

1.4: Common Experimental Designs

Post-Test Only Control Group Design

In this section we look at some common research designs, the notation used to symbolize them, and then consider the internal validity of the designs. We start with the most basic experimental design, the Post-test Control Group Design (Figure 1.4.3). In this design, subjects are randomly assigned to one of two groups with one group receiving the experimental treatment. This type of design is called between-subjects design because different participants/subjects are assigned into different groups. In the figure below, the symbol R means there is a random assignment to the group. X symbolizes exposure to experimental treatment. O is an observation or measurement. There are advantages to this design in that it is relatively inexpensive and eliminates the threats associated with pre-testing. If randomization worked the (unobserved) pre-test measures would be the same so any differences in the observations would be due to the experimental treatment. The problem is that randomization could fail us, especially if the sample size is small.

$$\begin{array}{ccc} R & X & O_1 \\ R & & O_2 \end{array}$$

Figure 1.4.3: Post-test Only (with a Control Group) Experimental Design

Pretest-Posttest Control Group Design

Many experimental groups are small and many researchers are not comfortable relying on randomization without empirical verification that the groups are the same, so another common between-subjects design is the Pre-test, Post-test Control Group Design (Figure 1.4.4). By conducting a pre-test, we can be sure that the groups are identical when the experiment begins. The disadvantages are that adding groups drives the cost up (and/or decreases the size of the groups).

$$\begin{array}{ccccc} R & O_1 & X & O_2 \\ R & O_3 & & O_4 \end{array}$$

Figure 1.4.4: Pre-test, Post-Test (with a Control Group) Experimental Design

This brief discussion illustrates common research designs and the challenges to maximize internal validity. The designs mentioned above involves random assignment. Therefore they are considered strong experimental designs. With these experimental designs, we worry about external validity, but since we have said we seek the ability to make causal statements, the preference is given to research via experimental designs.

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