Stat 101 – Lecture 19

Random Assignment

- Random assignment tends to spread the effects of uncontrolled outside variables evenly across the treatment groups.
- Random assignment reduces the chance that an uncontrolled outside variable will bias the results.

1

Randomization

- Randomly selecting a few subjects from a population to participate in the experiment.
- Can generalize the results of the experiment to the population

2

Replication

- Within an experiment.
  - There must be several subjects in each treatment group.
  - Can assess the natural variation in the response for subjects treated the same.

3

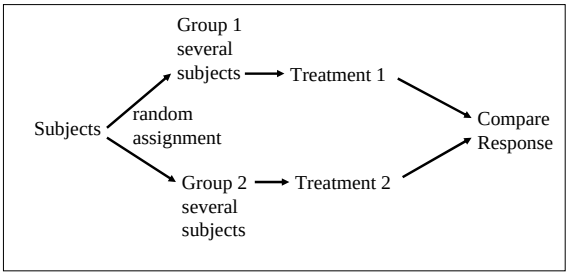
Stat 101 – Lecture 19

"Replication"

- Repeating the entire experiment.
  - This is especially important if the subjects in an experiment are not a random sample from a population.
  - Are the results of the entire experiment repeatable with another set of subjects?

4

Diagrams



5

Block

- There may be attributes of the subjects that can't be controlled but may contribute to variability in the response.
- Group similar subjects into blocks and then randomly assign subjects from each block to the treatments.

6

Stat 101 – Lecture 19

Example

- Does using a calculator affect scores on a statistics exam?
- Factor of interest: Calculator use.
- Treatment Group: Calculator
- Control Group: No Calculator
- Response: Score on exam.

Blocking

- Scores on a statistics exam may be affected by the mathematics ability of the students taking the exam.
- Use math ability as a blocking variable.

Blocking

- Math ability
  - –high, average, and low.
  - –For each math ability group, assign, at random, half of the students to use calculators and half to not use calculators.

Stat 101 – Lecture 19

More Ideas

- Blinding.
  - –Single blind and double blind.
- Control group.
  - –Placebo

10

Multiple Factors

- Factors
  - – can use calculator (yes, no)
  - – can use a formula sheet (yes, no).
- Treatments
  - – calculator and formulas, calculator but no formulas, formulas but no calculator, no calculator and no formulas.

11

Confounding

- Sodium and blood pressure.
  - – All subjects on the low sodium diet had their blood pressure measured by a registered nurse using a standard manual cuff and stethoscope.
  - – All subjects on the high sodium diet had their blood pressure measured using an automated cuff and digital readout.

12