
October 20, 2005

Use the following to answer questions 1-4:

Does using a cell phone while driving make an accident more likely? Researchers compared telephone company and police records to find 699 people who had cell phones and were also involved in an auto accident. Using phone billing records, they compared cell phone use in the period of the accident with cell phone use the same period on a previous day. Result: the risk of an accident was 4 times higher when using a cell phone.

1. This study is
 - A) a randomized comparative experiment.
 - B) an experiment, but without randomization.
 - C) a simple random sample.
 - D) an observational study, but not a simple random sample.

2. The explanatory variable in this study is
 - A) whether or not the subject had an auto accident.
 - B) whether or not the subject was using a cell phone.
 - C) the risk of an accident.
 - D) whether or not the subject owned a cell phone.

3. The researchers also recorded the manufacturer of each subject's cell phone (Motorola, Nokia, and so on). This variable is
 - A) categorical.
 - B) quantitative.
 - C) response.
 - D) not valid.

4. An example of a lurking variable that might affect the results of this study is:
 - A) whether or not the subject had an auto accident.
 - B) whether or not the subject was using a cell phone.
 - C) whether or not the subject was talking to a passenger in the car.
 - D) whether or not the subject owned a cell phone.

Use the following to answer questions 5-7:

BLANK A try to gather data without influencing the responses. **BLANK B**, on the other hand, impose some **BLANK C** in order to observe the response.

5. **BLANK A** should read
 - A) matched pairs designs.
 - B) observational studies.
 - C) explanatory variables.
 - D) experiments.

6. **BLANK B** should read
 - A) explanatory variables.
 - B) observational studies.
 - C) sample surveys.
 - D) experiments.

7. **BLANK C** should read
 - A) randomization.
 - B) confounding.
 - C) response variable.
 - D) treatment.

8. A study of a drug to prevent hair loss showed that 86% of the men who took it maintained or increased the amount of hair on their heads. But so did 42% of the men in the same study who took a placebo instead of the drug. This is an example of
 - A) a sampling error: the study should not have included men whose hair grew without the drug
 - B) the placebo effect: a treatment often works if you believe that it will work
 - C) an error in calculating percentages
 - D) failure to use the double-blind idea

9. During a visit to the doctor, you are weighed on a very accurate scale. You are weighed five times and the five readings are essentially the same. When being weighed, you are wearing all of your clothes and a pair of hiking boots. As a measure of your weight without clothes, the reading on the scale is
- A) unbiased and reliable
 - B) unbiased and unreliable
 - C) 95% accurate
 - D) biased and unreliable
 - E) biased and reliable

Use the following to answer questions 10-13:

The student newspaper runs a weekly question that readers can answer online or by campus mail. One question was "Do you think the college is doing enough to provide student parking?" Of the 136 people who responded, 79% said "No."

10. The number 79% is a
- A) margin of error
 - B) parameter
 - C) reliability
 - D) statistic
11. If we applied the quick method to the poll we would obtain this 95% confidence interval:
- A) $79\% \pm 11.7\%$
 - B) $79\% \pm 7.3\%$
 - C) 136 ± 79
 - D) $136 \pm 8.6\%$
12. The newspaper poll does not give a trustworthy estimate of student opinion because of
- A) bias due to nonresponse
 - B) bias due to undercoverage
 - C) bias due to the suggestive wording of the question
 - D) bias due to relying on voluntary response
13. When we say that the newspaper poll is biased, we mean that
- A) repeated polls would miss the truth about the population in the same direction
 - B) repeated polls would give results that are very different from each other
 - C) the question asked shows gender or racial bias
 - D) faculty may have a different opinion from students

