Control, Variables, and Constants

Control:
What is used to COMPARE the results to. It is the variable in which no independent variable has been applied.

Variable:
Anything that changes in an experiment. There are 2 types:
Independent: What you change on purpose (cause)
Dependent: What you observe changing, or
What you measure/observe (effect)

Constant:
Anything that stays the same in an experiment to make sure that only the Independent Variable is being changed.

Parts of an Experiment

The following parts of an experiment should be included in most science projects and should be identified in the written paper. Correlations and other atypical designs are exceptions.

1. The independent variable is the variable that is intentionally changed in the experiment, such as the temperature of the water in which an effervescent tablet was dissolved.

2. The levels of the independent variable are the different values of the independent variable, such as using water at 10°, 20°, 30°, 40°, and 50° C. The levels of the independent variable can also be thought of as the experimental groups that are set up.

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3. The <mark>dependent variable</mark> is the variable that responds to the changes in the independent variable. For example, the time it takes for the tablets to dissolve in the different temperatures of water is the dependent variable.

4. The <mark>control</mark> is the standard against which the researcher compares the results from each treatment group (level) in the experiment. For example, the control might be the room temperature water, which is about 20° C. In many cases, there will not be a true control. The researcher could then set one of the groups as the standard and measure the other groups against that standard.

5. <mark>Constants</mark> are the things that are kept the same each time one of the trials in the experiment is repeated. For example, constants could include the amount of water used, the brand of effervescent tablet used, the type of water used, and the fact that the water was not stirred. As many outside factors as possible should be kept constant in an experiment so that the researcher can be sure that any changes that occur do so because of the independent variable.

IV (cause) is the quantity that is changed on the experiment by the experimenter (plotted on the x-axis).

DV (effect) DEPENDS on the IV, so dependent variable. DV changes as a result of changes in the IV (plotted on the y-axis).

Constants (parts of the experiment that remain constant). A factor that <mark>does not change</mark> in the experiment.

Control group is the standard for comparison. Control has to be part of your trial and has to represent normal circumstances. Example: A farmer is raising cattle for the county fair. He wants to raise the largest cows he possibly can. There are four groups of cattle, all the same reed, sex, initial starting size and live in the same conditions. Group 1 receives vitamins, group 2 receives protein supplements,

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group 3 receives Taco Bell food and group 4 receives no dietary supplements. IV is what the experimenter changes (the food/supplement). The DV is the effect of changing them.   The DV variable in this case would be the growth/size of the cattle from those conditions. The constants are the same sex, same size, same breed and same conditions. Our control group would be group 4 as they do not receive any dietary supplement.

EXAMPLE

1. Hypothesis: The greater amount of growth hormone you give a buffalo, the more weight it will gain.
2. Experiment: Select 3 young buffalo that all have a weight 100 pounds and are all six months old. Give one buffalo no shot of growth hormone. Give the second buffalo 10 ml of growth hormone, the third buffalo 20 ml, and the fourth buffalo 25 ml of growth hormone. Each buffalo will be given the same amount of food, the same amount of water, and the same amount of exercise. Weigh each buffalo 45 days after the shot.

   DATA:

Amount of Growth Hormone	Amount of weight gained
No shot	40 pounds
10 ml	50 pounds
20 ml	70 pounds
25 ml	100 pounds

Identify the:

Independent variable is what the experimenter changed – Amount of growth hormone received.

Dependent variable is that the experimenter thinks it is going to change the weight gain.

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Graph

Dependent Variable

Would be on the Y so it would be weight gain in pounds

Independent variable would be on the X so it would be growth hormone.

Control group gets no shots.

Constants are each buffalo will be given the same amount of food, the same amount of water, and the same amount of exercise. Weigh each buffalo 45 days after the shot.

Does the data support the hypothesis? Explain.

No shot – 40 pound gain.

25 ml shot – 100 pound gain.