The Use of Video Feedback in Training Statistical Consultants

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1. Introduction

As statistical consultants we often end a consulting session feeling that we have done a reasonable job, and that although improvements are possible there have been no major hitches. We may feel twinges of disquiet about one or two points in the session, but then those sorts of problems come with the territory. Given the conditions under which we operate, a perfect job is not possible.

Most of us, if asked, would include the following as basic objectives of a consulting session:

(i) the consultant understands the client's problem;
(ii) the consultant provides a solution to the problem;
(iii) the client understands this solution and can implement it.

In practice, we conduct a consulting session by addressing three major tasks in sequence:

(1) Identify the problem.
(2) Find statistical tools which are suitable for tackling the problem at a level of statistical expertise relevant to the client.
(3) Explain to the client how to use these tools in solving the problem.

Notice the gap between intention and practice. "Identify the problem" versus "*understand* the *client's* problem". "Explain to the client" versus "ensure that the client has *understood*"! Students (and teachers) of statistics have a tendency to see the main task as "solving THE problem" (task (2)). Those of us who teach statistical consulting also put effort into (1) and (3). It is evident to us and to others (Zahn, 1988; Boroto and Zahn, 1989) that we have difficulty determining where and why our consulting falls short.

The subject of this paper is an approach to improving consulting which helps to close the gap between what we would like to do as consultants and what we actually end up doing, and to improve our understanding of what we should be doing. The first author learned many of the techniques and concepts described here from Doug Zahn and Dan Boroto of The Florida State University (see McCulloch et al., 1985). He has been teaching a course (part of the MSc in Statistical Consulting offered at Queen's University) based on these principles for five years.

2. An approach to improving statistical consulting

To improve our consulting we require several ingredients: a target, criteria for distinguishing good consulting from poor, data on our consulting performance, a way of analysing the data, and a scheme for using the information from the data to effect a change for the better in our consulting. The approach that we advocate entails iterating the following steps, each time refining both performance and philosophy of consulting:

(i) Write down a philosophy of consulting.
(ii) Collect data on one's consulting and analyse it.
(iii) Apply the results of the data analysis to improving one's consulting.

The necessary data might be collected by the consultant in real time during the session, but this is a formidable task, especially for an inexperienced consultant who is preoccupied with a multitude of other issues. Our experience in studying many consulting sessions over the past five years has taught us that those aspects of our consulting which need the greatest attention in making improvements are invariably those which escape our notice in the heat of the session.

Better ways of collecting information about our performance as consultants are: filling out a checklist at the end of the session, having the client fill out an evaluation form, asking a third person to observe the session, recording the session on audiotape, and recording the session on videotape. These are arranged roughly in order of increasing accuracy of information, and all have their merits. We have found the last mode most useful by far, and will focus on it for the rest of the paper. The mechanics of video-taping consulting sessions no longer pose serious barriers, given the current state of home video equipment; the greatest impediment is our reluctance to see ourselves on tape and thus discover what others already know.

3. Analysing the data from a videotape

The amount of information in a long videotape is overwhelming; summarising the whole tape results in superficialities. We need to find short, appropriate segments. In teaching statistical consulting, we have found it useful to choose a beginning and an ending segment to give background and outcome information, and a short (one to three minute) segment exhibiting a "breakdown" for review by a coach or teacher. Students are requested to locate these segments by reviewing the whole tape with a companion, re-examining short crucial segments as needed. There is a "Narcissus effect" which

induces a preoccupation with one's image on the tape and diverts attention from important details. Presence of a companion, someone sympathetic to the endeavour who will enter into dialogue about what is going on, seems to restore a more objective interest.

