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Independent Variable

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The independent variable, also known as the manipulated variable, is the factor manipulated by the researcher, and it produces one or more results, known as dependent variables.

The banner features the Explorable logo and the text 'Quiz Time!' at the top. Below are three quiz cards:

- Quiz: Psychology 101 Part 2** (Image: Roller skates)
- Quiz: Psychology 101 Part 2** (Image: Colored pencils)
- Quiz: Flags in Europe** (Image: Ferris wheel)

[See all quizzes =>](#)

What is a Variable?

Any factor that can take on different values in an experiment is a scientific variable.

For example, in an experiment investigating the effectiveness of a new training program, the variables might be:

- Final test scores
- Student age
- Time spent on the training program
- Time to complete final test
- Student gender
- Student ratings of the training program

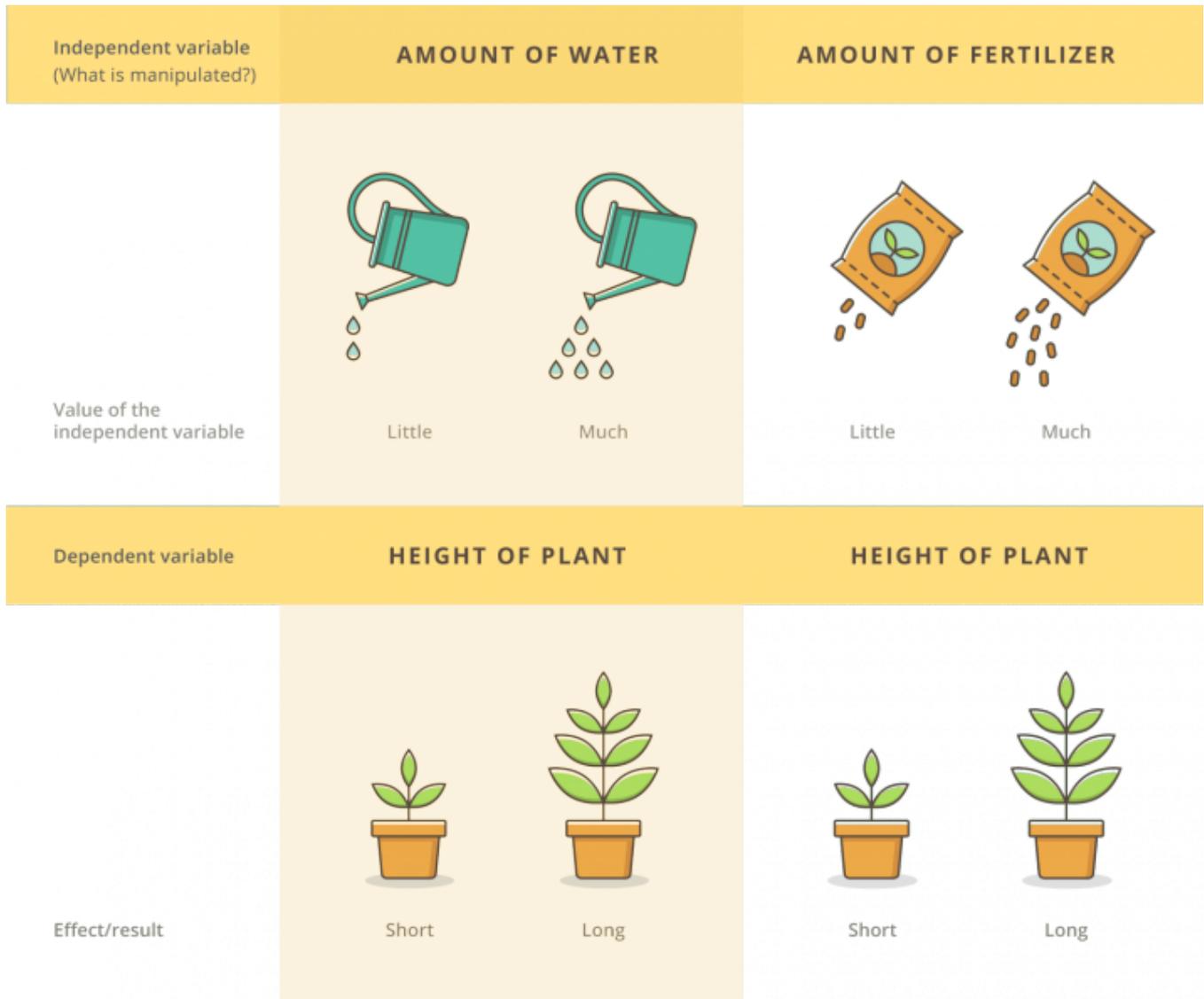
Depending on how the researcher operationalizes all the variables in an experiment, the above could be either dependent [1] or independent variables.

