

THE STATISTICAL CONSULTANT

Section on Statistical Consulting
Murray K. Clayton, Editor
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American Statistical Association

The Logo Contest — We Have a Winner!

Ron Wasserstein
Contest Organizer

Mary J. Chabala of Bristol-Myers Squibb is the winner of the Section on Statistical Consulting Logo Contest. Her design (shown below) was chosen by the Section Executive Committee from among over 20 submissions. The design is attractive but simple: the words in the oval capture the breadth and depth of the consulting process and their first letters spell “CONSULTING.” In the center of the design, the words “Statistical Consulting Section” overlay the letters “ASA,” suggesting the relationship of the Section to the entire organization.

The logo will be used on all Section publications and letterhead. For her excellent effort, Ms. Chabala received a check for \$200 from the Section, and was recognized at the Section business meeting in Chicago.

Logo image not available on this web page version.

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A Message from the 1996 Section Chair

Marcia L. Gumpertz

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It has been an honor to serve as the Consulting Section chair for 1996, and I have enjoyed getting involved with the section and getting to know so many other statisticians with similar interests. The Section has produced a great deal of information this year, and tried to facilitate communication among consulting statisticians. There have been three newsletters, each one full of information about the business of consulting, teaching consulting, and consulting tips. We now have a Section web site and two electronic discussion groups, and a new logo. Our number of invited sessions at the annual meetings has been steadily growing, as has the number of special contributed sessions. These sessions have been very well attended and the program chair has gotten lots of suggestions for session topics. In 1996 we initiated a travel award competition for proposals for special contributed sessions for the 1997 meetings, and we had many excellent proposals. The 2nd annual mixer in Chicago was a great success, attended by somewhere around 100 people.

Thanks and recognition are due to so many people: Murray Clayton for the newsletter, Brian Yandell for the web site, Ron Wasserstein for running the logo competition, John Dixon for the 1996 program, Barry Moser for the 1997 program and for the list-servers, Sandra Stinnett for the mixer, Keith Muller, and Kristen Meier, Richard Morris, Roy Tamura, George McCabe, Linda Young, Carolyn Apperson-Hansen, Stephan Arndt, and Susan Spruill for serving on committees and volunteering other services.

The Consulting Section has become for me a place where I can talk to others who have

a similar orientation to the statistics profession. It is also a source of information about statistical techniques that are useful in practice, and information about teaching consulting and applied statistics. Some of the articles give a view into the life of a private consulting business. I know that the Consulting Section doesn't provide all of these functions perfectly, so if you can think of ways that it could better carry out these functions or answer other needs of consulting statisticians, I hope that you will send suggestions to the Consulting Section electronic discussion group. Here's looking forward to a vibrant future under the leadership of the new chair, Keith Muller!

And from the 1997 Section Chair: “For Your Information: Don't Be Bashful!”

Keith Muller

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What does an ASA section do? In particular, what does the Statistical Consulting Section do? In brief, it represents you, and in many ways. Section members like yourself, especially members of the Executive Committee, volunteer time in many ways. 1) We organize and help run sessions at our meetings (ASA, ENAR, WNAR). 2) We support electronic discussion groups, a web page, and this newsletter. 3) We represent your interests to ASA officers and staff. 4) We serve on standing and ad hoc committees to maintain the organization.

What's new and exciting? 1) We have started a travel award competition which provides travel money to the person who organizes the best contributed paper session for the ASA. We expect that the session will usually be allotted special treatment by the program committee. 2) We are creating an award to recognize statisticians who make outstanding

contributions to the profession in the arena of consulting. This award is distinct from the recognition accorded to those becoming a Fellow of the ASA (which may also be based on contributions in the consulting arena). 3) We are working on moving the section along the same electronic and digital highway that we all ride on in our jobs and home. Besides the obvious advantages of creating better information flow among members, we hope to strengthen the “corporate memory” and make it easier for future officers to do their jobs. 4) You received a proposal for revision to the Section’s charter with your other ASA ballots. Rewriting descriptions of Section officers’ duties may not make the excitement hit parade, but helps make sure everyone knows who has to do what, when and where.

