error is very bad and is to be avoided. In the present example, the decision rule is biased in favor of deciding that the population mean is equal to 100 rather than, say, 103. In many research situations, the cost of a type I error may be large relative to the cost of a type II error. For example, to commit a type I error in concluding that a particular medication arrests the production of cancer cells and therefore can be used in place of other medical procedures is a serious matter. On the other hand, falsely deciding that the medication does not arrest the production of cancer cells (type II error) would result in withholding the medication from the public and would probably lead to further research. In such a context, a type II error is less undesirable than a type I error. However, in another context, concluding that an experimental effect is not significant may result in an experimenter discontinuing a promising line of research whereas a type I error would mean further exploration into a *blind alley*. Faced with these two alternatives, many experimenters might prefer to make a type I rather than a type II error. It is apparent from the foregoing discussion that the *loss function* associated with the two errors must be known before a rational choice concerning α can be made. However, experimenters in the behavioral sciences are generally unable to specify the losses associated with the two errors of inference. Therein lies the problem. The problem is resolved by falling back on accepted conventions. The principal benefit of statistical decision theory—that of using decision rules having optimum properties for a given purpose—is seldom enjoyed by experimenters in the behavioral sciences. A general introduction to the meaning of optimal solutions to problems is given by Ackoff, Gupta, and Minas (1962).

It is hoped that the preceding discussion helps to dispel the magic that seems so inextricably tied to the .05 and .01 levels of significance. The use of the .05 or .01 level of significance in hypothesis testing is a convention. When either level is achieved by a test, it signals that an *improbable* event has occurred or that the hypothesis under test has led to a poor prediction. A test of significance provides information concerning the probability of committing an error in rejecting the null hypothesis. It is one bit of information required in making a decision concerning a research hypothesis. A test of significance embodies no information concerning loss-values associated with the decision, the experimenter's prior personal convictions concerning the hypotheses, or the importance or usefulness of the obtained results. Various problems associated with the uncritical use of significance tests in research have been examined in detail by Bakan (1966). Bayesian statistical theory represents an attempt to incorporate prior information into the decision process, information that is not utilized within the classical theories of Neyman-Pearson and Fisher. A rapprochement involving the best features of classical theory, decision theory, and Bayesian theory is to be hoped for. Binder (1964) in a review mentioned one modification of classical theory that incorporates Bayesian theory. A general introduction to Bayesian theory can be found in Edwards, Lindman, and Savage (1963) and additional references in Binder (1964).