leads to a prediction, or anticipated value, and to a hypothetical sampling distribution of anticipated values for a sample statistic. If the sample statistic equals the anticipated value, or falls in a region of the sampling distribution designated as a *probable anticipated value*, a decision is made to accept the null hypothesis. On the other hand, if the sample statistic deviates appreciably from the anticipated value, either a rare and improbable event has occurred or the null hypothesis has led to a poor prediction and should be rejected.

HYPOTHESIS TESTING

Hypothesis testing appears to be a straightforward objective procedure until an attempt is made to define such phrases as "probable anticipated value," "deviates appreciably," and "poor prediction." On what basis does one decide which anticipated values are probable, or when the sample statistic deviates appreciably from the anticipated value, or when a null hypothesis leads to a poor prediction? The answer to these questions in the behavioral sciences is that the experimenter falls back on a set of conventions. A branch of mathematics known as *decision theory* deals with the problem of choosing optimum decision rules. Although hypothesis-testing procedures in the behavioral sciences use many notions from decision theory, the application is incomplete and research is frequently conducted according to rules that are less than optimum for the experimenter's purposes.

STEPS FOLLOWED IN TESTING A HYPOTHESIS

What conventions are currently used in testing a hypothesis? These conventions can be summarized in four steps.

Step 1: State a null hypothesis H_0 and an alternative hypothesis H_1.

Step 2: Decide on an appropriate sample statistic and test statistic. The selection of a test statistic is based on (1) H_0, (2) the chosen sample statistic, and (3) tenable assumptions concerning the population distributions. Assumptions underlying the sampling distributions of χ^2, t, and F test statistics are discussed in Section 2.1.

Step 3: Decide on a level of significance α and a sample size N. α and N, together with the sampling distribution of the test statistic under the null hypothesis, determine the *region for rejecting* H_0.
The *location* and *size* of the region for rejection of the null hypothesis are determined by H_1 and α, respectively. An experimenter attempts to select a level of significance so that the region of rejection contains values of the test statistic that have a low probability of occurrence if H_0 is true but a high probability if H_1 is true.

Step 4: Obtain the sample statistic and compute the test statistic. If the value of the test statistic falls in the region of rejection, H_0 is rejected in favor of H_1. If the test statistic falls outside the region of rejection, the experimenter may either accept H_0 or suspend making a decision concerning it.