

AP Statistics

2019-01-09 Section 4.2 Experiments

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An **observational study** observes individuals and measures variables of interest but does not attempt to influence the responses.

The goal of these studies can be to describe a group or situation, compare groups, or examine relationships between variables.

An **experiment** deliberately imposes certain treatments to measure responses.

When our goal is to understand **cause and effect**, experiments are the only source of fully convincing data.

If we do not control and initiate the cause, we can not be as certain that the effect occurred as a result of it.

Experiment's goal is to determine whether the treatment causes a change in the response.

A **lurking variable** is a variable that is not among the explanatory or response variables in a study but that may influence the response variable.

This means that it is something that is not part of the experiment, but still holds influence.

Confounding occurs when two variables are associated in a way where the result cannot allow them to be distinguished.

For example, did students get better grades because the class got easier or they became more organized?

Use the following questions in order to derive certain classifications:

Experimental Units: How were my subjects grouped?

Explanatory Variable: What can influence my outcome?

Response Variable: What outcomes am I measuring?

Treatments: What am I imposing on the subjects?

A study published in the New England Journal of Medicine (March 11, 2010) compared two medicines to treat head lice: an oral medication called ivermectin and a topical lotion containing malathion. Researchers studied 812 people in 376 households in seven areas around the world. Of the 185 households randomly assigned to ivermectin, 171 were free from head lice

after two weeks compared with only 151 of the 191 households randomly assigned to malathion.

Experimental Units: Households

Explanatory Variable: Type of medicine

Response Variable: Whether or not the household had contracted lice

Treatments: Group with oral medicine vs topical lotion

The **randomized comparative experiment** (how to experiment well)

You must have **random assignment** – where treatments are randomly assigned to experimental units

For example, in a clinical trial each patient must be given a random chance of getting assigned each type of treatment

It is not required that each type of treatment be assigned to an equal number of experimental units, only that it be random

See "2019-01-09 4.2 Experiments - Image 1.png" for a diagram of how this process should work.

Control groups provide a baseline for comparison