

STATION 2

Independent & Dependent Variables

In scientific experiments there are 2 variables. One that YOU control and one that is the result.

Variable – something in the experiment that is changed

1. Independent (manipulated) variable – ‘The Cause’

The one thing that YOU change in an experiment. On a graph it is on the X-axis.

2. Dependent (responding) variable – ‘The Effect’

The result of the experiment, what YOU measure. It ‘depends’ on what YOU changed.

On a graph, it is on the Y-axis.

The independent variable causes the dependent variable to change!

Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to test this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.



1. What was the initial observation?

Homer saw the shower is covered in green slime.

Identify the -

2. Control Group

½ of the shower with water

3. Independent (Manipulated) Variable

Coconut Juice

4. Dependent (Responding) Variable

How much of the slime disappeared

5. What should Homer's conclusion be?

No, the coconut juice and water is not effective at removing the green slime from the shower.

STATION 2

Smithers thinks that a special juice will increase the productivity of workers. He creates two groups of 50 workers and assigns each group the same task (in this case, they're supposed to staple a set of papers). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Smithers counts how many stacks of papers each group has made. Group A made 1,500 stacks. Group B made 2,000 stacks.



Identify the -

6. Control Group
Group B

7. Independent (Manipulated) Variable
Special Juice

8. Dependent (Responding) Variable
How many stacks of papers are stapled
-Group A 1,500 stacks
-Group B 2,000 stacks

9. What should Smithers conclusion be?

The special juice given to Group A during the experiment had no effect on the number of papers stapled. The special juice is not effective.

10. How could this experiment be improved upon?

***Answers will vary**

***Include more workers in each group.**

Lisa is working on a science project. Her task is to answer the question: "Does Rogooti (which is a commercial hair product) affect the speed of hair growth?" Her family is willing to volunteer for the experiment.



11. Describe how Lisa would perform this experiment. Identify the control group, and the independent and dependent variables in your description.

***Answers will vary**

***Control: Marge (mom) that has no Rogooti applied.**

***Independent Variable: Rogooti (hair product)**

***Dependent Variable: How long (#) hair has grown**

STATION 3

Independent & Dependent Variables

In scientific experiments there are 2 variables. One that YOU control and one that is the result.

Variable – something in the experiment that is changed

1. Independent (manipulated) variable – ‘The Cause’

The one thing that YOU change in an experiment. On a graph it is on the X-axis.

2. Dependent (responding) variable – ‘The Effect’

The result of the experiment, what YOU measure. It ‘depends’ on what YOU changed.

On a graph, it is on the Y-axis.

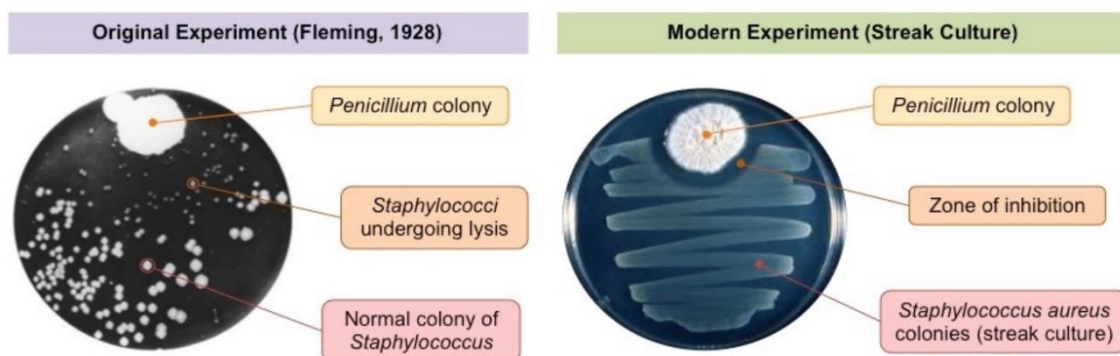
The independent variable causes the dependent variable to change!

How Penicillin, an Antibiotic, Was Discovered

In 1928, Sir Alexander Fleming was studying Staphylococcus bacteria growing in culture dishes. He noticed that a mold called Penicillium was also growing in some of the dishes. A clear area existed around the mold because all the bacteria that had grown in this area had died. In the culture dishes without the mold, NO clear areas were present.

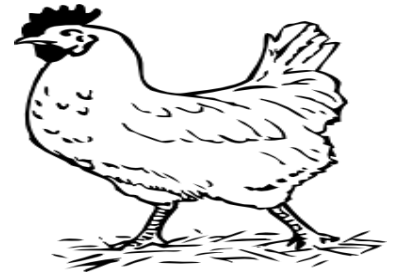
Fleming hypothesized that the mold must be producing a chemical that killed the bacteria. He decided to isolate this substance and test it to see if it would kill bacteria. Fleming transferred the mold to a nutrient broth solution. This solution contained all the materials the mold needed to grow. After the mold grew, he removed it from the nutrient broth and then added the broth to a culture of bacteria. He observed that the bacteria in the culture died. Fleming's experiments were later used to develop antibiotics.

1. State the question or problem that Fleming investigated. Does mold (*Penicillium*) kill bacteria?
2. What was Fleming's hypothesis? If *Penicillium* is applied to the bacteria, then there will be a large number of bacteria that die.
3. How was the hypothesis tested? Isolated mold & applied it to a petri dish full of living bacteria
4. This experiment lead to the development of what major medical advancement? Antibiotics



The Strange Case of Beriberi

*In 1887 a strange nerve disease attacked the people in the Dutch East Indies. The disease was beriberi. Symptoms of the disease included weakness and loss of appetite, victims often died of heart failure. Scientists thought the disease might be caused by bacteria. They injected chickens with bacteria from the blood of patients with beriberi. The injected chickens became sick. However, so did a group of chickens that were **not** injected with bacteria.*



One of the scientists, Dr. Eijkman, designed a new experiment based on his own observations. Before the experiment, all the chickens had eaten whole-grain rice, but during the experiment, the chickens were fed polished white rice. Dr. Eijkman researched this interesting case and found that polished white rice lacked thiamine, a vitamin necessary for good health.

5. State the question or problem that Dr. Eijkman investigated. Does feeding chickens white rice vs. brown rice affect their ability to contract the disease Beriberi?

6. What was the original hypothesis (if-then statement)? If Beriberi is injected into chickens, then the chickens will become sick.

7. What was the independent (manipulated) variable and the dependent (responding) variable?

Independent Variable: White Rice Dependent Variable: How many chickens have Beriberi

8. Write a statement that summarizes the results of the experiment. At first, Dr. Eijkman believed that Beriberi was caused by bacteria in the blood of humans. Upon carrying out an experiment based on diet with rice, Dr. Eijkman confirmed that white rice lacks a necessary vitamin in chickens that protects against Beriberi (hence, why they become sick) vs. chickens that eat a whole-grain diet of brown rice and receive this vitamin to be protected against Beriberi. If Beriberi was caused by bacteria, ALL chickens would become ill regardless of what they ate. Therefore, Beriberi is NOT caused by bacteria, but rather a vitamin deficiency.

9. Was the hypothesis proven to be true or false? False because Beriberi affected chickens that were not injected with the disease to begin with

10. How would Dr. Eijkman test his new hypothesis? *Answers will vary* He could test out his hypothesis on people.