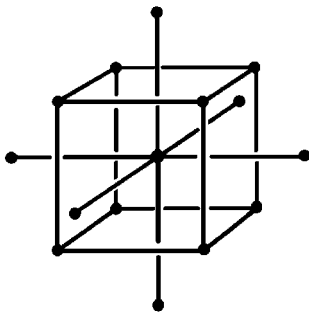
**DEVELOPING PEOPLE**, How we nurture and develop our team members;

**TECHNICAL APPLICATIONS**, How we work with other technical societies to foster quality.

Please submit an abstract, a short biographical sketch, recent papers and presentations made (videos and conference ratings, if possible) by March 2, 1998. Include contact information, preferably with E-mail address. Receipt of submissions will be acknowledged and those whose papers are accepted will be notified by March 16, 1998. Final papers will be due April 15 in printed and electronic format (doc or .txt form).

For submissions or inquiries contact:

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## Ellis R. Ott Scholarships For Applied Statistics and Quality Management

The Statistics Division of the American Society for Quality is pleased to announce the availability of \$5000 scholarships to support students who are enrolled in, or are accepted into enrollment in, a masters degree or higher program with a concentration in applied statistics and/or quality management. This includes the theory and application of statistical inference, statistical decision making, experimental design, analysis and interpretation of data, statistical process control, quality control, quality assurance, quality par improvement, quality management and related fields. The emphasis is on applications as opposed to theory.

Last year's (1997-98) scholarship winners were:

William McDaniel, Northwestern University  
Christopher Bilder, Kansas State University  
Delia Grenville, Virginia Polytechnic Institute and  
State University  
David Dahl, Brigham Young University

Qualified applicants must have a grade point average of 3.25 or higher on a 4.0 scale, or equivalent standing on another scale, in any field of undergraduate study. Scholarship awards are based on demonstrated ability, academic achievement, involvement in student or professional organizations, faculty recommendations, and career objectives.

Application instructions and forms may be obtained from:

1. the Statistics Division Web Page at <http://www.asq.org/statdiv/>

or by writing to:

2. Lynne B. Hare  
Nabisco, Inc.  
200 DeForest Avenue  
East Hanover, NJ 07936-1944

or by sending an email request to:

3. Lynne B. Hare  
Email: HareL@Nabisco.com

# SCENES FROM THE 41ST ANNUAL FALL TECHNICAL CONFERENCE OCTOBER 16-17, 1997 BALTIMORE, MD



***Kymm Hockman, FTC Conference Chair. Kymm did a great job!!***



***Steve Bailey, former Stat Division Chair and current President of ASQ, told us about ASQ 's preparation for the 21st century.***



***Joe Voelkel prepping for his talk. Joe, another past Stat Division Chair, won the Shewell Award for his 1996 FTC presentation.***



***Galen Britz introducing Hunter Award recipient Lynne Hare. Both Galen and Lynne are former Stat Division Chairs.***



***Lynne Hare discussing the legacy that Bill Hunter has left us.***



***Don Emerling, Stat Division Chair, introducing Gipsie Ranney, Youden Address speaker.***

Three students, Trevor Craney (So. Carolina), Dianna Shah (Eastern Kentucky) and Robin Wurl (Rutgers) received grants from the Stat Division to attend the conference. Robin Wurl gave a nice presentation titled "Multiresponse Optimization Techniques: Sensitivity to Parameter Selection". All three of them enjoyed the conference. Some of their comments: "It was educational to hear speakers who have been practicing statistics." "I will share my learning with other students." "The talks at the FTC were generally much more interesting (than at the ASA conference)." "Enjoyed the casual atmosphere." "Will encourage my classmates to attend next year." "Thanks for your support."



***Happy 20th B'day,  
Stat. Division!!!***



*Janice Shade (Treasurer), Nancy Belunis (Past Chair) and Beth Propst (Past Chair) await the Youden Address.*



*Statistics Division Leadership Team: Don Emerling (Chair), Don Williams (Chair-elect), Bob Mitchell (Secretary), and Janice Shade (Treasurer).*



*Paul Smith gives out his last awards. Thanks, Paul!*



*Jon Kettenring, ASA President, gave a luncheon talk on large messy non-numeric data sets*

A number of awards are made each year for “quality” presentations. These awards are based on audience evaluation of the presentation and committee evaluation of the corresponding manuscript. Awardees for presentations made at the 1996 FTC included:

- Shewell Award (Best Presentation): Joel Voelkel.
- Wicoxon Prize (Best Practical Application Paper): Harry Martz, Paul Kvam and Lee Abramson.
- Youden Prize (Best Technometrics expository paper): Bryan Olin and William Meeker.

