

CHAPTER 2

REVIEW

Exam Tip: You need to be clear on the distinction between the purposes for "blocking" and randomizing. If you are asked to describe an experiment involving blocking, be sure to remember to randomize treatments within blocks.

> Rapid Review

NAME: _____

ANSWERS

DATE: _____

PERIOD: _____

B

1. You are doing a research project on attitudes toward fast food and decide to use as your sample the first 25 people to enter the door at the local FatBurgers restaurant. Which of the following is (are) true of this sample?

- a. It is a systematic sample.
- ☒ b. It is a convenience sample.
- c. It is a random sample.
- d. It is a simple random sample.
- e. It is a self-selected sample.

2. How does an experiment differ from an observational study?

OBSERVATION DOES NOT IMPOSE A TREATMENT.

EXPERIMENT DOES HAVE TREATMENTS AND CAUSE/EFFECT CAN BE DETERMINED

3. What are the three key components of an experiment? Explain each.

CONTROL - DESIGNED TO HOLD CONFOUNDING VARIABLES CONSTANT

REPLICATION - USE SUFFICIENT # OF SUBJECTS TO MINIMIZE EFFECTS OF CHANCE VARIATION. (PLACEBO'S)

RANDOMIZATION - EQUALIZE GROUPS SO DIFFERENCES IN RESPONSE ARE ATTRIBUTED TO THE TREATMENT.

4. Your local pro football team has just suffered a humiliating defeat at the hands of its archrival. A local radio sports talk show conducts a call-in poll on whether or not the coach should be fired. What is the poll likely to find?

* THIS IS A VOLUNTARY RESPONSE POLL; WHICH DRAW RESPONSES FROM THOSE WHO FEEL MOST STRONGLY ABOUT THE ISSUE POLLED.

* THE POLL IS MOST LIKELY TO RESULT IN FIRING THE COACH.

5. It is known that exercise and diet both influence weight loss. Your task is to conduct a study of the effects of diet on weight loss. Explain the concept of *blocking* as it relates to this study.

* BLOCK BY EXERCISE LEVEL (VERY ACTIVE, ACTIVE, NOT ACTIVE)

* RANDOMIZE EACH BLOCK

* BECAUSE EXERCISE IS HELD CONSTANT, YOU CAN BE CONFIDENT THAT DIET (NOT EXERCISE) →

IS ATTRIBUTED TO RESULTS OF WEIGHT LOSS
MEASURED IN THE STUDY.

6. Explain the concept of a *double-blind* study and why it is important.

DOUBLE BLIND TEST - NEITHER THE SUBJECTS OR RESEARCHERS KNOW WHO IS IN THE TREATMENT OR CONTROL GROUPS.

WHICH HELPS TO CONTROL FOR RESPONSE BIASES

7. You are interested in studying the effects of preparation programs on SAT performance. Briefly describe a matched-pairs design and a completely randomized design for this study.

MATCHED PAIR

- RANDOMLY SELECT STUDENTS (100) THAT HAD NO SAT PREP
- TAKE SAT
- GIVE SAT PREP CLASS
- RETAKE SAT
- STATISTICALLY, COMPARE PRE- AND POST-PREP SAT SCORES.

COMPLETELY RANDOMIZED DESIGN

- RANDOMLY SELECT STUDENTS (100)
- THEN RANDOMLY ASSIGN TO 2 GROUPS
 - STUDENTS WITH NO PREP
 - STUDENTS WITH SAT PREP
- STATISTICALLY, COMPARE AVERAGE PERFORMANCE OF EACH GROUP.

Practice Problems

Multiple-Choice

1. Data were collected in 20 cities on the percentage of women in the workforce. Data were collected in 1990 and again in 1994. Gains, or losses, in this percentage were the measurement upon which the studies, conclusions were to be based. What kind of design was this?

- ✓ I. A matched pairs design
✓ II. An observational study
✗ III. An experiment using a block design

BECAUSE THERE ARE 2 MEASUREMENTS FOR EACH CITY.

- (a) I only
(b) II only
(c) III only
(d) I and III only
(e) I and II only

2. You want to do a survey of members of the senior class at your school and want to select a *simple random sample*. You intend to include 40 students in your sample. Which of the following approaches will generate a simple random sample?

