tigator. Examples are sex, socioeconomic level, scholastic achievement, IQ, litter membership, strain, and so on. A blocking variable may be of the nominal, ordinal, or interval-ratio type. With ordinal or interval-ratio variables arbitrary groupings (such as high, medium, and low) are used as blocks.

In some experiments the blocking variable is of no interest to the investigator and is used purely for the purpose of error reduction. In other experiments the blocking variable may be of considerable intrinsic interest in itself and may be an integral part of the experiment. In such experiments error reduction may not be a matter of concern. Such experiments are in effect ordinary factorial experiments, where one or more of the variables are classification rather than treatment variables.

Randomized block experiments are on occasion conducted with one observation per cell. To illustrate, let the treatment variable be four different dosages of a drug intended to alleviate depression and let the blocking variable be a score on a depression scale administered prior to the administration of any drug. Let the dependent variable be a measure of motor performance, such as reaction time. If 20 subjects were available, these subjects could be divided into 5 blocks of 4 subjects each. The four subjects with the highest scores on the depression scale would constitute the first block, the next highest subjects the second block, and so on. Within each block subjects are assigned to treatments at random. The result is a 5×4 table of numbers with one observation per cell. Such data are analyzed using the two-way classification analysis with one observation per cell. The total sum of squares is partitioned into treatment, block, and interaction sums of squares. Care must be exercised in the choice of error term in applying the F ratio. Frequently, as in the illustrative example above, the blocking variable may be viewed as a random variable and the treatment variable as a fixed variable; that is, the model is mixed. The proper error term for testing treatment effects is the interaction mean square. No test of the effects due to blocks can be made. In general in randomized block designs investigators must concern themselves with whether the blocking variable may be viewed as fixed or random, and govern themselves accordingly in the choice of the appropriate error term.

19.12 EXPERIMENTS WITH NESTED FACTORS

Consider an experiment which is intended to investigate two different drugs, A and B, in the treatment of depressed patients. The dependent variable is a measure of improvement under the drug. Assume that the patients are under treatment by three different therapists. Such an experiment might be conducted as a 2×3 factorial experiment with six groups of n experimental subjects. All six treatment combinations are present in the experiment. In such a factorial experiment both factors are said to be crossed. In the example above each of the two drugs crosses, as it were,