(b) Can efficiency be increased more by the use of a larger sample size or by exercising additional experimental controls during the conduct of the experiment?
(c) Can efficiency be increased by the measurement of one or more characteristics related to the dependent variable in order to use regression techniques?
(d) Can efficiency be increased more by the use of a complex experimental design that requires considerable time to plan and analyze or by using a simple design but a large number of subjects? If subjects are plentiful and time required to obtain the data is sufficient, a simple design utilizing a large number of subjects may be more efficient than a complex design that involves costly planning and statistical analysis.

It should be apparent that the question "What is the best experimental design to use?" is not easily answered. Statistical as well as nonstatistical factors must be considered. The discussion has emphasized economic factors in the selection of a design because rules can be explicitly stated for increasing the precision and power of an experimental methodology; but, when efficiency is considered, such rules are difficult to formulate.

ROLE OF EXPERIMENTER AND STATISTICIAN

It is the conviction of the author that the selection of the best experimental design for a particular research problem can be most expeditiously accomplished when the roles of experimenter and statistician are performed by the same person. This is essentially the same position taken by Finney (1960, 3), who states, ". . . to write of the 'experimenter' and the 'statistician' as though they are separate persons is often convenient; the one is concerned with undertaking a piece of research comprehensively and accurately yet with reasonable economy of time and materials, the other is to provide technical advice and assistance on quantitative aspects both in planning and in interpretation . . . the statistician can produce good designs only if he understands something of the particular field of research, and the experimenter will receive better help if he knows the general principles of design and statistical analysis. Indeed, the two roles can be combined when an experimenter with a little mathematical knowledge is prepared to learn enough of the theory of design to be able to design his own experiments."

CRITERIA FOR EVALUATING AN EXPERIMENTAL DESIGN

Many different sets of criteria could be given for evaluating an experimental design. The criteria presented by Winer (1962, 47) and Lindquist (1953, 6) are most helpful. The following questions, except for number 5, were selected because they touch on the major points presented in this chapter.