Asking Good Questions

STAT8801
Statistical Consulting

School of Statistics
University of Minnesota

February 14, 2011

Introduction

So you've welcomed the client and made them feel comfortable. Now on to the heart of the consultation.

- What information do we need?
- How do we ask questions to get this information?

This lecture follows Chapter 5 of Derr (2000) and section 2.1 of Cabrera and McDougall.

Why is it important to ask good questions?

Better a poor answer to the right question than a good answer to the wrong question.

John Tukey

Type III error: Providing the right answer to the wrong question.
A. W. Kimball

Type III errors are a constant risk — we must know the right question!

It is very easy to answer the wrong question.
We need to work hard with clients to avoid it.

What information do we need?

What information do we need?

Watch the good Dr. Derr (video 4a). What questions does she ask?

Think of five specific questions you might ask a client. Then share with those near you and write down five more from your conversation.

Field of Study

We need some background about the field of study:

- What field?
- New situation or old?
- Relevant methods and/or literature?
- What are standard methods (if any)?
- What are common problems?
- Background reading?

Background helps avoid type III error. Ask if you don't understand.

Client Background

How well does the client understand the project?

How much statistical knowledge does the client have?

Will we need to educate the client?

What level of statistical sophistication is appropriate for this client?

Do we need to help the client formalize the problem?

Learn about the project

What's the project status? (from Chatfield, 1995)

1. Project formulation and planning.
2. Data collection.
3. Data coding, entry, quality control.
4. Data exploration.
5. Model building and inference.
6. Comparison with prior work.
7. Reporting results.

More generally, planning or analysis stage.

Planning stage

Wow, you're lucky!

- Goals and objectives
- Resource constraints
- Best way to collect data
- Sample size
- Plan for analysis

Details will depend on the kind of project.

What kind of project?

Designed experiment — help with

- Units
- Treatments
- Responses
- Randomization
- Design
- Power

What kind of project?

Sample survey — help with

- Target populations
- Variables
- Sampling design
- Sample size
- Sources of bias
- Sampling instrument
- Training
- Coding

What kind of project?

Observational study — help with

- Data sources
- Linkages
- Data quality
- Sources of bias

Analysis stage

More common. You'll need to determine

- Goals and objectives
- How data were collected
- Limitations of data
- Was design followed
- Can goals be addressed
- Plan for analysis
- Triage/damage control
- Postmortem

Ask ...

... the statistician, if [s]he is really to assist the scientist, must perform a necessary, but irritatingly annoying task: he must ask the scientist impertinent questions. Indeed, the questions, if bluntly asked, may appear to be not only impertinent but almost indecently prying — because they deal with the foundations of the scientist's thinking. By these questions, unsuspected weaknesses in the foundations may be brought to light, and the exposure of weaknesses in one's thinking is a rather unpleasant occurance.

W. Lurie (1958)

... politely

The statistician will, then if [s]he is wise in the ways of human beings as well as learned in statistics, ask these questions diplomatically, or even not ask them as questions at all. He may well guide the discussion with the scientist in such a way that the answers to the questions will be forthcoming without the questions having been even explicitly asked.

W. Lurie (1958)

It is a consultation, not an interrogation.

How to ask questions?

Watch "evil" Dr. Derr. (video 2a)

- What kinds of questions did she ask?
- Why couldn't she get the information she needed?
- What did the good Dr. Derr do instead, that worked?

Leading Questions

The "desired" answer is implied in the question.

I assume that you got informed consent?

Were you able to get a random sample from this population?

You often get the desired answer, regardless of the correct answer, so these should be avoided.

Closed Probe Questions

Closed probe questions ask for specific information, usually with a Yes or No answer.

Often begin with 'Can,' 'Did,' 'Will,' 'Are,' 'Do,' etc.

- Did you interview every person on the list?
- Did you randomize treatments to units?
- Are there any missing data?

Closed Probe Questions

Use them for obtaining very specific information, but

- They must be clearly worded.
- They must be free from jargon.
- They can seem very intimidating.
- Their answers have a narrow scope.

Forced Choice Questions

This is a multiple choice question.

- Are you able to change the order in which different animals receive the treatments, or must the order be the same for each animal?
- Is this going to be a mail-in survey or a telephone survey?

Use them for obtaining very specific information, but

- They must be clearly worded.
- They must be free from jargon.
- They must include all possible responses.

Leaving out options may seem to imply that only those included are acceptable.

Open Probes

Open probes solicit general information.

Can be

- Focused: "I'd like to hear more about the responses you plan to measure."
- Broad: "What factors are likely to affect the response?"
- Transitional: "Is there anything more that we should cover concerning the layout of the soil samples before we go on to discuss the variables you plan to measure?"

Open probes get long responses, closed probes get short responses.

Concrete Paraphrase

Make sure you understand the technical details. Restate factual information and get an OK.

Often contain "Let me make sure that I understand" or "Do I have this correctly?"

- So you will be targeting all students on this campus, and mailing out this survey to a random sample of them?
- So the masers could get their energy either from radiation or from shockwaves, is that correct?

All together now

You need all types of questions (except perhaps leading questions) to get the job done.

I like to go from general to specific when consulting, so ...

I use open probes to introduce a topic, closed probes to get specifics, and paraphrasing to summarize.

Start with open and move to specific, but give client the chance to give more information.

However, there is no one true way to have a consulting meeting.

Process

Statistical consulting usually looks like:

1. Client's problem
2. Statistical framework
3. Statistical solution
4. Client's solution

This is usually an interative process, so we may go back to 1 and repeat a few times.

Summary

- We want to answer the client's questions.
- To do this, we must ask the right questions.
- We need to get sufficient information without intimidating or insulting the client.
- Questions needed will depend on stage of the project, technical skill of the client, needs of the client, and other factors.