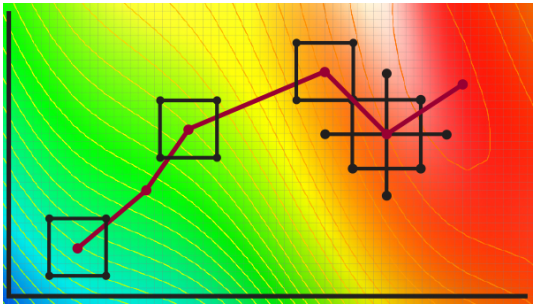
Experimentation for Improvement



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Design and Analysis of Experiments

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Some important terminology we will use all the time

Outcome

- What we measure after the experiment is finished
- It is the aspect you are interested in improving.

Factors

- Things which you actively change to influence the outcome.
- We typically change 2, 3, 4, or many more factors.
- Don't fixate on changing 1 factor at a time.

Various outcomes are possible in your experiment:

- height of the plant
- average length of leaves
- the number of flowers

These are examples of numeric measurements (quantitative).

- colour of the flower

This is a qualitative measurement.
(We use qualitative outcomes infrequently)

Outcome = Response

- What we measure after the experiment is finished
- It is the aspect you are interested in improving.

Objective

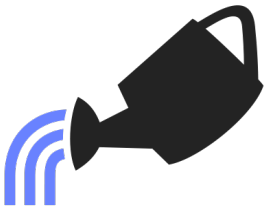
combine the outcome with "a desire to *adjust* the outcome"

Various examples of "objectives"

- maximize ($\uparrow$) the profit
- maximize ($\uparrow$) the height of the plant
- minimize ($\downarrow$) pollution
- minimize ($\downarrow$) energy used to produce a product

But sometimes the objective is "the same as before" ($=$)

Factors = Variables



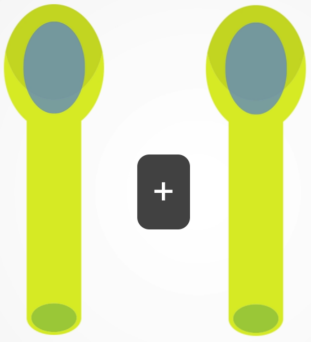
Types of factors

numeric factors (quantitative) can be measured and adjusted to different levels

categorical factors (qualitative) are simply selected for their characteristic

Outcome = taste

Objective = same



Low level: 15mL

High level: 30mL

Low level: 6 drops

High level: 10 drops