

11-8 Reteaching

Samples and Surveys

When doing a survey, it usually is not practical to get the opinion of every member of a population. You can get a fairly accurate picture of the opinion of a population by surveying a *sample* of the population. A sample is a smaller group that represents the whole population. There are several ways to choose a sample:

Convenience	choosing any people easily available
Self-selection	having people volunteer to participate in the survey
Systematic	ordering the population and choosing participants at regular intervals (such as choosing every fifth person from the telephone book)
Random	all members of the population have an equal chance of being asked to participate

The way you choose the sample can introduce *bias*, or systematic error, into the survey. When a survey is biased, the results are inaccurate.

Problem

An athletic shoe company wants to learn which brand of athletic shoes is worn most often by local high-school students. The company sets up a booth in a local mall and offers a coupon for a free pair of their athletic shoes to anyone who answers the question, “What is your favorite brand of athletic shoes?”

- What is the sampling method used? There may be more than one.
 - Is there any bias in the company’s sampling method?
- People in the mall are readily available to the booth. Also, people must volunteer to participate. The sample is a convenience sample and is self-selected.
 - The survey is biased in several ways:
 - People who do not shop at the mall are excluded.
 - Only people who choose to walk up to the booth participate in the survey.
 - People who are not high-school students may participate in the survey.
 - People may be more likely to say this company makes their favorite shoes when they are offered a free pair.

Exercises

A politician wants to know what issues are most important to the voters in his district. Identify the sampling method and any bias in the method.

- The politician spends 9:00 A.M. to 4:00 P.M. on Tuesday talking to people as they enter a grocery store. **convenience; excludes people who don’t shop during that day**
- The politician sets up a questionnaire on his website. **self-selected; excludes people without Internet access**

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You can use different types of study methods to gather information about a sample.

- observational study** You measure or observe members of a sample so that they are not affected by the study.
- controlled experiment** You divide the sample into two groups. You give a treatment to one group but not to the other “control” group. Then you compare the results from the treated group and the control group.
- survey** You ask every member of the sample the same questions.

Problem

A French teacher wants to know how well the students in each of her classes know the correct forms of irregular French verbs. During one class period, she listens to her students as they make conversation in French. She keeps track of how many irregular verbs they use correctly and incorrectly.

- a. What study method is described in this situation?

This is an observational study. The teacher observes her students during conversation without changing their behavior.

- b. Should the sample statistics be used to make a general conclusion about the population?

The teacher wants to know about the students in each of her classes, but she only observes one class period. The class she observes may not be representative of all of her students, so the sample statistics should probably not be used to make a general conclusion about all of her classes.

Exercises

Identify the type of study method described in each situation, and explain whether the sample statistics should be used to make a general conclusion about the population.

3. A pollster wants to know what percentage of U.S. senators would support a new law about speed limits. He selects 20 of the 100 senators at random and asks them whether they would support the law. **survey; The statistics can be used to make a general conclusion about the population because the sample is randomly selected, and the survey question does not appear biased.**
4. Researchers want to test a new fertilizer for corn. They apply the fertilizer to one field of corn and give no fertilizer to a second field of corn. Both fields are the same size, have the same type of soil, and receive the same amount of water and sunlight. The researchers record the weight of the corn produced in each field. **controlled experiment; Because the only difference between the two fields is whether or not they received the fertilizer, the statistics from the study can be used to make a general conclusion about the effectiveness of the fertilizer on corn.**