It's the research design that decides which variables are manipulated and which are

measured as a result of that manipulation.

What is the Independent Variable?

The independent variable is "independent" because its variation does not depend on the variation of another variable in the experiment/research project. The independent variable is controlled [2] or changed only by the researcher. This factor is often the research question/hypothesis [3] behind the outcome of the experiment.



In the above example, the researcher may have wanted to see if participating in the training program raised students' scores on a final test.

Mini-quiz 1

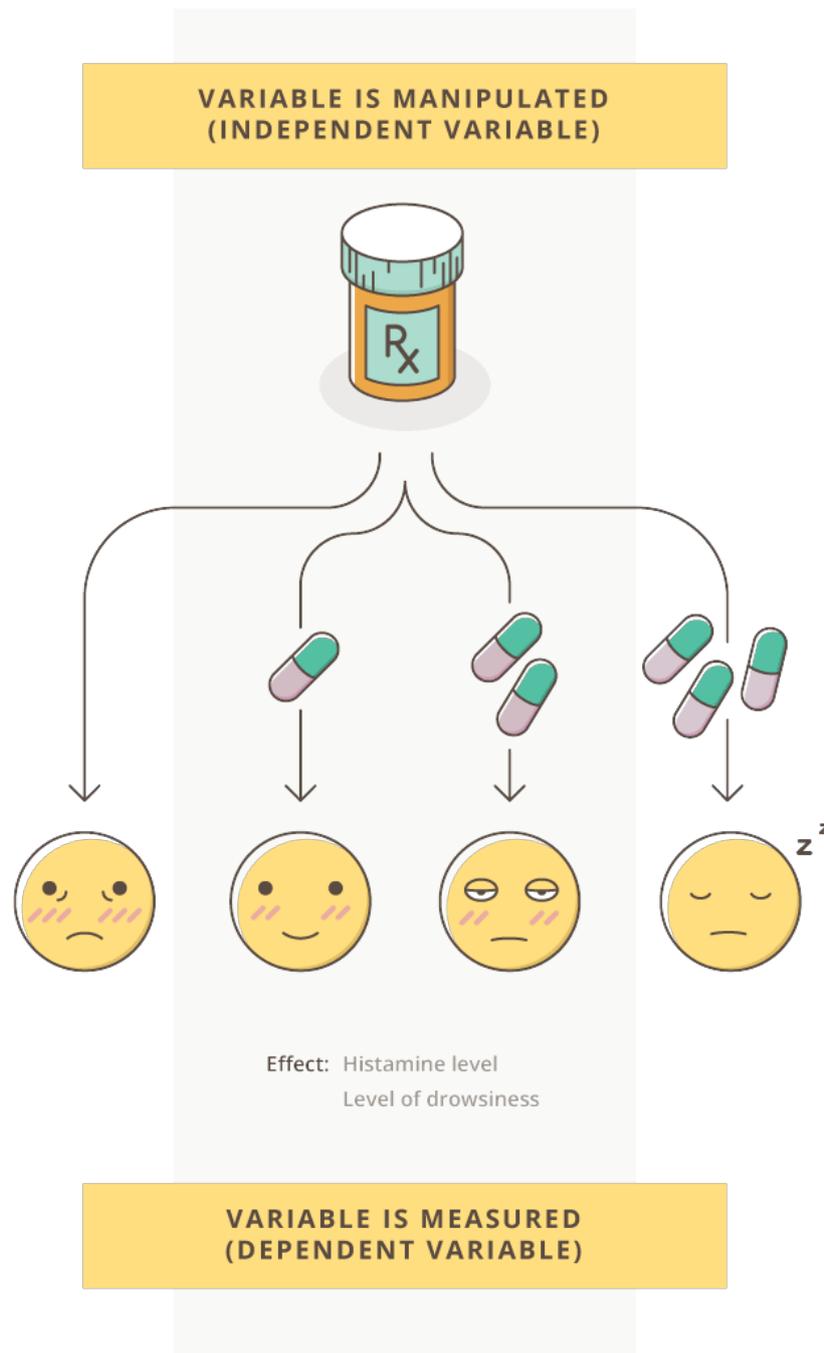
Can you identify the independent variable in this experiment?

