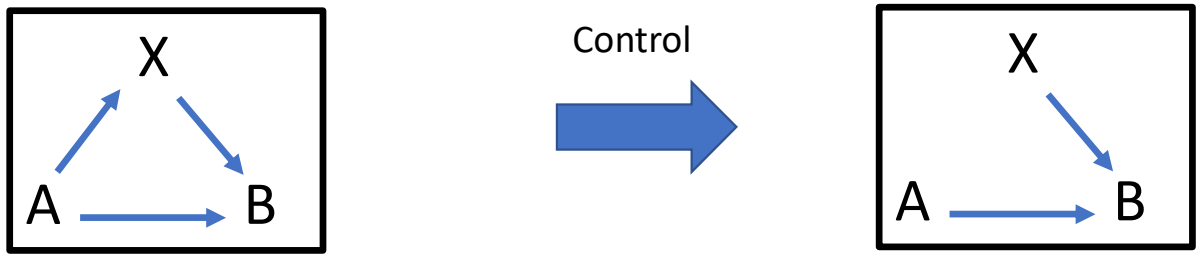
Control Variables | What Are They and Why Do They Matter?

From https://www.scribbr.com/methodology/control-variable

Control Variable

- A **control variable** is anything that is held constant or limited in a research study.
- A variable that is not of interest to the study's aims, but is controlled because it could influence the outcomes



If you don't control relevant extraneous variables, they may influence the outcomes of your study, and you may not be able to demonstrate that your results are really an effect of your independent variable.

Examples

Research question	Control variables
Does soil quality affect plant growth?	• Temperature • Amount of light • Amount of water
Does caffeine improve memory recall?	• Participant age • Noise in the environment • Type of memory test
Do people with a fear of spiders perceive spider images faster than other people?	• Computer screen brightness • Room lighting • Visual stimuli sizes

Overall Methods Of Control

- Variables may be controlled directly by holding them constant throughout a study (e.g., by controlling the room temperature in an experiment),
- or they may be controlled indirectly through methods like randomization or statistical control (e.g., to account for participant characteristics like age in statistical tests).

Random Assignment

- In experimental studies with multiple groups, participants should be randomly assigned to the different conditions
- Example: Random assignment. You recruit volunteers through social media ads, word of mouth, and flyers on campus. About 40% of participants sign up through Facebook ads, while more than 50% hear about the study through campus flyers.
- Participants are randomly assigned to one of two groups: a control group or an experimental group.

Standardized

- To control variables, you can hold them constant at a fixed level using a protocol that you design and use for all participant sessions.
  - For example, the instructions and time spent on an experimental task should be the same for all participants in a laboratory setting.
- All participants receive the same information about the study, including instructions for participation and debriefing materials.
  - To control for diet, fresh and frozen meals are delivered to participants three times a day.
  - To control meal timings, participants are instructed to eat breakfast at 9:30, lunch at 13:00, and dinner at 18:30.
  - To control caffeine intake, participants are asked to consume a maximum of one cup of coffee a day.

Statistical Controls

- Measure and control for extraneous variables statistically to remove their effects on other variables.
- "Controlling for a variable" means modelling control variable data along with independent and dependent variable data in regression analyses.
  - isolate the control variable's effects from the relationship between the variables of interest.
- Example: Statistical Collect data on your main variables of interest, income and happiness, and on your control variables of age, marital status, and health.
- In a multiple linear regression analysis, all control variables along with the independent variable as predictors.
  - The results tell you how much happiness can be predicted by income, while holding age, marital status, and health fixed.

Control variable vs control group

- A control variable isn't the same as a control group.
- Control variables are held constant or measured throughout a study for both control and experimental groups, while an independent variable varies between control and experimental groups.
- A control group doesn't undergo the experimental treatment of interest, and its outcomes are compared with those of the experimental group.