

Controlled trial

There are many forms of controlled experiments. A relatively simple one separates research subjects or biological specimens into two groups: an experimental group and a control group. No treatment is given to the control group, while the experimental group is changed according to some key variable of interest, and the two groups are otherwise kept under the same conditions.

Controls eliminate alternate explanations of experimental results, especially experimental errors and experimenter bias. Many controls are specific to the type of experiment being performed, as in the molecular markers used in SDS-PAGE experiments, and may simply have the purpose of ensuring that the equipment is working properly. The selection and use of proper controls to ensure that experimental results are valid (for example, absence of confounding variables) can be very difficult. Control measurements may also be used for other purposes: for example, a measurement of a microphone's background noise in the absence of a signal allows the noise to be subtracted from later measurements of the signal, thus producing a processed signal of higher quality.

For example, if a researcher feeds an experimental artificial sweetener to sixty laboratory rats and observes that ten of them subsequently become sick, the underlying cause could be the sweetener itself or something unrelated. Other variables, which may not be readily obvious, may interfere with the experimental design. For instance, perhaps the rats were simply not supplied with enough food or water, or the water was contaminated and undrinkable, or the rats were under some psychological or physiological stress, etc. Eliminating each of these possible explanations individually would be time-consuming and difficult. However, if a control group is used that does not receive the sweetener but is otherwise treated identically, any difference between the two groups can be ascribed to the sweetener itself with much greater confidence

Randomized controlled trial.

Non randomized controlled trial.

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