- (a) Write the name of each student in the senior class on a slip of paper and put the papers in a container. Then randomly select 40 slips of paper from the container.
(b) Assuming that students are randomly assigned to classes, select two classes at random and include those students in your sample.

IN ORDER TO
BE SRS,
EACH OF 40
SELECT MUST
HAVE EQUAL
CHANCE TO BE
SELECTED.

- (c) From a list of all seniors, select one of the first 10 names at random. Then select every n th name on the list until you have 40 people selected.
- (d) Select the first 40 seniors to pass through the cafeteria door at lunch.
- (e) Randomly select 10 students from each of the four senior calculus classes.

3. ☒ Which of the following is (are) important in designing an experiment?

- I. Control of all variables that might have an influence on the response variable
- II. Randomization of subjects to treatment groups
- III. Use of a large number of subjects to control for small-sample variability

REPLICATION

- (a) I only
- (b) I and II only
- (c) II and III only
- ☒ (d) I, II, and III
- (e) II only

4. ☒ Your company has developed a new treatment for acne. You think men and women might react differently to the medication, so you separate them into two groups. Then the men are randomly assigned to two groups and the women are randomly assigned to two groups. One of the two groups is given the medication and the other is given a placebo. The basic design of this study is

- (a) completely randomized
- ☒ (b) blocked by gender
- (c) completely randomized, blocked by gender
- (d) randomized, blocked by gender and type of medication
- (e) a matched pairs design

NOT COMPLETELY RANDOMIZED

BECAUSE IT IS BLOCKED

5. ☒ A *double-blind* design is important in an experiment because

- (a) There is a natural tendency for subjects in an experiment to want to please the researcher. ☒
- (b) It helps control for the placebo effect. ☒
- (c) Evaluators of the responses in a study can influence the outcomes if they know which subjects are in the treatment group and which are in the control group. ☒
- (d) Subjects in a study might react differently if they knew they were receiving an active treatment or a placebo. ☒
- ☒ (e) All of the above are reasons why an experiment should be *double-blind*.

6. ☒ Which of the following is not an example of a *probability sample*?

- (a) You are going to sample 10% of a group of students. You randomly select one of the first 10 students on an alphabetical list and then select every 10th student after that on the list.
- ☒ (b) You are a sports-talk radio host interested in opinions about whether or not Pete Rose should be elected to the Baseball Hall of Fame, even though he has admitted to betting on his own teams. You ask listeners to call in and vote.
- (c) A random sample of drivers is selected to receive a questionnaire about the manners of Department of Motor Vehicle employees.
- (d) In order to determine attitudes about the Medicare Drug Plan, a random sample is drawn so that each age group (65–70, 70–75, 75–80, 80–85) is represented in proportion to its percentage in the population.
- (e) In choosing respondents for a survey about a proposed recycling program in a large city, interviewers choose homes to survey based on rolling a die. If the die shows a 1, the house is selected. If the die shows a 2–6, the interviewer moves to the next house.

7. ^(A) Which of the following is true of an experiment but not of an observational study?

- (a) A cause-and-effect relationship can be more easily inferred.
- (b) The cost of conducting it is excessive.
- (c) More advanced statistics are needed for analysis after the data are gathered.
- (d) By law, the subjects need to be informed that they are part of a study.
- (e) Possible confounding variables are more difficult to control.

8. ^(D) A study showed that persons who ate two carrots a day had significantly better eyesight than those who ate less than one carrot a week. Which of the following statements is (are) correct?

- ~~X~~ This study provides evidence that eating carrots contributes to better eyesight. ^(F)
- II. The general health consciousness of people who eat carrots could be a confounding variable.
- III. This is an observational study and not an experiment. ^(T)

- (a) I only
- (b) III only
- (c) I and II only
- (d) II and III only
- (e) I, II, and III

9. ^(B) Which of the following situations is a cluster sample?

- (a) Survey five friends concerning their opinions of the local hockey team.
- (b) Take a random sample of five voting precincts in a large metropolitan area and do an exit poll at each voting site.
- (c) Measure the length of time each fifth person entering a restaurant has to wait to be seated.
- (d) From a list of all students in your school, randomly select 20 to answer a survey about Internet use.
- (e) Identify four different ethnic groups at your school. From each group, choose enough respondents so that the final sample contains roughly the same proportion of each group as the school population.

• NO TREATMENT
Therefore

observation
study

• Observation

Studies can
NOT show

CAUSE-EFFECT.