

hand or with a hand calculator. On the rogue plot, nine of the samples had zero infection. There was clearly no need for a calculator: the field worker had simply recorded the single non-zero value as the average value. Once this was corrected, the rogue point jumped magically onto the straight line and the relationship between y and x was evident. Subsequent sophistications in the "statistical" analysis seemed to me somewhat less important than the IDA phase, as regards the aim of finding out from the raw data the answer to the plant pathologists' question.

(e) I never trust any published formula, no matter how eminent the author. Here is another problem with the publication policies of statistical

journals. Several editors take the view that proofs are only for mathematicians, and so they decree that results may be published but their proofs should not be. Without the proofs, how can we check the results? Moreover, as Chatfield notes in Example 7(c), proofs do tend to go hand in hand with clearly defined notation and clearly stated assumptions, both of which are too often dismissed from statistical journals as being no use to practical people.

(f) Knowing whom to ask for help and advice can be more of an asset than knowing all the techniques. A corollary is: don't be afraid to show that you have made a mistake or do not know what to do.

Comment

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It is a pleasure for us to have the opportunity to comment on this timely article. As Dr. Chatfield properly points out, there are many facets of a successful statistical investigation that are not taught in most books or in most courses. Although a solid grounding in statistical methods and theory is necessary for success in solving real-world problems, it is not sufficient. An understanding of the potential pitfalls and strategies for avoiding them is a clear requirement for achieving this success.

Chatfield provides suggestions on a wide range of topics related to statistical consulting and provides a very useful bibliography. In addition to those references cited by Dr. Chatfield, we would add the volume of Boen and Zahn (1982). We find ourselves in strong agreement with virtually all of Chatfield's suggestions. We would like to point out some additional areas where our experience has shown the need for particular attention.

1. INTERACTING WITH THE INVESTIGATOR

It should be recognized that the active involvement of the investigator is essential in a successful statistical investigation. Too often the view is taken

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that once the statistician gets the data from the investigator, then the "real statistics" begins and the investigator's role is diminished. (This attitude may be reflected in the silence of the delegates in Chatfield's Example 5.) A critical reason for investigator involvement is that he/she holds the key to much information that is essential to the conduct of the analysis and that *cannot* be determined solely by looking at the data. We address two aspects of this involvement.

(a) As articulated by Chatfield, a clear statement of the objective of an investigation is necessary in order to carry out a useful statistical analysis. However, it is our experience that obtaining a clear statement is often quite difficult. If you ask the investigator early in a consulting session, "What are your objectives in this study?", you can receive a variety of responses, many of which are only of marginal use. Sometimes the investigator will attempt to abstract a statistical problem, as he/she perceives it, in order to get "right to the matter quickly." On other occasions, you will be given a superficial description of the problem to "spare you all the experimental details." In still other situations, the investigator has not thought that far. It is our experience that it is often ineffective to ask the investigator for a statement of the objective at the very beginning of a consulting session.

We find it useful to pursue two major lines of questioning early in our meetings. One line is to find out about the background of the project. We try to ask questions like, "What do you anticipate to learn from this study?", "How will you use the