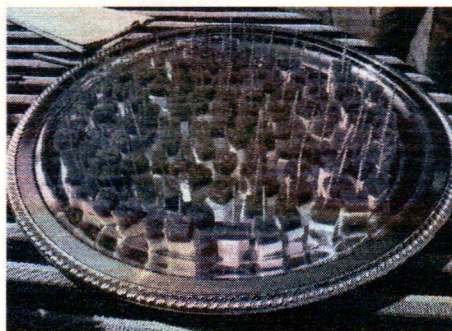


9.5 Would You Like to Try a Sample?

A Develop Understanding Task



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In the task *Wow! That's Weird!*, you saw a number of statistics for things like the average weight of a house cat. You know it would be impossible to measure all the house cats to find their average weights, but scientists still claim to know it.

You've probably heard it many times before: "Survey results show that 54% of Americans believe that. . ." You're sure that you didn't participate in the survey and neither did anyone you know, and yet, the researchers claim that the survey represents the beliefs of all Americans.

How can this be possible? In the next few tasks, we'll explore how statistics allow us to draw conclusions about an entire group without actually working with the entire group. Sometimes the results make sense and other times you might think that they just can't be right. We will learn how to make judgments about statistical studies, based on the methods that have been used.

First, we need to get our terms straight. When we talk about the entire group that we are interested in, that is called the **population**. When some members of the group are selected to represent the entire group, that is called a **sample**. The thing we are interested in knowing about the population is the **parameter of interest**. *-what info are they finding*

For each of the scenarios below, identify the population, the sample and the population parameter of interest.

1. A grocery store wants to know the average number of items that shoppers purchase in each visit to the store. They decide to count the items in the cart of every twentieth person through the check stand.

Population grocery store shoppers

Sample every 20th shopper

Parameter of interest average number of items bought

2. A team of biologists wants to know the average weight of fish in a lake. They decide to drop a net and measure all the fish caught in three different locations in the lake.

Population fish in a lake

Sample 3 sets of fish caught in a net

Parameter of interest average weight of fish

3. There are lots of different ways that a sample can be chosen from a population. Group the following examples of ways to select a sample into six categories.

A. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You decide to put the name of each student in the school into a big bowl. You draw 100 names and ask those students to respond to a survey about the activities they prefer. Simple Random

B. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You assign each student in the school a number. You randomly select a starting number among the first 10 numbers and then select every tenth student in the list from that point forward. Systematic Random

C. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You use the rolls from each homeroom class. You go through each homeroom class, drawing 2 names from each class. You ask those students to respond to a survey about the activities they prefer. Stratified Random

D. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You get the list of all the homeroom classes and randomly select 5 classes. You go to each of the classes selected and survey all the students in that class. Cluster Random

E. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You stand in the cafeteria during your lunch break and ask students in they would be willing to participate in your survey as they walk by. Convenience

F. You are in charge of school activities. You want to know what activities students would prefer to participate in during the school year. You make a lot of copies of the survey about the

activities that students prefer and you put them on a table outside the cafeteria. Students can choose to take the survey and drop their responses into a big box on the table.

Volunteer

G. You are interested in finding out the percent of residents in the city that have experienced a robbery in the past year. Using the city property records, you assign each residence a number. You use a random number generator to give you a list of numbers. You look up the police reports for each residence selected.

Simple

H. You want to know the average number of hours that high school seniors spend playing video games in your state. You randomly select 20 high schools in the state and then ask all the seniors at each of the 20 high schools about their video game habits.

Cluster

I. An auto analyst is conducting a satisfaction survey, sampling from a list of 10,000 new car buyers. The list includes 2,500 Ford buyers, 2,500 GM buyers, 2,500 Honda buyers, and 2,500 Toyota buyers. The analyst selects a sample of 400 car buyers, by randomly sampling 100 buyers of each brand.