Clues to the identification of breakdowns are instances of something going wrong, a gap between intention and action, a breakdown in communication, however transient. Breakdowns often occur where there is lack of clarity or completeness in the information being communicated, where accuracy is questionable, where there is uncertainty about why the client is there or about what is the purpose of any part of the session, or where the issue of implementing the consultant's suggestions has not been addressed. A careful analysis of any tape will reveal plenty of trouble spots. One segment is enough to work on at any one time provided it contains a part of the session which adversely affects the outcome in a non-trivial way. Identifying the most serious breakdown, in the spirit of a Pareto analysis, may be helpful. Our experience indicates that if the consulting process was disrupted, then something important of which the consultant was unaware is likely to have occurred, and working with such a breakdown will yield valuable results.

4. A sample segment of videotape showing a breakdown

We illustrate the notion of "breakdown" by presenting a transcribed segment of videotape.

The client is a fourth-year undergraduate in computing science who has taken one course in statistics. His project involves duplicating some SPSS code for a biochemist in the form of a Pascal program. He is concerned to find the formulae he can use. The discussion involves manipulation of the numbers printed on the SPSS output.

A TRANSCRIPT OF A TAPE SEGMENT WITH A BREAKDOWN

M P Griffin: [writing on a notepad] You divide through the square root of this down here. OK?

Client: OK.

MPG: Square root of AA if you like. Then you do this by the square root of BB and so on all the way down. That's only half of what you do.

Clt: [gives a hollow laugh] OK.

MPG: Then the other thing is you have to divide, this way, by the square root of this guy. So this guy gets divided by two square roots. The formula is, the sum of the two x-y terms you just calculated ...

Clt: [bends over to retrieve a piece of paper from his satchel] I'll get a piece of paper.

MPG: [continued on, as if ignoring this] divided by the square root of s x squared times s y squared. Well maybe I should say AB here, AB.

Clt: [heaves a deep sigh] OK.

MPG: I'm going to give this to you, so you don't need to copy it down and be anxious about it.

Clt: I just figured I would lay them out, 'cause this one's starting up

there, and I might get confused.

MPG: Yes, sure, so you can copy it down if you like. I'll try to lay it out for you a little better than that [goes on writing and explaining].

(Note that the visual cues gleaned from the videotape supplement the verbal part of the transcript. This is a concrete demonstration of the superiority of videotape over audiotape for these purposes.)

In this segment the consultant (a professor, the second author) seems to be unaware that the client (a student) is having great difficulty keeping track of all he is being told. The failure in communication is even more evident in the body language on the tape. The effect of the breakdown was apparent at the end of the session for, although the client stated that he had no further questions, once the video camera was turned off the discussion continued for another fifteen minutes regarding just how to do the calculations.

5. Coaching session based on a breakdown

At the heart of this approach is the "breakdown analysis". The trainee consultant is aided by a coach. Attention centres on a specific point on the tape where a breakdown occurred and the identification of what the breakdown was. Together the consultant and the coach try to reconstruct the underlying motivations, attitudes, thought processes, and levels of awareness in the mind of the consultant which led to the breakdown.

This March a class in the consulting course was videotaped. The course instructor (the first author) was coaching one of the students in the course who had taped a consulting session with a client from Queen's University's STATLAB, the university statistical consulting service; the other students in the course made occasional comments. The following transcript from the class tape illustrates the coaching process.

A TRANSCRIPT OF EXCERPTS FROM A COACHING SESSION

J T Smith: State what the breakdown is.

Trainee Consultant: When I went in I had already talked to her on the phone, so I had an idea of what she wanted to do: graphing and plots. ... She said that she really needed a spreadsheet program. [I thought] "That's not what you're here to talk to me about, you're here to talk to me about plots, graphs." ... Before she could do the graphs she needed a spreadsheet program.

[At this point the segment of the consulting tape containing the breakdown was viewed.]

JTS: What were you working on at that particular moment [of the breakdown]?

TrC: In my head?

JTS: Uh-huh.

TrC: The problem of what she would graph in this data. Like what

variables she was going to plot, not how she was going to do it, but what variables she was going to plot. ... I was thinking about the problems she was going to have in getting from data on paper to plots. The statistics, she kept saying things about statistics, and I was unclear as to what she wanted; whether she thought graphs were statistics, or whether she actually wanted something more than that. ...

