

Section 1.3 - Experimental Design

1. Definitions:

- **Observational Study:** observes and measures characteristics of part of a population but does not attempt to influence the responses
- **Experiment:** a treatment is imposed on part of a population in order to observe their responses.

2. Surveys: Census vs. sampling (West Wing, Disc 1, Side 2, Episode 6, 15:50-17:00; 20:50-24:00)

- **Survey:** important kind of observational study; asks questions of people
- **Census:** sample survey that attempts to include the entire population in the sample
- **Sampling:** a count or measure of part (**a sample**) of a population

3. Designing a Statistical Study

- (a) Identify the variable(s) of interest and the population of the study.
- (b) Develop a detailed plan for collecting data. If you use a sample, make sure that the sample is representative of the population.
- (c) Collect the data.
- (d) Describe the data, using descriptive statistics techniques.
- (e) Interpret the data, and make decisions about the population using inferential statistics.
- (f) Identify any possible errors.

4. Sampling Techniques

- **Random Sample:** every member of the population has an equal chance of being selected.
- **Simple Random Sample (SRS):** An SRS of size n consists of n individuals from the population chosen in such a way that every set of n individuals has an equal chance to be the sample actually selected.
- **Stratified Random Sampling:** First divides the population of individuals into groups (strata), and then takes an SRS from each group. Example: statewide election polls, by county.
- **Cluster Sampling:** When the population falls into naturally occurring subgroups, each with similar characteristics. Example: One floor of a freshman, all girls dorm.
- **Systematic Sampling:** Each member of the population is assigned a number. The numbers are ordered and selected at regular intervals starting with a starting number. (Telephone numbers.) Must avoid regularly occurring patterns in order.

5. Sources of Bias:

- Wording of Questions (West Wing, Disc 3, Side 2, Episode 21, 0:58-2:30)
- Non-responses (West Wing, Disc 3, Side 2, Episode 21, 4:40-5:00)
- Clarifying focus (West Wing, Disc 2, Side 2, Episode 16, 21:30-24:10, 32:38-34:30)