1. Score on the test
2. Time spent on the training program
3. Participation on the training program

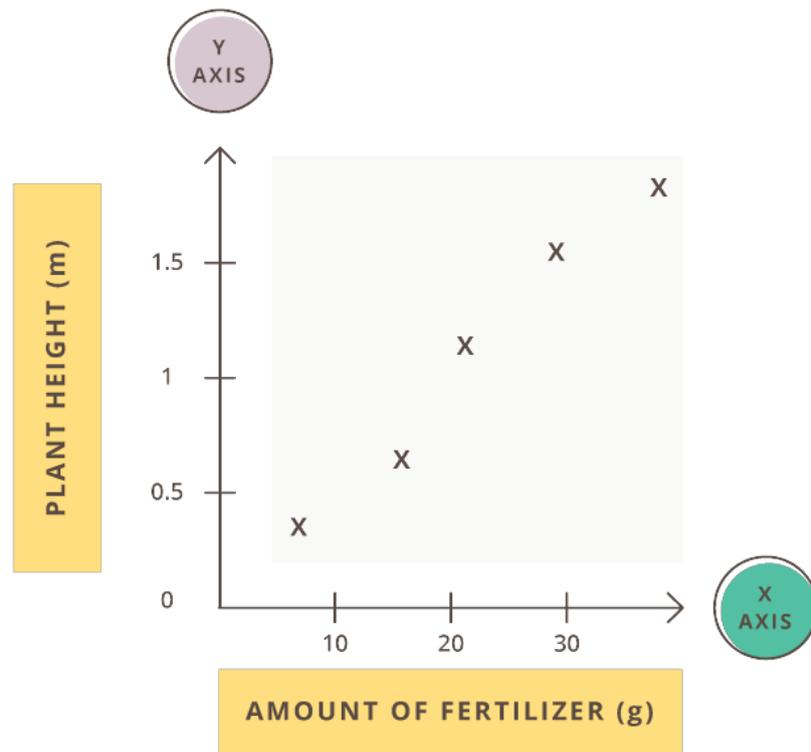
What do you think is correct? The answer is at the bottom of the article.

How Many Independent Variables Do You Test?

There are often not more than one or two independent variables tested in an experiment, otherwise it is difficult to determine the influence of each upon the final results. There may be several dependent variables [1], because manipulating the independent variable can influence many different things.



For example, an experiment to test the effects of a certain fertilizer on plant growth could measure height, number of fruits and the average weight of the fruit produced. All of these are valid analyzable factors arising from the manipulation of one independent variable, the amount of fertilizer.



Potential Complexities of the Independent Variable

The term independent variable [4] is often a source of confusion; many people assume that the name means that the variable is independent of any manipulation. The name arises because the variable is isolated from any other factor, allowing experimental manipulation to establish analyzable results [5].