What do I want you to do? Don’t be bashful! (1) Attend the ASA, ENAR and WNAR meetings. When you pick out a talk to attend, notice what sections sponsored it.

(2) Come to the Section’s (brief) annual business meeting and mixer (much fun, including many excellent door prizes) at the ASA annual meetings. (3) Volunteer to chair sessions and serve on committees for the Section (including elected positions). (4) Share your insights by contributing papers and organizing sessions. People organize sessions to promote new ideas, re-invigorate good old ideas that have been neglected, and to learn from leaders in the field. In other words, you don’t have to be an expert about the topic to know how to organize a good session. (5) Contact me (Keith_Muller@UNC.EDU) or any other executive committee member (see our Web page or the roster in this newsletter) about any questions or suggestions.

By the nature of the topic, members of the Statistical Consulting Section all have an interest in helping others. So you can count on your fellow members being friendly and supportive. Don’t be bashful!

Book Review: “Influence Without Authority”

Editor’s Note: Last issue I asked our readers if they had read a book or article or seen a video that would be of particular interest to our Section members. I am grateful to Steve Simon for contributing the following book review. If anyone else would like to contribute a review or commentary, please let me know — I’m eager to hear from you!

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Being a good statistical consultant is more than just being knowledgeable about statistical methods. We have to be able to work effectively with other people. We have to be able to persuade people to stop using the change-one-variable-at-a-time design philosophy. We have to convince people that a power calculation is an integral part of the research protocol. We have to motivate people to act on special causes identified by their control charts. In

short, we have to be influential. If we cannot influence people, then all our knowledge of statistical methods is wasted.

The book I have found most helpful in this regard is *Influence Without Authority* by Allan R. Cohen and David L. Bradford. The title alone will bring a knowing smile to many people’s faces. How often do we find ourselves in situations where we need to influence people over whom we have no direct authority!

The premise of this book is that the way to influence people is to help them meet their goals so that they will be willing to make an extra effort to help us meet our goals. For example, have we neglected to thank others when

they go out of their way to help us? For people who desire that type of recognition, a simple expression of gratitude will help establish a positive relationship that will pay off the next time we need a special favor. Other people might be looking for more challenges in their work or a greater sense of closeness and friendship with their co-workers.

Here's an example where recognizing what people value gave me more of an opportunity to influence them. In a previous job, I spent a lot of time lobbying for the adoption of Total Quality Management (TQM). For me, it was a new and exciting challenge. But for others, it would have been a mistake to describe TQM that way. Cohen and Bradford point out that for some people, a new challenge is the last thing they desire; they spend their work hours trying to avoid hassles. For these people, I had to stress the proactive nature of TQM that prevented problems before they occurred. Others were frustrated by the lack of money and personnel time. They were attracted when they realized that TQM could free up resources that were currently wasted in unnecessary inspection and review steps. Still others valued visibility and recognition; they were attracted by the attention they would receive as members of the first few TQM teams.

Being influential requires us to see the world as other people see it. When someone raises an objection to our proposal, our first reaction is to immediately counter that objection. Cohen and Bradford tell us that we should treat that objection as a clue to what the other person values. When researchers complain that they don't have time to wait for a power calculation to be done, point out the far greater loss of time if we end up recruiting more subjects than needed. We frame our response in terms of timeliness (instead of, say, quality), because they just told us that timeliness is an asset they value.

Why are some people hard to influence? Cohen and Bradford describe the negative attribution cycle, a situation that many of us encounter where work relationships spiral down-

ward out of control. We encounter difficulty in influencing someone. We end up attributing negative thoughts to them, such as stereotyping that person as uncooperative. We end up avoiding this person, which makes it yet more difficult to understand them. The potential for misunderstanding hurts more of our interactions. This further reinforces our negative feelings and the cycle continues.

