

Chapter 2: Collecting Data

Section 2.3-2.4

Name _____

1. We have distinguished two types of studies: observational and experimental. Briefly explain the difference between these two types of study. You may use an example to support but not substitute for an explanation.
2. Explain how would one determine if a variable is an explanatory variable or an extraneous variable? Again, you may use an example to support but not substitute for an explanation.

3. River City is seeking to compare the effects of two mosquito sprays, A and B, to be used in the insect control plan for their park system. Consider the following two options for an experiment:
- In Experiment #1, a simple random sample of plots of park land would be taken from the population of River City parks. Treatments would be randomly assigned to the plots.
 - In Experiment #2, a simple random sample of plots of park land would be taken from each of four geographic areas in River City. (River City has 4 geographic areas of town, the NE, NW, SE, and SW quadrants; the same number of plots from each quadrant would be sampled for Experiment #2.) Treatments would be randomly assigned to the plots within each geographic area.
- a) For each experiment, #1 and #2, discuss in a few sentences whether or not one could legitimately infer a cause-and-effect relation between the choice of repellent and fewer mosquitos.
- b) For each experiment, #1 and #2, discuss in a few sentences whether or not one could legitimately generalize the results to the population of plots of park land in River City.

4. The likelihood an animal successfully avoids a predator's attack is greater if the presence of the predator is detected. Some aquatic animals are known to send chemical signals to warn others of predators. As an example, the Iowa darter (*Etheostoma exile*) excretes ammonium from its gills. In an experiment to see if red-legged frogs (*Rana aurora*) send chemical signals, specimens were collected as embryos and raised in an aquarium. As tadpoles they were placed into two tanks. The "upper tank" in each pair connected to the "lower tank" to mimic river flow. The investigator placed a wooded model of a heron in one of the upper tanks and moved it around for 30 seconds to simulate a predator attack. Both the upper and lower tanks were monitored for anti-predator behavior as indicated by increased movement of the frogs.

(a) What is the explanatory variable (factor) for this experiment?

(b) What is the response variable for this experiment?

(c) During the course of the experiment the investigators were very careful to not let the wooden heron model come in contact with the glass of the aquaria or make noise in any other way. If they had been unsuccessful and their wooden heron made significant amounts of noise, how would that affect the interpretation of the results?