14. The Dow Jones Industrial Average (DJIA) is the most common measure of stock market prices. Suppose that the DJIA starts at 9000 points and drops 300 points. This is a decrease of
- A) 0.033%
 - B) 3.3%
 - C) 33.3%
 - D) 333%
15. A 300 point drop in the DJIA was a big drop when the DJIA was at 2000 and a much smaller drop when the DJIA reached 9000. The percent by which stock prices fall is a more meaningful measure. The lesson here is that
- A) rates are often more meaningful than counts
 - B) it is easy to make a mistake calculating a percent
 - C) the DJIA is a categorical variable
 - D) confidentiality has been violated
16. The telephone company says that 62% of all residential phone numbers in Los Angeles are unlisted. A telephone survey contacts a random sample of 1000 Los Angeles telephone numbers, of which 58% are unlisted. In this setting,
- A) 62% is a parameter and 58% is a statistic
 - B) 58% is a parameter and 62% is a statistic
 - C) 62% and 58% are both parameters
 - D) 58% and 62% are both statistics
17. Gallup conducts its polls by telephone, so people without phones are always excluded from the Gallup sample. Any errors in the final result due to excluding people without phones
- A) are included in Gallup's announced margin of error
 - B) are in addition to the announced margin of error
 - C) can be ignored, because these people are not part of the population
 - D) can be ignored, because this is a nonsampling error
18. Confounding often defeats attempts to show that one variable causes changes in another variable. Confounding means that
- A) this was an observational study, so cause and effect conclusions are not possible
 - B) the effects of several variables are mixed up, so we cannot say which is causing the response
 - C) we don't know which is the response variable and which is the explanatory variable
 - D) we would get widely varied results if we repeated the study many times

Use the following to answer questions 19-24:

Want to stop smoking? Nicotine patches may help, and so may taking a drug that fights depression. A report in a recent issue of the *New England Journal of Medicine* describes a study of what works best. Here is part of the summary:

Use of nicotine replacement therapies and the antidepressant bupropion helps people stop smoking. We conducted a double-blind, placebo-controlled comparison of sustained-release bupropion (244 subjects), a nicotine patch (244 subjects), bupropion and a nicotine patch (245 subjects), and placebo (160 subjects) for smoking cessation.

Results. The abstinence rates at 12 months were 15.6 percent in the placebo group, as compared with 16.4 percent in the nicotine patch group, 30.3 percent in the bupropion group, and 35.5 percent in the group given bupropion and the nicotine patch.

19. How many treatments did this experiment compare?
 - A) two.
 - B) three.
 - C) four.
 - D) can't tell from the information given.

20. The response variable in this experiment is
 - A) the combination of drug (bupropion or placebo) and nicotine patch.
 - B) 893 people who want to quit smoking.
 - C) bupropion.
 - D) whether or not a subject was able to abstain from smoking for a year.

21. One group received a placebo. Why not just give this group no treatment at all?
 - A) It is not ethical to give no treatment at all in this setting.
 - B) Just thinking you are getting a treatment may have an effect, and we want to see if the real treatments do better than this.
 - C) A placebo is the same thing as no treatment at all.
 - D) Subjects would be disappointed if not given a pill.

22. The experiment was "double-blind." This means that
 - A) neither the subjects nor the people who worked with them knew whether they were taking bupropion or placebo.
 - B) the subjects did not know that the treatments were intended to reduce their smoking.
 - C) the subjects did not know whether they were taking bupropion or placebo.
 - D) subjects were not allowed to see cigarette ads.

23. The subjects of the study included both men and women. All of the subjects were randomly assigned among all the treatments with one use of the table of random digits. This design is called
- A) a simple random sample
 - B) a completely randomized design.
 - C) a matched pairs design.
 - D) a block design.
24. The subjects of the study included both men and women. If the men and women were separately assigned to treatments, using the table of random digits twice, the design would be
- A) a simple random sample.
 - B) a completely randomized design.
 - C) a matched pairs design.
 - D) a block design.
25. Studies with human subjects must be approved in advance by an Institutional Review Board. The Board's main purpose is to
- A) be sure that the study is scientifically interesting.
 - B) be sure that the study uses good statistical techniques.
 - C) be sure that the study will have some benefit to society.
 - D) be sure that the subjects of the study are safe.
26. A study of the effect of government job training programs finds that the pay of workers after training is higher than it was before training. A critic points out that workers often enroll for training when their pay has recently dipped. So the effect of training in raising pay is mixed up with the fact that pay would often rise when we measure from a low point. The statistical term for this effect is
- A) confounding
 - B) control
 - C) nonresponse
 - D) stratification
27. When I set my alarm clock to ring at 6:30, it rings 10 minutes late every day. My alarm clock is
- A) biased.
 - B) invalid.
 - C) imprecise.
 - D) unreliable.
 - E) Both (A) and (D).