A useful acronym is **DRY-MIX**. This helps you remember which axis to plot your data should you need to draw a graph:

- **D** - Dependent
- **R** - Responding
- **Y** - Y-axis

- **M** - Manipulated
- **I** - Independent

- **X** - X-axis

Some research papers [6] appear to give results manipulating more than one experimental variable, but this is usually a false impression.

Each manipulated variable is likely to be an experiment in itself, one area where the words 'experiment' and 'research' differ. It is simply more convenient for the researcher to bundle them into one paper, and discuss the overall results.

The researcher above might also study the effects of temperature, or the amount of water on growth, but these must be performed as discrete experiments, with only the conclusion and discussion amalgamated at the end.

Examples of the Independent Variable

Jane Elliott's Anti-Racism Experiment

Third grade teacher Jane Elliott's famous experiment involved dividing her class into two groups: blue-eyed and brown-eyed children. She gave the blue-eyed children extra privileges and emphasized how superior they were to the brown-eyed, who were now a "minority group."

As a result, the brown-eyed children saw a drop in confidence, academic performance and an increase in bullying. However, when she later labelled the blue-eyed group as the inferior, these effects were reversed.

Here, the independent variable was group status, i.e. whether the children were in the privileged group or not. This had various observable effects on the children. Importantly, the eye color of the children was *not* the independent variable here. Eye color was an arbitrary choice made by the teacher to draw parallels to racism and prejudice.

Mini-quiz 2

Can you identify a possible dependent variable in this experiment?

1. Level of bullying
2. Academic performance
3. Confidence level
4. All of the above

What do you think is correct? The answer is at the bottom of the article.

Bandura Bobo Doll Experiment

In the Bandura Bobo Doll experiment [7], whether the children were exposed to an aggressive adult, or to a passive adult, was the independent variable.

This experiment is a prime example of how the concept of experimental variables can become a little complex. Bandura also studied the differences between boys and girls, with gender as an independent variable. Surely, this is breaking the rules of only having one manipulated variable!

In fact, this is a prime example of performing multiple experiments at the same time. If you study the structure of the research design [8], you will see that the Bobo Doll Experiment should have been called the Bobo Doll Experiments.

It was actually four experiments, each with their own hypothesis [3] and variables, running concurrently. It would have been expensive, and possibly unethical [9], to test the children four times and, if the same children were used each time, their behavior may have changed with repetition.

Careful design allowed Bandura to test different hypotheses [10] as part of the same research.

Mini-quiz 3

Can you identify the separate independent variables in this experiment? Pick two.

1. Presence or absence of Bobo doll
2. Gender of the role models
3. Aggressiveness of the role models
4. Number of children

The answer is at the bottom of the article.

Mini-quiz Answers:

Mini-quiz 1

Can you identify the independent variable in this experiment?

Option 3. Participation on the training program.

The researcher could manipulate the variable of whether students participated on the program or not, then measure the results, for example their score on a final test.

Mini-quiz 2

Can you identify a possible dependent variable in this experiment?

Option 4. All of the above.

The experiment measured the children's overall behavior. But this could have been broken into separate dependent variables, for example academic performance, level of bullying, or confidence levels.

Mini-quiz 3

Can you identify the separate independent variables in this experiment? Pick two.

Option 2 and 3. The gender of the role models and the aggressiveness of the role models.

Bandura was interested to see if a child would imitate their role model, but he also wanted to see if a child was more likely to imitate them if they were of the same gender.

Source URL: <https://explorable.com/independent-variable?gid=1580>

Links

- [1] <https://explorable.com/dependent-variable>
- [2] <https://explorable.com/controlled-variables>
- [3] <https://explorable.com/research-hypothesis>
- [4] http://en.wikipedia.org/wiki/Dependent_variable
- [5] <https://explorable.com/statistically-significant-results>
- [6] <https://explorable.com/write-a-research-paper>
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