Our natural desire to avoid unpleasant encounters has worked to our disadvantage here. To break the cycle, we have to stop assuming the worst and make a concerted effort to understand and interact with this person. An influential person is someone who can work well with everyone, not just with people they like. Cohen and Bradford remind us that "an alliance does not require that there be any great love between the two parties, only some mutual interest on one or more issues."

Cohen and Bradford remind us that we need to identify what it is we really want before we try to influence someone else. In one situation, I was so intent on getting a change in a research protocol that I lost all sense of perspective. I was unhappy that our group was working on a project where our good statistical advice was being ignored. Despite increasingly vigorous and vocal objections, I was unable to compel the researchers to follow our advice, which they perceived as our meddling in scientific issues. My strident warnings had no effect other than squandering a lot of goodwill.

If I had known in advance what I really wanted, I would have simply suggested we disassociate ourselves from that project. This is a much simpler way to ensure that we don't work on projects where our advice is ignored. Furthermore, for those researchers who are willing to forgo our expert help, the door is left open without any bitter recrimination. When these researchers discover how hard it is to perform their own data analyses, they are likely to work more closely with us in future projects.

This last situation is an example of a negative exchange; do what we want or we won't

help with something you want. In general, Cohen and Bradford discourage the use of negative exchanges. If handled poorly, the threat of negative exchanges can lead to difficulties in future interactions. Cohen and Bradford encourage us to seek positive exchanges whenever possible, creating an atmosphere of good will for the future. In a clever turn of the phrase, they describe this as “keeping push from coming to shove.”

Nevertheless, we will encounter people at work whom we cannot influence through positive exchanges. These people may not be interested in the positive things of value that we have to offer; or they may not perceive the value of our positive contributions. Some people are just aggressive by nature and only respect people who can stand up to their toughness.

Cohen and Bradford devote an entire chapter to deciding how and when to use the threat of negative exchange. If we must rely on negative exchanges, we are better off to escalate the threats gradually and to avoid personal attacks. We want to be perceived as tough but not as mean. After all, we want to be able to work well with this person in future encounters.

My favorite chapter in the book is how to influence the boss, the person with whom we have the least authority. How delightful our workplace would be if we could just change the behavior of our boss!

Cohen and Bradford encourage us to examine ourselves first. Is the poor quality of my work causing my boss to micromanage me? Do I want greater independence while behaving in passive and dependent ways? If our boss does something we don't like, perhaps we are doing something ourselves to trigger this behavior.

Other than changing our own behavior, the best way to influence our boss is to develop a sense of interdependence. We need to find out what things our boss values. When we provide these things to our boss, we open up the possibility of getting what we want in exchange. Some issues need to be handled delicately. For example, Cohen and Bradford suggest ways to disagree with the boss without appearing to be insubordinate.

Because this book is written for a very general audience, some statisticians may find it difficult to relate to the specific situations in this book. Almost a full chapter, for example, is devoted to Anne Austin's attempts to get Cosmarket Corporation to market a shampoo product with a wheat germ additive. I had no problems finding valuable lessons in this chapter, but readers who are less willing to extrapolate from such examples may prefer books targeted more to our discipline, such as Boen and Zahn (1982).

We can't be good statistical consultants if we aren't influential. Very rarely are we in a position, however, to compel others to do our bidding. I have repeatedly turned to the advice of Cohen and Bradford when I find myself in situations where I need influence without authority.

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A Course in Biostatistical Consulting

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Introduction

Consultation with clients is one activity of professional statisticians which is least addressed by formal statistical education. A course in statistical consulting provides students of statistics with an invaluable tool for dealing with the realities of statistical consulting practice. A thorough discussion of the topic is provided by McCulloch et al. (1985). Good references are Boen and Zahn (1982), Zahn and Isenberg (1983), and Stinnett (1990, 1991, 1993). In this article we describe a course in biostatistical consulting which is a result of a seven-year long effort to provide such education to our graduate students.