JTS: Were you aware at that point, while it was happening, that she had something quite specific on her mind?

TrC: No, no. Not that I can answer it. No.

JTS: So what were you hearing from her?

TrC: At that point while she was talking about the program? ... In my head I thought she had come to talk to me about graphics. ...

JTS: Well that's interesting, that she was saying some things and they were flowing right past you at that point. Can you -- do you have any idea as to why this was going on?

TrC: 'Cause that wasn't statistics. ... What she was asking about was not a statistical problem, it was a technical problem, and wasn't what she had come to see me about.

JTS: So it was a question of need, or what she wanted right at that moment.

TrC: Yes. I didn't pay any attention to that at all. ...

JTS: How might you have heightened your awareness to that need? ... How then can one tune in to the latest needs, right at the moment? I think that's the challenge. I guess the first thing is awareness that that can happen. I think you have that awareness.

TrC: ... I didn't at the time.

JTS: Well fair enough, at the time, but now you have had a chance to look at the tape and see it in action. Have you any ideas of how you can heighten the awareness of the need at the time? ...

TrC: It's hard to listen at the same time though. At one point you have been given the problem and you are trying to think it out on the spot, and you are supposed to be listening to what she is saying while you are trying to think it out, and so, you know ...

JTS: That's for sure, no question. So?

TrC: I should have been listening carefully. ... Whatever she came up with at the time, that's her problem; and I shouldn't have had the idea that she couldn't ask me about the spreadsheet for example. ... She should have been able to ask about anything. ...

JTS: So does this say anything to you about your own philosophy of consulting? Would you change anything you wrote down at the beginning of the year?

TrC: I would just read it again. ...

JTS: Good!

TrC: Not good really.

JTS: Good that you saw what you saw and were able to understand what was going on.

The trainee consultant found it difficult to say exactly what was the breakdown. Succinctly stated, the breakdown was failing to address the client's concern about getting her data into a spreadsheet program. As the coaching session progressed, it became apparent that the breakdown resulted from a conflicting commitment in the consultant: being more committed to solving a manageable problem than to addressing the client's problem. At the heart of coaching is helping people to become aware of conflicting commitments. By studying the videotape and reflecting back on the experience, the trainee consultant came to an awareness of the choice she faced between comfort and effective consulting. She was thus able to sharpen her resolve to choose in future on the side of good consulting, either following her previously avowed philosophy of consulting or discovering the need to redefine it.

The analysis is aided if the trainee consultant is able to "relive" the experience shown on tape and bring to consciousness happenings that were contributing to the breakdown but were not in the foreground of awareness at the time. To help with this the coach may use a roleplay of the situation or may solicit insights from other students in the group. A successful breakdown analysis results in the conscious realisation of some aspect of consulting behaviour that had until this point remained unconscious. An acceptance of this new awareness as useful and a determination to use it fosters a recommitment to previously avowed standards of consulting.

6. Common reasons for breakdowns

Over a period of time, users of this method develop an awareness of what it is that facilitates effective consulting, and, more importantly, what it is about their own consulting that subverts the process. As a coach, one accumulates a list of commonly recurring assumptions, beliefs, and attitudes: points of view not realised by consultants, agendas that are hidden, unconscious, and unacknowledged and that can be recognised again and again in one form or another as being at the heart of the breakdowns that consultants experience. The following list is suggestive of the most prevalent cases.

(i) I must appear to be an expert: I must be able to answer any question that comes up, without delay; consequently, it is better to give an incorrect answer, or shoehorn the problem into a badly-fitting technique, than to admit I need more time or outside help.

(ii) I must spend the time giving a comprehensive lecture on how the principles of statistics apply to the problem at hand.

(iii) I must sidetrack the consultation so that I can reach the end without admitting that I don't know the answer.

(iv) I cannot be satisfied with the first solution but must offer the client a large number of ways of attacking the problem presented.