Note: Paul Smith has chaired the Awards Committee for many years, and has been a quiet, steady contributor to the success of the FTC. Paul is turning over the chair of the committee to James Lucas and Brad Brown (See, it took two people to replace him!!). Thanks, Paul!!

**QUIZ:**

1. What is the difference between the Youden Address and the Youden Prize?
2. How many Stat Division Chairs are pictured on these two pages?

**The 1998 42nd Annual Fall Technical Conference will be held at the Corning, NY Radisson Hotel on October 22-23. Theme for the conference is “Management Analytics: Statistics, Quality and Decision Making. As always, the conference is co-sponsored by the Statistics Division and the Chemical and Process Industries Division of ASQ and the Section on Physical and Engineering Sciences of ASA. Make your travel plans now!!**

# MINI PAPER

## TO RANDOMIZE OR NOT TO RANDOMIZE, THAT IS THE QUESTION

Marilyn Hwan LSI Logic

### BACKGROUND

For years, I believed that randomizing the runs in a designed experiment would definitely remove the effects of a systematic drift. With this belief, I stated in the American Society for Quality Control Statistics Division Newsletter (1993):

“Whether to randomize the order in which the matrix settings is run depends on two main considerations: the cost of randomization, and whether a time dependent factor (known or unknown) will disturb the result.”

A reader pointed out that when randomization is used, there is still a substantial chance that a main effect or two-factor interaction will be confounded with a lurking variable. Another reader was disturbed that I would even consider not randomizing! These conflicting remarks continued to nag me. This paper was written to share the results of this internal debate. Readers’ comments are invited.

### WHAT RANDOMIZATION CAN/CANNOT DO

The discussion is illustrated with a simple design, a full factorial with 3 factors, 2 levels each. Thus, the experiment may have factors A= pressure, B = temp, and C = time, and each factor will have a “-” and a “+” setting. All eight combinations of the settings of three variables will be run in the experiment (see Figure 1). I refer to the “time dependent factor” or “lurking variable” as “drift.”

Since randomization is supposed to alleviate the problem of a drift affecting our experiment, any random order should be equally acceptable. The order shown in Figure 1

is one of the possible and acceptable orders. As you can see, the systematic drift would then be confounded with Factor C (but not with other effects). There are many other orderings which would also confound the drift with Factor C. For example, any order in which the top 4 combinations and bottom 4 combinations are randomized within themselves would result in the drift confounding with factor C. We can apply the same logic with the other factors. Instead of alleviating the problem of a drift, many orderings will still confound the effect of systematic drift with some factor or interaction.

### CONCLUSIONS

Randomization may not alleviate the effects of a systematic drift. All that has resulted is that the experimenter relinquished control over which factors will be confounded with a drift!

### SUGGESTIONS

(1) Run the experiment with a “standard” at the beginning and end of the experiment (at minimum) to check for large drift. If drift dominates the results over the short experimental period, the system may not be sufficiently stable for valid results from a designed experiment.

(2) Consider cost when determining the order in which experiments are run.

(3) If drift is present (unavoidable) and must be accounted for in the experiment, the experimenter may wish to intentionally confound the drift with a high order interaction in order to avoid the main effect confounding illustrated above. This allows the experimenter to control which effect is confounded with the drift, unlike what happens when time is randomized.

### References:

Hwan, Marilyn (1993), “A Holistic Approach to the Design of Experiments-Part I”, American Society for Quality Control Statistics Division Newsletter, Spring

FIGURE 1: A FULL FACTORIAL DESIGN OF 3 FACTORS, 2 LEVELS EACH

COMBINATION #	Factor A	Factor B	Factor C
1	-	-	-
2	+	-	-
3	-	+	-
4	+	+	-
5	-	-	+
6	+	-	+
7	-	+	+
8	+	+	+

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<sup>1</sup>Chaired by the Officer (or Past Chair) at the top of the column



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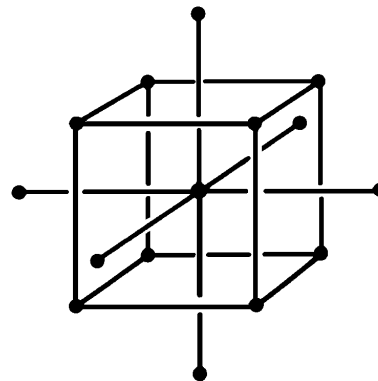
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Issue	Vol.	No.	Due Date
Summer '98	17	2	May 15, 1998
Fall '98	17	3	Aug. 15, 1998



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