Background

The School of Public Health at the University of Illinois at Chicago was established in 1971, with six programs, two of which were Epidemiology and Biostatistics. The Master of Science degree program was established in 1972 and The Doctor of Public Health and Doctor of Philosophy programs were added in 1976. In 1979, Epidemiology and Biostatistics were combined into a joint program. A biostatistics consulting laboratory was established in 1985 to provide research contacts and service to the campus research staff, the university hospital and to medical institutions in the Chicago area. The number of full-time and part-time biostatistics faculty gradually increased from 3 in 1972 to 10 in 1995. The number of graduate students enrolled each year in the MS and PhD program in Biostatistics rose from 1 in 1971 to 12 in 1995.

The course in biostatistical consulting was established in 1989 to provide additional skills to the culturally and educationally diverse student body. In particular it was noted that students lacked communication and writing skills. The course has been taught in the fall semester as an elective. In the period 1989-1995, the student enrollment has been, respectively, by year: 4, 4, 8, 5, 6, 9 and 11.

Course Description

Here we summarize the general format and content of our course in biostatistical consulting. Prerequisites for the course are a completed first year of courses in our Master's program (this includes a 4-credit course in linear regression) or consent of the instructor. This 15-week, 2 hours per week course is taught by one instructor and consists of three parts, the length of which may vary. The hours presented below reflect our class in the Fall of 1995.

Part 1: Lectures (12 hours)

Lectures are divided into three parts, covering the following topics.

General topics (2 hours) Statistics and Biostatistics; statistics and communication skills; simplicity and sophistication; language of science and language of newspaper and TV reporting; statistics and society; statistics and social responsibility; monetary reward and authorship.

Statistical topics (6 hours) Common problems in statistical consulting; grant writing; null and the alternative hypotheses; power and sample size; type I and type II errors; p-values and confidence intervals; credibility intervals; precision; visual display of information.

Sample size calculations (4 hours) On the spot sample size calculations with pocket

calculator; sample size calculations using statistical software; visual presentation of power and sample size; explaining the power and sample size calculations to non-statisticians.

Part 2: Joint Project (3 hours)

Joint project preparation and assignment (1 hour)

A data set is provided and students are divided into two teams. Somewhat vague questions of interest are provided by the instructor. Such questions may be: Are the two methods for measuring blood flow equivalent? Is one drug better than the other? One team of students is instructed to argue in favor and the other team against a particular claim. All assignments, including designation of group leaders, are made by the instructor. Team leaders schedule regular meetings with the course instructor to inform him or her on the progress of the project. Students are allowed to solicit help from anyone.

Joint project presentation and discussion (2 hours) Using the overhead projector, the two student teams present their analyses. Team leaders are expected to provide introductory or concluding remarks. In addition to the course instructor, other biostatistics faculty are invited to judge the outcome of the presentation. In the end, the faculty confers and declares a victory for one of the teams, or a draw. Each team is expected to provide a written document presenting their analyses and conclusions.

Part 3: Consultation with clients (15 hours)

A consulting session with a client is required of each student taking the course. Faculty and research staff from the School of Public Health and the University (but not the biostatistics

faculty) are scheduled by the instructor to visit the class and meet with a student who acts as a statistical consultant during the session. The client and the consultant sit at a desk in the middle of the classroom, while other students are positioned at surrounding desks. The consulting session lasts 40-50 minutes, after which (in round table fashion) each student provides comments regarding what he or she observed during the session. Final comments are provided by the student-consultant, client and the course instructor. The visiting client is advised to ask two questions, one regarding the sample size or power calculations, while the second may be on any statistical or epidemiological matter. In general, the second question is open ended and the student-consultant is not expected to be able to answer it in full. During the session, the student has to fill out a consulting form. Instructions given to the visitor and to the student-consultant are provided in the Appendix.

