

KEY

## Chapter 4

1. Which of the following could not be a well-designed experiment?

- (a) Larry's experiment about the effects of habitat on squirrel behavior will be replicated across a sample of 5,000 squirrels. *TOO MANY SUBJECTS*
- b. Tom wants to study the driving habits of students at his high school. To do this, he will randomly select 50 students from each grade to interview.
- (c) Sally wants to observe the effects of sleep on performance in grades at her high school. To do this, she will randomly select 15 of her AP Statistics classmates to participate in the study. *HOMOGENEOUS GROUPING MAY SKEW RESULTS*
- d. When studying the effects of a depression drug, doctors include a group that will not be taking the actual drug, but still have the same tests done as the group taking the drug.
- e. Anita decides to compare the effects of shade, partial shade, and full sun on the height of beanstalks.

2. Researchers want to study the effects of oatmeal consumption on heart health, however worry that the effects may vary based on age and gender of the experimental subjects. Which of the following experimental set ups is most appropriate in this situation?

- a. A matched pairs design, matching older males to younger males, and older females to younger females, and randomly assigning one from each pairing to consume oatmeal daily.
- b. A convenience sample of people walking down the oatmeal aisle in the grocery store.
- c. An observational study of only one of the given age/gender groups.
- d. A completely randomized design, placing half of the volunteers in a group that eats oatmeal daily, and the other half in a group does not eat oatmeal daily through random selection.
- (e) A blocked design, where half of the older males, half of the younger males, half of the older females, and half of the younger females are randomly placed into the daily oatmeal group, and the remainder does not eat oatmeal daily.

*THIS PROVIDES THE OPPORTUNITY TO REDUCE ERROR IN THE STUDY. IT WILL ALSO LOWER THE PROBABILITY THAT ANY ONE GROUP WILL BE OVERREPRESENTED OR UNDERREPRESENTED.*

1. In a recent study, the effects of daily green tea consumption on weight loss were studied by researchers. The scientists had 264 volunteers at their disposal, of which 186 exercise regularly, and the other 78 do not.

a. Identify the experimental units, treatments, the explanatory variable, and the response variable.

EXPERIMENTAL UNITS: 186 SUBJECTS WHO EXERCISE + 78 WHO DO NOT.

TREATMENTS: DAILY GREEN TEA CONSUMPTION OR NO GREEN TEA CONSUMPTION

EXPLANATORY VARIABLE: GREEN TEA CONSUMPTION

RESPONSE VARIABLE: WEIGHT LOSS (OR GAIN)

b. Explain why a completely randomized design would not be appropriate in this scenario.

IT WOULD LIKELY CREATE A SCENARIO WHERE SUBJECTS WHO EXERCISE ARE TOO HEAVILY REPRESENTED.

c. What experimental design would work best? Describe how the researchers could implement such a design.

A RANDOMIZED BLOCK DESIGN WOULD BE BEST. ABOUT 2/3 OF THE SUBJECTS SHOULD BE THOSE WHO EXERCISE. FROM THESE, YOU WOULD RANDOMLY ASSIGN TEA CONSUMPTION BETWEEN THE EXERCISERS AND NON-EXERCISERS

2. Define "double blind," and explain how a double blind experiment is useful when testing the effectiveness of drugs that treat anxiety.

A DOUBLE BLIND STUDY INVOLVES NOT ALLOWING THE SUBJECT OR THE EXPERIMENTERS KNOW IF THE SUBJECT IS RECEIVING THE TREATMENT AND WHO IS RECEIVING THE PLACEBO.