Stratified

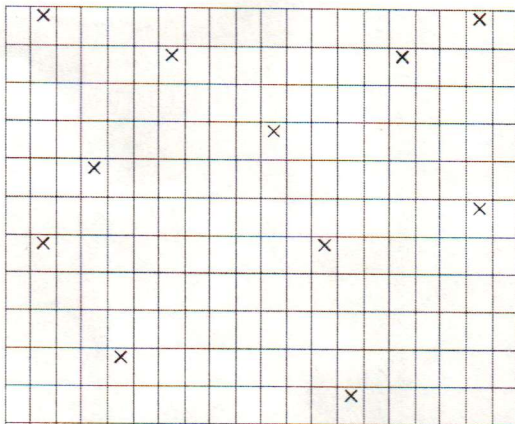
J. A shopping mall management company would like to know the average amount that shoppers in the mall spend during their visit. They post two survey takers near one of the exits who ask shoppers to tell them what they spent as they leave the mall.

Convenience

K. A restaurant owner wants to find out the average number of dishes ordered at each table served on Friday evenings, their busiest time. She decides to collect and analyze every fifth receipt of the night, starting at 6:00 p.m.

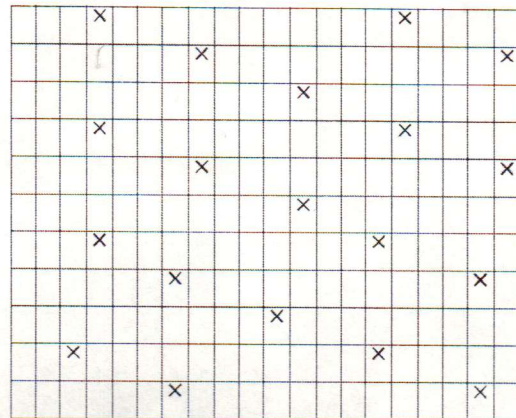
Systematic

L.



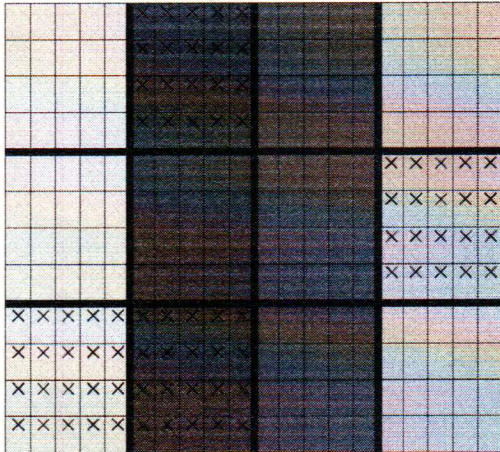
Simple

M.



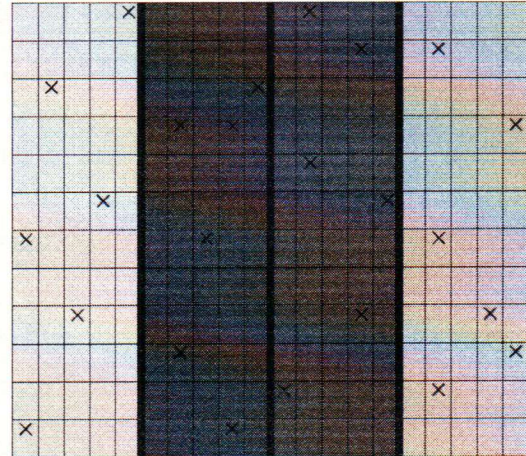
Systematic

N.



Cluster

O.



Stratified

4. What might be some of the advantages and disadvantages of each type?

Simple Random - Easy to design

Cluster Random - Easier to sample large groups

Stratified - More representative of the population

Systematic - More efficient than simple random

Convenience - Easy to get people, more likely to be biased

Voluntary - Same as convenience

5. A person you know owns a small theater that shows local dramatic productions. She wants to know the average age of the people that buy tickets to the see the shows so that she can better select which plays to stage. Explain to the owner why selecting the first 20 people that arrive for the show may not be a representative sample.

The first 20 may have similar traits

6. Describe a process for selecting a representative sample of the theater patrons.

Use systematic, randomly choose one of the first 10 people, then every 10th person after that.

Non-Random

Convenience: Ask people who walk by

Volunteer: People choose to participate

Random

Simple: Random number generator

Systematic: 1st one is randomly chosen,
then every person after that
 ↑
 10th or 5th or 20th

Stratified: Same number of people from
each group are chosen
5 freshmen, 5 soph., 5 jrs, 5 srs

Cluster: everyone in each randomly
chosen group is ~~is~~ surveyed.