Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- Eliminate Bias
  - Controls
  - Random Assignment to Treatment
  - Blinding

- Reduce Sampling Error
  - Replication
  - Balance
  - Blocking
  - Extreme Treatments

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- Eliminate Bias

Bias: a systematic discrepancy between estimates and the true population characteristic

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- Eliminate Bias
  - Controls
    - A group which is identical to the experimental treatment in all respects aside from the treatment itself

    - **Placebo** - sugar pills

    - **Multiple control groups**
      - » One is a placebo
      - » Second is the current best existing treatment

    - **Independent recovery** - patients tend to seek out treatment when they feel their worst. This means that improvement might be inevitable, **even without treatment**
      - an untreated group to compare to 'treated' group so that we can measure the effects of a new therapy
      - Control and treatment subjects should be tested randomly or simultaneously to reduce the affect of temporal environmental changes

Goals of experiments:

- *determine how explanatory variable (treatment) affects response variable*

- Eliminate Bias

  - Random Assignment

    - *The essential distinction and advantage of an experiment!*

    - **Individuals are randomly assigned to treatments**

    - Theory: breaks association between possible confounding variables and the explanatory variable so that the causal relationship between explanatory and response variable can be measured

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- Eliminate Bias
  - Random assignment

- **Random assignment** averages out the effects of confounding variables

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- ## Eliminate Bias
  - ### <u>Random assignment</u>
  - Random assignment averages out the effects of confounding variables

Experimental unit								
Random number	11	18	87	55	76	70	90	4
Treatment	A	A	B	A	B	B	B	A

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- ## Eliminate Bias

    - ## Blinding

        o Conceal knowledge about which subjects receive treatments

        o Eliminates unconscious bias

        o Unblinded studies usually find much larger effects (**as much as threefold higher**), showing the bias that results from lack of blinding*

        * as pointed out by the textbook, these studies often have other issues, if they have forgotten to incorporate blinding techniques

Goals of experiments:

determine how explanatory variable (treatment) affects response variable

- ## Eliminate Bias
  - Controls
  - Random Assignment to Treatment
  - Blinding

- ## Reduce Sampling Error
  - Replication
  - Balance
  - Blocking
  - Extreme Treatments