Factorial designs and notation

Design

A factorial design, then, Is one with more than one factor or Independent variable. A complete factorial design is one in which all levels of each independent variable are paired with all levels of every other independent variable. An incomplete factorial design also has more than one independent variable, but all levels of each variable are not paired with all levels of every other variable. One advantage of using factorial designs Is that they allow us to assess how variables interact.

In the real world, It old be unusual to find that a certain behavior Is produced by only one variable; behavior Is usually contingent on many variables operating together In an interactive way. Designing experiments with more than one independent variable allows researchers to assess how multiple variables may affect behavior. Remember that an independent variable must have at least two levels if it does not vary, It Is not a variable.

Thus, the simplest complete factorial design would be one with two Independent variables, each with two levels. Let's consider an example. Suppose we manipulate two independent variables: word type (concrete versus abstract) and rehearsal type (rote versus imagery). The independent variable Word Type has two levels, abstract and concrete; the independent variable Rehearsal Type also has two levels, rote and imagery. This is known as a 2 x 2 factorial design.

Factorial notation Is a notation that Indicates how many independent variables were used In a study and how many levels were used for each variable. The factorial notation (2 x 2) for a factorial design is determined as follows: [Number of levels of independent variable 1] x Number of levels of

independent variable 2] x [Number of levels of Independent variable 3] Thus, the factorial notation Indicates how many Independent variables were used In the study and how many levels were used for each independent variable.

This is often a point of confusion for students, who frequently think that in the factorial notation 2 x 2, the first number (2) indicates that there are two independent variables and the second number (2) indicates that they each have two levels. This is not how to Interpret factorial notation. Rather, each number In the notation specifies the umber of levels of a single Independent variable.

Thus, a 3 x 6 factorial design Is one with two independent variables: the two numbers in the factorial notation each represent a single independent variable. In a 3 x 6factorial design, one independent variable has three levels, and the other has six levels. Alternatively, in a 2 x 3 x 5 design, there are three independent variables.