

33. **Job discrimination?** A company with a large sales staff announces openings for three positions as regional managers. Twenty-two of the current salespersons apply, 12 men and 10 women. After the interviews, when the company announces the newly appointed managers, all three positions go to women. The men complain of job discrimination. Do they have a case? Simulate a random selection of three people from the applicant pool and make a decision about the likelihood that a fair process would result in hiring all women.

22. **Blood donors.** A person with type O-positive blood can receive blood only from other type O donors. About 44% of the U.S. population has type O blood. At a blood drive, how many potential donors do you expect to examine in order to get three units of type O blood?

27. **Dice game.** You are playing a children's game in which the number of spaces you get to move is determined by the rolling of a die. You must land exactly on the final space in order to win. If you are 10 spaces away, how many turns might it take you to win?
29. **The hot hand.** A basketball player with a 65% shooting percentage has just made 6 shots in a row. The announcer says this player "is hot tonight! She's in the zone!" Assume the player takes about 20 shots per game. Is it unusual for her to make 6 or more shots in a row during a game?

**35. Freshmen.** A certain college estimates that the 3-score SAT total for students who apply for admission can be described by a Normal model with a mean of 1570 and a standard deviation of 180. Admissions officers search the pile of envelopes, opening them at random to look for three applicants with SAT totals over 1800. How many envelopes do you think they will need to open?

**9.** A company packaging snack foods maintains quality control by randomly selecting 10 cases from each day's production and weighing the bags. Then they open one bag from each case and inspect the contents.

Identify the following:

(a) The population:

(b) The population parameter of interest:

(c) The sampling frame:

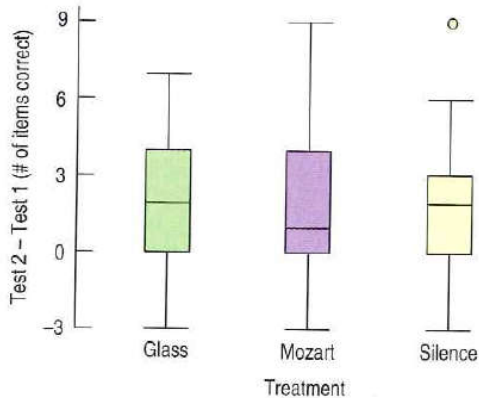
(d) The sample:

(e) The sampling method, including whether or not randomization was employed:

(f) Any potential sources of bias you can detect (name the bias and also explain why it is a problem) and any other problems you see in generalizing to the population of interest:



27. **Mozart.** Will listening to a Mozart piano sonata make you smarter? In a 1995 study, Rauscher, Shaw, and Ky reported that when students were given a spatial reasoning section of a standard IQ test, those who listened to Mozart for 10 minutes improved their scores more than those who simply sat quietly.



- a) These researchers said the differences were statistically significant. Explain what that means in this context.
- b) Steele, Bass, and Crook tried to replicate the original study. The subjects were 125 college students who participated in the experiment for course credit. Subjects first took the test. Then they were assigned to one of three groups: listening to a Mozart piano sonata, listening to music by Philip Glass, and sitting for 10 minutes in silence. Three days after the treatments, they were retested. Draw a diagram displaying the design of this experiment.
- c) The boxplots on p. 315 show the differences in score before and after treatment for the three groups. Did the Mozart group show improvement?
- d) Do you think the results prove that listening to Mozart is beneficial? Explain.

31. **Wine.** A 2001 Danish study published in the *Archives of Internal Medicine* casts significant doubt on suggestions that adults who drink wine have higher levels of "good" cholesterol and fewer heart attacks. These researchers followed a group of individuals born at a Copenhagen hospital between 1959 and 1961 for 40 years. Their study found that in this group the adults who drank wine were richer and better educated than those who did not.

- a) What kind of study was this?
- b) It is generally true that people with high levels of education and high socioeconomic status are healthier than others. How does this call into question the supposed health benefits of wine?
- c) Can studies such as these prove causation (that wine helps prevent heart attacks, that drinking wine makes one richer, that being rich helps prevent heart attacks, etc.)? Explain.

3. In a test of roughly 200 men and women, those with moderately high blood pressure (averaging 164/89 mm Hg) did worse on tests of memory and reaction time than those with normal blood pressure. (*Hypertension* 36 [2000]: 1079)

1–20. What's the design? Read each brief report of statistical research, and identify:

- a) whether it was an observational study or an experiment.

*If it was an observational study, identify (if possible)*

- b) whether it was retrospective or prospective.  
c) the subjects studied, and how they were selected.  
d) the parameter of interest.  
e) the nature and scope of the conclusion the study can reach.

*If it was an experiment, identify (if possible)*

- b) the subjects studied.  
c) the factor(s) in the experiment, and the number of levels for each.  
d) the number of treatments.  
e) the response variable measured.  
f) the design (completely randomized, blocked, or matched).  
g) whether it was blind (or double-blind).  
h) the nature and scope of the conclusion the experiment can reach.

7. After menopause many women take supplemental estrogen. There is some concern that if these women also drink alcohol, their estrogen levels will rise too high. Twelve volunteers who were receiving supplemental estrogen were randomly divided into two groups, as were 12 other volunteers not on estrogen. In each case, one group drank an alcoholic beverage, the other a non-alcoholic beverage. An hour later everyone's estrogen level was checked. Only those on supplemental estrogen who drank alcohol showed a marked increase.