Sampling Distribution. A theoretical probability distribution that describes the functional relation between possible values of a statistic based on N cases drawn at random and the probability associated with each value over all possible samples of size N.

Statistical Model. A mathematical statement concerning the sampling distribution of a random variable that is used in evaluating the outcome of an experiment or in predicting the outcome of future replications of an experiment.

Test Statistic. A statistic whose purpose is to provide a test of some statistical hypothesis. Test statistics such as t and F have known sampling distributions that can be employed in determining the probability of an obtained result under the null hypothesis.

Relative Efficiency of a Statistic. Ratio of experimental error of one statistic to that of another statistic.

Statistical Decision Theory. Branch of mathematics concerned with the problem of decision making and the choice of decision rules under uncertain conditions.

1.3 FORMULATION OF PLANS FOR COLLECTION AND ANALYSIS OF DATA

ACCEPTABLE RESEARCH HYPOTHESES

Some questions cannot currently be subjected to experimental investigation. For example, the questions "Can three or more angels sit on the head of a pin?" and "Does life exist in more than one galaxy in the universe?" cannot be answered because no procedures presently exist for observing either angels or other galaxies. Scientists confine their research hypotheses to questions for which procedures can be devised that offer the possibility of arriving at an answer. This does not mean that the question concerning the existence of life on other galaxies can never be investigated. Indeed, with continuing advances in space science it is probable that this question will eventually be answered.

Questions that provide the impetus for experimental research should be statable in the logical form of the general implication. That is, a question should be reducible to the form, *if A, then B.* For example, *if* albino rats are subjected to microwave radiation, *then* their food consumption will decrease. This research hypothesis can be investigated because procedures both for manipulating radiation level and for measuring food consumption of rats are available.

DISTINCTION BETWEEN DEPENDENT AND INDEPENDENT VARIABLES

In the example just cited, the presence or absence of radiation is designated as the *independent variable*—the variable that is under the