Sullivan Section 1.5

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Design of Experiments - Terminology

- A participant or subject in an experiment is called an **experimental unit**

- The **treatment** is a condition applied to the experimental unit.

- A **response variable** is a variable of interest in the experiment.

- A **predictor variable** is a factor that has an effect on a response variable.

- A **placebo** is an innocuous treatment that is indistinguishable from the real treatment.

- A **double blind** experiment is one in which neither the researcher nor the subjects know who receives an actual treatment and who receives a placebo.

- The **claim** is a statement of the problem to be solved or question to be answered by the experiment.

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The experimenter then observes the effect of varying the *treatments* on the *response variables*.

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Step 3: Determine the number of experimental units (subjects) required, or sample size.

Steps in Conducting an Experiment (continued)

Step 4: Determine how the levels of predictor variables will be controlled.

There are three methods of accomplishing this:

- 1) Control them so they remain constant throughout the experiment.

- 2) Manipulate them at predetermined levels. In effect, they become part of the treatment.

- 3) Randomize them so their effect "averages out".

Steps in Conducting an Experiment (continued)

Step 5: Collect and process the data. In this step, the experiment is performed or *replicated* on each experimental unit, and the results are recorded.

Step 6: Test the claim. Using **inferential statistics**, the results obtained from the sample are generalized to the entire population, with a statement as to how much confidence we have in that generalization.

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Completely Randomized Design

A **completely randomized design** is one in which the experimental units are randomly assigned to the treatments.

Matched-Pairs Design

A **matched-pairs design** is one in which each experimental unit is paired with one that is in some way similiar. The experimental units in each pair are given different treatments.

The use of twins in many social science experiments provides many classic examples of the matched-pairs design.

In some cases the pair may consist of the same experimental unit measured before and after some treatment.

An example would be same store sales before and after a promotional campaign.