(v) I am the guardian of statistical methodology: the model for analysis must be faithful to all the aspects of the problem. A client who brings in such a problem must be made to face this.

(vi) A client who is inadequately prepared to understand the concepts which I think are needed to solve this problem should go away and take more statistics courses, or at the very least must take what I dish out.

(vii) The "real" problem is the statistical or mathematical abstraction that I devise to suit the situation rather than what is on the client's mind.

(viii) I must be shown some respect: the client must satisfy certain reasonable social norms to be worthy of my full attention, e.g. arrive on time, be reasonably dressed, not smoke, not chew gum, etc.

(ix) My job is to solve the problem and the client can sit there quietly while I do it. There is no point in explaining why I have suddenly gone silent or what I am trying to work out.

(x) Implementation of my advice is the client's responsibility. I gave it my best shot, and I can't help it if the client can't do what I recommended.

(xi) It is not my job to dig out of the client what is wanted and needed. He (she) said it all in twenty-five words or less at the beginning of the session and I need all the time I've got to explain my solution.

Generally, in our experience, we have not been aware of these agendas until they have been recorded on videotape and have been brought to light with the help of a coach. We have found that the presence of one of these attitudes inevitably leads to a breakdown which diminishes the outcome of the session.

7. Discussion

The traditional statistical consulting course spends time on statistical methodology, data analysis projects, and apprenticeship consulting where the student sits in on consulting sessions conducted by the professor and may or may not contribute to the session. Little time is spent on coaching. The approach we present replaces the apprenticeship model. It is based on the principle that consulting is a craft that must be practiced, that consulting involves handling the entire session from start to finish, and that carefully devised feedback in conjunction with repeated efforts to modify areas of difficulty provide an appropriate and effective way to improve performance. Our approach uses a videotape record of the session, analysed with the help of a coach, as an effective feedback mechanism.

In a consulting course, access to genuine clients is valuable when possible; in our situation, such access is limited. As an alternative, we have found that practice sessions provide rich opportunities for improvement using this technique. In practice sessions, one student is assigned to be the client, another student, the consultant. Like all simulations, practice sessions do not mirror all aspects of reality, but nevertheless present enough of the essential elements of real situations to alow refinement of skills, deepened understanding of the consulting process, and accumulation of valuable experience.

The use of a "target", a personal philosophy of consulting written down at the outset, is necessary for the ongoing assessment of consulting effectiveness. The focus, therefore, is constantly on principles of good consulting and cultivating an awareness of discrepancies between one's philosophy and one's practice. The information collected on continuing performance reflects back on the philosophy and deepens understanding of the consulting process.

A by-product of using this method in a group setting (in a consulting course) is that students also learn to become coaches. In doing so they acquire a tool that they can use to improve their own and others' consulting throughout their careers.

Although no formal evaluation of our degree programme has yet been carried out, reports have been positive from students who have been interviewed for jobs involving consulting and who have found themselves in work situations requiring the giving of statistical advice. They tell us that employers are happy with their level of consulting skills.

We have presented this approach in the spirit in which it was given to us: with the hope that someone would find in it the answers to a lot of questions about systematically evaluating and improving statistical consulting, whether for purposes of applying it to one's own consulting practice or designing a course for the instruction of others. We invite you to contact us if you wish to discuss any of these issues further, and to contact Doug Zahn who has offered to distribute, at cost of materials, copies of the three videotapes listed in the References.

Acknowledgements

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Videotapes available at cost by writing to D A Zahn, Department of Statistics, The Florida State University, Tallahassee, Florida 32306, USA.

(a) D A Zahn - The Statistical Consulting Course at Florida State University.

(b) J T Smith and D A Zahn - Increasing the Effectiveness of Statistical Consultants : A Live Demonstration. 1987 ASA Annual Meeting.

(c) D R Boroto and D A Zahn - How Statisticians Can Be Valued and Utilized : The Problem of Assessing What Consumers Want and Need. 1990 ASA Winter Conference.