

Daniel and the scientific method



Objectives

- 1) To read and apply information in a text to parts and steps of the scientific method
- 2) To use patterns as evidence to support an explanation.
- 3) To identify cause and effect relationships and use them to explain change.

Questions

1. What was the question to be answered?
2. What was the independent or manipulated variable?
3. What was the dependent or responding variable?
4. What were the constants?
5. Who was in the control group?
6. How many/who subjects were part of the experimental cohort?
7. What was Daniel's hypothesis?
8. How long did the trial last?
9. Patterns can be used as evidence to support an explanation. When the guard compared and contrasted the two groups of experimental subjects, what pattern did he notice?
10. Cause and effect relationships are routinely identified, tested, and used to explain change. What cause and effect relationship did the guard examine?
11. How did the guard analyze and interpret the results of the experiment? What conclusion did the guard draw?

A **variable** is something that can
vary or change.

Scientists talk about 2 types in every experiment.

**INDEPENDENT or
manipulated**

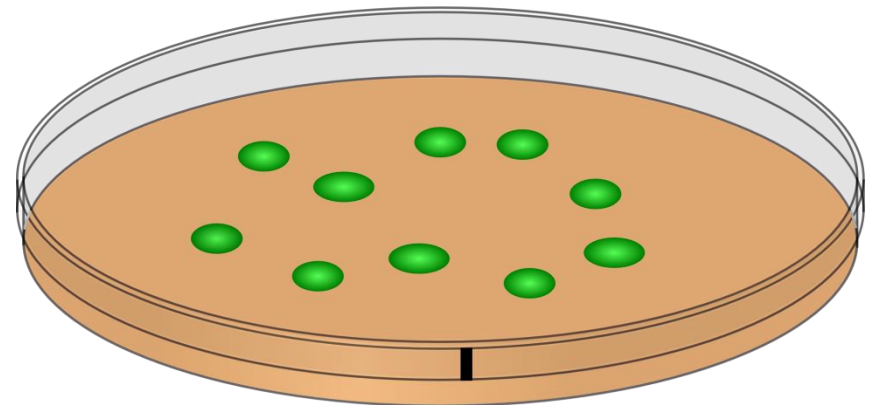
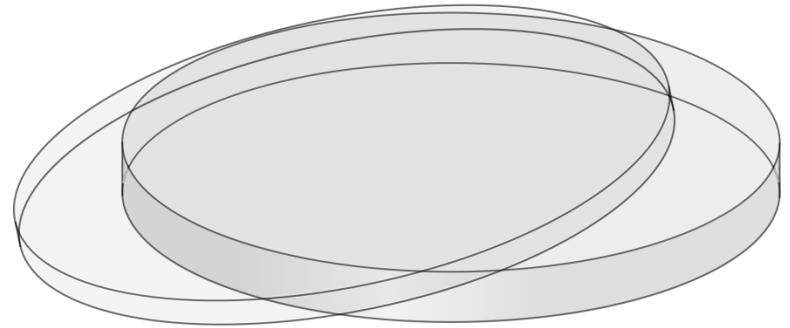
The one thing (variable)
being tested

**DEPENDENT or
responding**

What happened or what
responds in the
experiment or is
measured

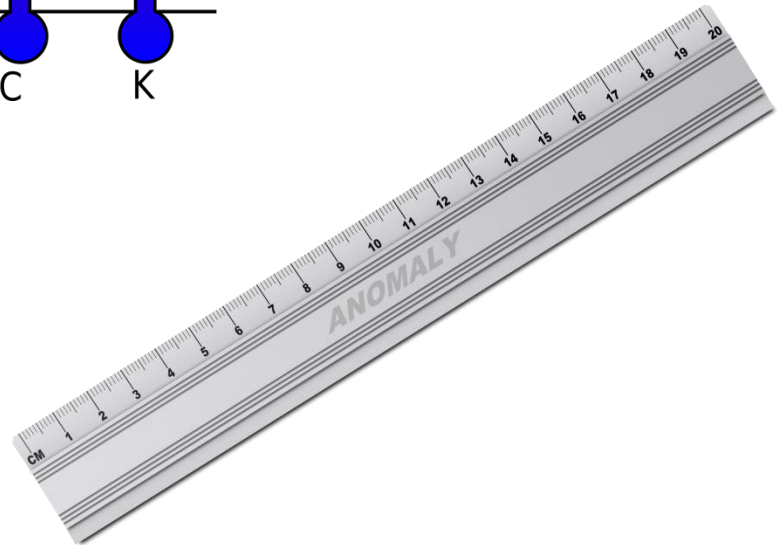
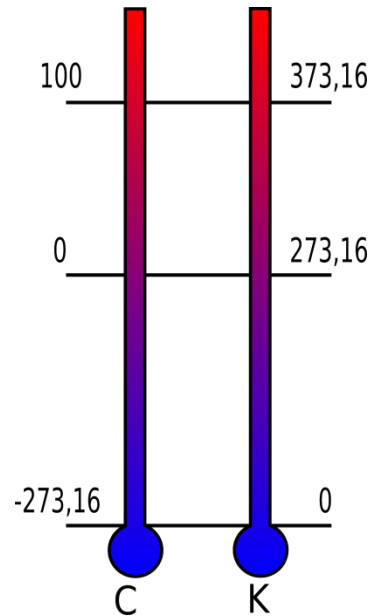
Independent Variable (also called the Manipulated Variable)

- What you are testing in an experiment
- The cause
- Purposely changed
- experimenter changes this



Dependent Variable (also called the responding variable)

- What you are measuring in an experiment
- Creates data
- The effect



Hypothesis (plural – hypotheses)

Special kind of prediction; an educated guess

a hypothesis can be written using
an If, Then statement

• **IF** the *independent variable* changes, **THEN** the *dependent variable* changes, because.