Discussion

The course described above seems to us to be a condensed and simplified version of a more extensive, two-course sequence described by McCulloch et al. (1985). Our MS program differs from the one described in their article in that it is only three (and not four) semesters long. The seven-year experience with this course yielded additional insights listed below.

Student participation

We have found that the class works best when students establish a free-flowing interaction with the instructor and among themselves. This usually does not take more than two to three two-hour sessions. During the initial sessions, the instructor calls out students by their names asking them to provide comments on the topic under consideration. Foreign students (usually two-thirds of the class) seem to benefit the most from such initial encouragement to participate.

Reading materials

The first few times we taught the course, we attempted to follow the excellent text by Boen and Zahn (1982). Although the book is outstanding in covering a wide range of topics and situations which may arise in statistical consulting, the experience proved to be somewhat overly scholarly, both for the students and for instructors. Thus, we dropped the book from official use, provided the class with a copy, and referred to it as relevant topics arose in the classroom.

Homework

The only real homework assigned in this class is the joint project, which we try to assign early in the semester. Student presentation of the joint project is scheduled early in the second part of the semester. Occasionally we assign some additional readings, such as newspaper articles or sections from Boen and Zahn (1982), usually during the first half of the course. It has been our experience that student motivation to invest out-of-class time toward additional reading assignments in this class drops exponentially as the end of the semester nears.

Grading

We assign letter grades, which are based on a) class participation and attendance, b) joint project presentation and (to some extent) c) student performance in the consulting session. Although the pass/fail grading system is probably equally appropriate for this class, we believe that letter grades provide some additional motivation for class attendance and participation and for joint project contribution and presentation.

Sample size calculations

Sample size calculations proved to be an excellent ground on which to build students' understanding of the complexities of statistical

consulting. In particular, it has been our experience, with all relevant formulas provided, that an in-class calculation of sample size for a two-sample problem (limited to 10 minutes of class time) will yield almost as many sample sizes as there are students in the class. We like to "get a lot of mileage" out of this situation. After initially being somewhat humiliated by the experience, students tend to open up considerably to both the in-class discussion and to the notion that a good mathematical background does not guarantee an appropriate choice or use of a formula.

Video equipment

In the first several years of teaching the course, we videotaped the sessions of consultations with clients. Although videotaping proved to be useful and interesting to students, we do not get the impression that it is essential. Especially when the number of students in the class rose beyond 4 or 5, the recording and study of videotapes, as Stinnett (1993, p.151) pointed out, took an enormous amount of time. We have a sense that a similar effect can be obtained through observing several consulting sessions and engaging in subsequent class discussions.

Good and bad clients

Discussion about bad and good clients is kept to a minimum in our class. Over the years we have noted a tendency among students to complain about bad clients and we have not found such discussions very productive. Instead, we repeatedly point out that it is a consultant's responsibility to find a resolution to any problems that may arise in a session, and, in extreme cases, to report problems to the consulting supervisor.

Clients

All of the clients participating in our class are actual researchers employed by the School of Public Health at the University of Illinois at

Chicago. Thus all of the questions asked during consulting sessions are real. The guidelines are provided by the course instructor in a letter sent to the clients prior to their visit (see Appendix) to possibly filter out some problems which might arise during the consulting session. However, the wide range of topics and research fields that the students become exposed to seems to be worth the trade-off.

Client response

The response of faculty and research staff that have participated in the class has been outstanding. Without exception, the visiting clients report that they enjoy the class, and most report learning much about interacting with statisticians. Thus, we find that the format of the class is beneficial to the staff of our institution as well.

Conclusion

We believe that the class described in this report provides our students with additional confidence as they face their statistical careers. Although we do not have a study to confirm this, anecdotal information based on student course evaluations, graduation exit interviews, level of participation in the class, and employment success rate of our graduates, overwhelmingly suggest that the class is very useful. In particular, the class seems to be most beneficial to foreign students.