28. In January of 1997, the price of Intel common stock rose from \$131 per share to \$162 per share. (Intel makes the processors for the computers you have been happily using.) What percent increase is this?
- A) 19.1%
 - B) 23.7%
 - C) 80.9%
 - D) 123.7%
29. The drug manufacturer Merck recently stopped testing a promising new drug to treat depression. It turned out that in a randomized, double-blind trial a dummy pill did almost as well as the new drug. The fact that many people respond to a dummy treatment is called
- A) confounding.
 - B) nonresponse.
 - C) comparison.
 - D) the placebo effect.
30. When you drop your pencil point blindly into the middle of a table of random digits, what is the chance that the three digits to the right of where you land will be 999?
- A) 1 in 100, because every three-digit group has the same chance to come up.
 - B) 1 in 1000, because every three-digit group has the same chance to come up.
 - C) no chance, because 999 is not a random group of digits.
 - D) can't say—it is completely random.
31. The most important advantage of experiments over observational studies is
- A) a well-designed experiment can give good evidence that the treatments actually cause the response.
 - B) an experiment can compare two or more groups.
 - C) we can use randomization to avoid bias in designing an experiment.
 - D) we can study the relationship between two or more explanatory variables.

32. Your statistics recitation has 30 students. You want to call an SRS of 5 students from your recitation to ask where they use a computer for the online exercises. You label the students 01, 02, ..., 30. You enter the table of random digits at this line:

14459 26056 31424 80371 65103 62253 22490 61181

Your SRS contains the students labeled

- A) 14, 45, 92, 60, 56
 - B) 14, 31, 03, 10, 22
 - C) 14, 03, 10, 22, 22
 - D) 14, 03, 10, 22, 06
 - E) 14, 03, 10, 22, 11
33. Increasing the size of an SRS has these beneficial effects:
- A) the bias of the sample is reduced relative to smaller SRSs.
 - B) the margin of error is smaller than it is for smaller SRSs.
 - C) nonsampling errors become less important
 - D) (A) and (B) but not (C).
 - E) all of (A), (B), and (C).
34. When we take a census, we attempt to collect data from
- A) a stratified random sample
 - B) every individual selected in a simple random sample
 - C) every individual in the population
 - D) a voluntary response sample
 - E) a convenience sample
35. Which of the following is correct?
- A) Parameters describe population characteristics.
 - B) Parameters describe sample characteristics.
 - C) The population is a subset of the sample.
 - D) Statistics must be based on a simple random sample.
36. The margin of error for a poll is 4%. This means that
- A) 4% of those sampled did not answer the question asked
 - B) we have 95% confidence that the sample statistic is within 4% of the population parameter
 - C) 4% of those sampled gave the wrong answer to the question asked
 - D) 4% of the population were in the sample
 - E) the confidence we have in the statistic is 4%

37. We divide the class into two groups: first year students and others. We then take random samples from each group. This is an example of
- A) simple random sampling
 - B) clustered sampling
 - C) multistage sampling
 - D) stratified random sampling
 - E) systematic random sampling
38. Which of the following statements do you think could possibly be true?
- A) The number of students enrolled at Ohio State University is about 2 million.
 - B) A basketball team made 110% of its free throws in a game last week.
 - C) The temperature will be 195 degrees (Fahrenheit) tomorrow in Chicago.
 - D) More than 30 million people live in California.
 - E) The textbook for this class weighs 250 pounds.
39. An ad for a new heartburn treatment says that it "reduces heartburn by 300 percent." What does this mean?
- A) It means that there is 3 times as much heartburn before using the treatment as there is after using it.
 - B) It means there is only seven-tenths as much heartburn after using the treatment, because $300/1000 = 0.3$, or three-tenths.
 - C) It's nonsense, because removing 100 percent of the heartburn already removes all of it.
 - D) It's nonsense, because heartburn is a categorical variable, so percents don't make sense.
 - E) It's nonsense because percents only make sense for counts, and amount of heartburn isn't a count.
40. Ethical standards for randomized, controlled clinical trials include
- A) not asking subjects to agree to participate without first informing them of the nature of the study and possible risks and benefits.
 - B) insuring that each subject knows which treatment he or she received.
 - C) allowing subjects to decide whether or not to be in the control group
 - D) never testing drugs which have not been proven to be completely safe.
 - E) All of the above.