August 2002: Any Basic Statistical Computing Package Will Do (Rule 8.8)

Rules of the month are numbered in accordance with the numbering in the book. Thus, Rule 1.1 refers to the first rule in Chapter 1. And so on. These comments do not repeat the material in the book but highlight and amplify it. A rule is stated—as found in the book—and then discussed.

Statement of Rule 8.8

"Any basic statistical package will do, any text book will do."

Further Comments on Statistical Packages

Statistical packages have hit the media in recent months. A reporter for *Science* wrote a report with the title: "Software glitch threw off mortality estimates (Kaiser, 2002). A review of the SAS product JMP in *The American Statistician* generated editorial responses, a letter to the editor, and a web-based discussion: see Altman (2002) below and associated references.

The *Science* report dealt with the analysis of data linking mortality to air pollution, a mammoth project by Samet and colleagues at Johns Hopkins and Harvard (Samet et al., 2000). The analyses linked daily mortality, weather variables, and daily pollution levels at EPA monitoring stations across the United States; about 1 gigabyte of data. The effects looked for were relatively small. The statistical package used for the mortality estimates was S+. The authors used default convergence criteria that turned out to be insufficiently stringent so that local maxima were obtained rather than global maxima. With the more stringent convergence criteria the estimated effects of pollution were halved—but still significant.

The report in the *American Statistician* dealt with a straightforward analysis of the package JMP produced by SAS and found that JMP was "not an accurate tool for nonlinear modeling or simulation." SAS representatives argued that given the extreme examples used by the author he should have changed the convergence criteria that are usually set as a compromise between speed and accuracy. The section editor reran some of the problem-giving data sets with more stringent convergence criteria (on a newer version of SAS) and found that most of the pathological performances disappeared.

What does all this say about Rule 8.8? I think the rule is still reasonable. However, I might have made a more nuanced statement by prefacing the rule with the catchall qualifier: "Ordinarily." So a revised Rule 8.8 would say,

"Ordinarily, any basic statistical package will do, any text book will do."

Kaiser interviewed me for the *Science* report and accurately reflected our discussion when she wrote:
"99% of people are going to be working on problems for which the default settings are appropriate. But when their problem is unusual…they might need to take a look inside the box of their statistical package."

References

Altman, M. (2002). A review of JMP 4.03 with special attention to its numerical accuracy. *The American Statistician*, **56:** 72-75. With editorial response in **56:** 148 and JMP response in **56:** 160-161.

Kaiser, J. (2002). Software glitch threw off mortality estimates. *Science*, **296:** (June 14) 1945-1947.

Samet, J.M., Zeger, S.L., Dominici, F., Curriero, F., Coursac, I., Dockery, D., Schwartz, J. and Zanobetti, A. (2000). *The National Morbidity, Mortality, and Air Pollution Study (HEI Project No, 96-7): Morbidity and Mortality From Air Pollution in the United States.* Health Effects Institute, Cambridge, MA.

Responses

This section is intended to contain reader comments and perhaps responses from me. It provides a forum for discussion and further reflection.