Appendix

Letter Sent to all Clients Participating in the Consulting Class

Dear Dr. Smith:
Thank you for accepting my invitation to participate as a guest client in the Biostatistical Consulting class. Please let me remind you of the purpose of your visit and the role I would like you to play. The purpose of your visit is to provide one of the (presently eleven) students with a client, i.e. a person who comes to a biostatistical consulting unit to ask for statistical help and advice.

You should try to come up with two questions of statistical nature from your research field, and after consulting with myself, present them to your consultant upon arrival at the classroom. The first question should be rather simple and I encourage you to have it refer to a sample size or a power calculation. The second question should be rather broad and refer to a methodological or design issue.

After entering the classroom, I will greet you and introduce you to your statistical consultant. The two of you will sit at the desk in the center of the classroom. The rest of us will sit at the surrounding desks, observe and take notes pertaining to the session. You should plan to spend about an hour and a half with us; the consulting session itself should last about 40-50 minutes, and the rest of the time will be devoted to discussion. Each student will provide a comment, after which we will solicit comments from you and your consultant. In the end I usually provide some of my own views and close the session. The entire process is usually very entertaining and illuminating.

We thank you for providing help in this for us very important matter.

Sincerely yours,

Drs. Jovanovic and Ramakrishnan.

Handout Given to Students: An Outline of a Consulting Session

1. Introduction: "Hello, my name is . . .," "Please have a seat," etc.
2. "I need to ask you a few simple questions before we get to statistics" (fill out as many items as you can in the consulting form).
3. Listen to client's description of the problem. If client's statements are brief, review them in your own words and ask further questions. If the client's description is longer than what you feel comfortable with, interrupt the client politely: "May I interrupt? I need to clarify something." (Take notes if you need to.)
4. When you feel you have understood the question of interest, review it briefly in your own words and ask "Is this the question you would like answered?" If the answer is "yes," proceed to the next step. If not, ask more questions.
5. Make an attempt to deal with one topic at a time; try to provide a resolution to the most simple question asked.

6. Keep an eye on the watch. A consulting session in this class should last no longer than 40-50 minutes.
7. If a further meeting is needed, schedule it. Make sure it is clearly understood who is going to get in touch with whom, and when.
8. Use the last few minutes to tell the client what you are going to do next: "I will look at the data more carefully." "I will ask my colleagues about this." etc.
9. Thank the client for using your services.

The Consulting Form

1. Your name.
2. Date and time.
3. Client's name.
4. Client's address, telephone number, fax number, email.
5. "How did you learn about our consulting unit?"
6. Name of the project.
7. Is any funding available for this project? If it is, what is the funding agency?
8. Proceed with the consulting session.
9. Next meeting scheduled? (End the session here).
10. Additional comments (after the session).

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Notes from the Editor

Please note that the external home page for Lilly can be found at <http://www.lilly.com>. The article by R. N. Tamura and R. P. Rathmacher in Volume 13, No. 3, of *The Statistical Consultant* had erroneously listed the home-page as <http://elvis.d50.lilly.com>.

Your input please:

- Let me reiterate my invitation to you to submit a review of a book or video

that you think would be of interest to our readers.

Are you familiar with Stephen Covey's "Seven Habits of Highly Effective People"? Are you a better consultant because of it? Have you read Ed Bliss's book: "Getting Things Done"? Did it help?

- It can be helpful to a consulting statis-

tician to have a colleague down the hallway who you can discuss ideas with — a consultant's consultant, as it were. Some of us do not have that luxury, however. If you are the only statistician in a company or department, or if there are only two or three of you, I'd like to hear from you. What are your particular challenges? How do you address those challenges? What are the rewards and ben-

efits of a position like yours?

As always, you can reach me via e-mail at:
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