

Experiments versus Observational Studies

Read the descriptions of the six investigations described below. Indicate which of the investigations are experiments and which are observational studies. Comment on the validity of the conclusions drawn.

1. A team of researchers is investigating the effect of two drugs designed to help people quit smoking. They found that 39 people out of 90 who decided to use Drug A at the beginning of 1998 were no longer smoking at the end of 1998. In contrast, only 17 people out of 115 who chose to use Drug B at the beginning of 1998 had quit smoking by the end of 1998. The researchers concluded that Drug A is superior to Drug B when it comes to helping people quit smoking.
2. Epidurals are becoming the most common treatment for labor pain relief for women giving birth in U.S. hospitals. Researchers studying hospital records across the country have discovered that forceps are more likely to be needed to extract a baby if the mother has had an epidural. Proponents of drug-free birthing argue that epidurals should be avoided because the use of forceps may injure or traumatize the baby.
3. Bob would like to know if studying a foreign language in high school increases students' verbal ability in English. He obtains lists of all seniors in his high school who did and did not study a foreign language. He compares the scores on a test of English reading and grammar that all seniors are required to take. The average score for those who studied foreign language was 87% compared to an average of only 68% for students who did not study foreign language. Bob concludes that studying a foreign language improves English reading and grammar.
4. A company that manufactures cake mixes is writing baking instructions for a new cake mix. The company would like to know the baking time and oven temperature that will produce the best cake. They are willing to consider four oven temperatures (300°, 325°, 350°, and 375°) and three baking times (25, 30, and 35 minutes). Four batches of cake are cooked at each time/temperature combination. Product tasters provide a rating for each batch of cake. The time/temperature combination that yielded the highest mean rating is selected for the baking instructions.
5. Each of twenty children is given a straightforward puzzle to solve. All children solve the puzzle successfully. Ten of the twenty children are individually praised by an adult who says, "Very good! You must be smart to have solved that puzzle." The other ten children are individually praised by an adult who says, "Very good! You must have worked hard to have solved that puzzle." Each of the twenty children is given a more challenging puzzle. The number of children in each of the two groups who successfully solve the more challenging puzzle is recorded.
6. To detect the presence of harmful insects in farm fields, researchers put up boards covered with a sticky substance and examine the insects trapped on the boards. To determine if the color of the board affects the number of insects trapped, investigators places 6 boards of each of four colors (blue, green, white, and yellow) at random locations in a field of oats and measured the number of cereal leaf beetles trapped. Using the data below, the researchers conclude that color matters and that yellow will do the best job of attracting insects.

Board Color	Number of Cereal Leaf Beetles Trapped					
Blue	16	11	20	21	14	7
Green	37	32	20	29	37	32
White	21	12	14	17	13	20
Yellow	45	59	48	46	38	47