–This type of sentence or hypothesis shows what the IV will do to the DV



Sample Hypotheses

IF I study my homework, THEN I will pass the test.

~~~~~

IF I don't water the plants, THEN they will die.



~~~~~

IF I feed the baby, THEN she will stop crying.

Control Group

- Used for comparison
- Gets no treatment
- Includes materials in an experiment that are the same in both the control group and the experimental group
- Unchanged (never changes) throughout experiment
- If it did change, that would make 2 independent variables = NOT GOOD, invalidates the investigation

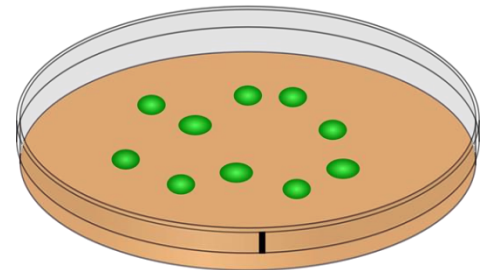
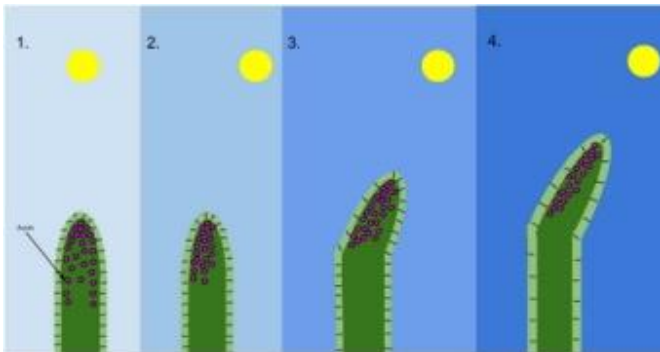
Constants – never change

Using same materials in all investigations (same plants, same amount of sun, same temperature, etc.) so you have only 1 independent variable.



Subject

Person/thing being
tested in experiment.



Trials

The number of times you TRY an investigation or experiment.

Not to be confused with court trials.



Cause and effect

Can be used to explain change. (ie. Fertilizer (independent variable) given to the plants on the right **CAUSED** them to grow faster or taller)



Answer key

What was the question to be answered? Which diet yielded the healthiest subjects

What was the independent or manipulated variable? Type of food (experimental group got vegetables and water; control group ate the King's food and wine)

What was the dependent or responding variable? How healthy the subjects looked

What were the constants? All subjects were captives in Babylon. All subjects were from the royal family and from the nobility— young men without any physical defect, good-looking, suitable for instruction in all wisdom, knowledgeable, perceptive, and capable of serving in the king's palace

Who was in the experimental group? Daniel, Hananiah, Mishael, and Azariah (AKA Daniel, Shadrach, Meshach and Abednego)

Who was in the control group? All other Israelite captives selected for training

How many/who subjects were part of the experimental cohort? 4

What was Daniel's hypothesis? If the four of us eat vegetables and water, then we will look healthier than those eating the King's food and wine.

How long did the trial last? 10 days

Patterns can be used as evidence to support an explanation. When the guard compared and contrasted the two groups of experimental subjects, what pattern did he notice? At the end of 10 days the experimental group looked better and healthier than all the young men who were eating the king's food.

Cause and effect relationships are routinely identified, tested, and used to explain change. What cause and effect relationship did the guard examine? How diet affected health

How did the guard analyze and interpret the results of the experiment? What conclusion did the guard draw? The guard concluded Daniel's hypothesis was correct and continued to remove the King's food and wine, replacing them with water and vegetables.

Additional free resources

Scientific investigation design 1 (plays like Who wants to be a millionaire)

<http://www.quia.com/rr/1100636.html>

Scientific investigations (plays like Jeopardy) <http://www.quia.com/cb/898452.html>

Scientific investigations 2 <http://www.quia.com/rr/1100639.html>



Daniel 7 -12 matching

<http://www.quia.com/jg/2359163.html>

Daniel matching

<http://www.quia.com/jg/1663805.html>

Daniel Rags to Riches

<http://www.quia.com/rr/477487.html>

<http://www.foolsforchrist.net/>

Additional free resources

Scientific Method (plays like Jeopardy) <http://www.quia.com/cb/418964.html>

Scientific Method (Plays like Millionaire) <http://www.quia.com/rr/434162.html>

Scientific Method Jeopardy <http://www.quia.com/cb/490267.html>

Daniel 1- 2 battleship

<http://www.quia.com/ba/520673.html>

Daniel 3 - 12 challenge board

<http://www.quia.com/cb/785700.html>

Daniel 3 - 6 unscramble

<http://www.quia.com/jw/457573.html>

Daniel 3-6 matching

<http://www.quia.com/jg/2360919.html>

<http://www.foolsforchrist.net/>



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