

Stat 104 – Lecture 9

Gathering Data

- Types of Studies
 - Experimental – Active manipulation.
 - Observational – Passive observation.

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Experiment

- Subjects are assigned to experimental conditions and then outcomes on the response variable are recorded.
- Experimental conditions correspond to values of an explanatory variable and are called treatments.

2

Observational Study

- Values of the response variable and the explanatory variable are observed for a group of subjects.
- No treatment is imposed.

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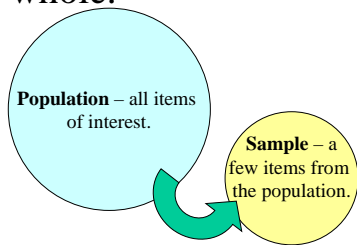
Cause and Effect?

- Experiment – Good experiments can establish a cause and effect relationship.
- Observational Study – Not possible to definitely establish a cause and effect relationship.

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Sample Surveys

- Idea 1: Examine a part of the whole.



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Properties of a Sample

- Would like the sample to be representative of the population.
- This may not be possible, but at least we would like a sample that is not biased.

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Sample Surveys

- Idea 2: Random selection
 - Selecting items from the population should be done at random so as to reduce the chance of getting a biased sample.

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Sample Surveys

- Idea 3: It's the sample size!
 - What fraction of the population is sampled is not important.
 - The size of the sample is the important thing.

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What about a census?

- Would a census (a complete enumeration) of the population be better?
- Difficult to do.
 - Populations are often dynamic.
 - Can be more complex.

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Example

- Population: All students at ISU.
- Question: Have you posted a video on YouTube?
- Population parameter: Proportion of all ISU students who would answer yes.

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Example

- Sample: 400 ISU students.
- Sample statistic: the proportion of the 400 students in the sample who say yes.

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How should we select the 400?

- Put an ad in the ISU Daily with the question and ask students to drop off their answers.
- Go to computer labs across campus and ask the first 400 students you meet.

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Simple Random Sample

- We want a representative sample but will settle for one that is not biased.
- SRS – Each combination of 400 ISU students has the same chance of being the sample selected.

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Simple Random Sample

- Sampling Frame
 - A list of all students at ISU (the Registrar has such a list)
 - Use a random method to select 400 students from this list.

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Simple Random Sample

- Put each person's name on a slip of paper (all slips the same size and weight).
- Mix the slips thoroughly.
- Select 400 slips – one at a time without replacement.

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