

In 1 - 10 , read each brief report of an experiment and identify the following (if possible):

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

1. The leg muscles of men aged 60 to 75 were 50% to 70% stronger after they participated in a 16-week, high-intensity resistance-training program twice a week. (*Journal of Gerontology* 55A[2000]:B336)

(a)
(b)
(c)
(d)
(e)
(f)
(g)

2. To research the effects of “dietary patterns” on blood pressure in 459 subjects, subjects were randomly assigned to three groups and had their meals prepared by dieticians. Those who were fed a diet low in fat and cholesterol and high in fruits, vegetables, and low-fat dairy foods (known as the DASH diet) lowered their systolic blood pressure by an average of 6.7 points when compared with subjects fed a control diet.

(a)
(b)
(c)
(d)
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(g)

3. Scientists at a major pharmaceutical firm investigated the effectiveness of an herbal compound to treat the common cold. They exposed each subject to a cold virus, then gave him or her either the herbal compound or a sugar solution known to have no effect on colds. Several days later, they assessed the patient’s condition, using a cold severity scale ranging from 0 to 5. They found no evidence of benefits associated with the compound.

(a)
(b)
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(g)

4. Does the use of computer software in Introductory Statistics classes lead to better understanding of the concepts? A professor teaching two sections of Statistics decides to investigate. She teaches both sections using the same lectures and assignments, but gives one class statistics software to help them with their homework. The classes take the same final exam, and graders do not know which students used computers during the semester. The professor is also concerned that students who have had calculus may perform differently from those who have not, so she plans to compare software vs. no-software scores separately for these two groups of students.

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5. Weight is an issue for both humans and their pets. A dog food company wants to compare a new lower-calorie food with their standard dog food to see if it's effective in helping inactive dogs maintain a healthy weight. They have found several dog owners willing to participate in the trial. The dogs have been classified as small, medium, or large breeds, and the company will supply some owners of each size of dog with one of the two foods. The owners have agreed not to feed their dogs anything else for a period of 6 months.

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6. Researchers at the Purina Pet Institute studied Labrador retrievers for evidence of a relationship between diet and longevity. At 8 weeks of age, 2 puppies of the same gender and weight were randomly assigned to one of two groups – a total of 48 dogs in all. One group was allowed to eat all they wanted, while the other group was fed a low-calorie diet (about 75% as much as the others). The median lifespan of dogs fed the restricted diet was 22 months longer than that of other dogs. (*Science News* 161, no. 19)

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7. Athletes who had suffered hamstring injuries were randomly assigned to one of two exercise programs. Those who engaged in static stretching returned to sports activity in a mean of 37.4 days. Those assigned to a program of agility and trunk stabilization exercises returned to sports in a mean of 22.2 days. (*Journal of Orthopaedic & Sports Physical Therapy* 34 [March 2004]:3)

(a)
(b)
(c)
(d)
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(f)
(g)

8. Researchers investigating appetite control as a means of losing weight found that female rats ate less and lost weight after injections of the hormone leptin, while male rats responded better to insulin. (*Science News*, July 20, 2002)

(a)
(b)
(c)
(d)
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(g)

9. An artisan wants to create pottery that has the appearance of age. He prepares several samples of clay with four different glazes and test fires them in a kiln at three different temperature settings.

(a)
(b)
(c)
(d)
(e)
(f)
(g)

10. Tests of gene therapy on laboratory rats have raised hopes of stopping the degeneration of tissue that characterizes chronic heart failure. Researchers at the University of California, San Diego, used hamsters with cardiac disease, randomly assigning 30 to receive the gene therapy and leaving the other 28 untreated. Five weeks after treatment the gene therapy group's heart muscles stabilized, while those of the untreated hamsters continued to weaken. (*Science News*, July 27, 2002)

(a)
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11. Exercise #2 reports on an experiment that showed that subjects fed the DASH diet were able to lower their blood pressure by an average of 6.7 points when compared to a group fed a “control diet.” All meals were prepared by dieticians.
 - a. Why were the subjects randomly assigned to the diets instead of letting people pick what they wanted to eat?
 - b. Why were the meals prepared by dieticians?
 - c. Why did the researchers need the control group? If the DASH diet group’s blood pressure was lower at the end of the experiment than at the beginning, wouldn’t that prove the effectiveness of that diet?

12. The makers of Frumpies, “the breakfast of rug rats,” want to improve their marketing, so they consult you:
 - a. They first want to know what fraction of children ages 10 to 13, like their celery-flavored cereal. What kind of study should they perform?
 - b. They are thinking of introducing a new flavor, maple-marshmallow Frumpies, and want to know whether children will prefer the new flavor to the old one. Design a completely randomized experiment to investigate this question.
 - c. They suspect that children who regularly watch the Saturday morning cartoon show starring Frump, the flying teenage warrior rabbit who eats Frumpies in every episode, may respond differently to the new flavor. How would you take that into account in your design?

13. In restaurants, servers rely on tips as a major source of income. Does serving candy after the meal produce larger tips? To find out, two waiters determined randomly whether or not to give candy to 92 dining parties. They recorded the sizes of the tips, and reported that guests getting candy tipped an average of 17.8% of the bill, compared with an average tip of only 15.1% from those who got no candy. (“Sweetening the Till: The Use of Candy to Increase Restaurant Tipping,” *Journal of Applied Social Psychology* 32 no. 2 [2002]:300 – 309)
 - a. Was this an experiment or an observational study? Explain.
 - b. Is it reasonable to conclude that the candy caused guests to tip more? Explain.
 - c. The researchers said the difference was statistically significant. Explain in this context what that means.