Hypothesis

Key Info

- A hypothesis is an educated guess about how things work.
- Most of the time a hypothesis is written like this: "If _____[I do this] _____, then _____[this]_____ will happen." (Fill in the blanks with the appropriate information from your own experiment.)

- Your hypothesis should be something that you can actually test, what's called a **testable** hypothesis. In other words, you need to be able to measure both "what you do" and "what will happen."

Hypothesis

After having thoroughly researched your question, you should have some educated guess about how things work. This educated guess about the answer to your question is called the hypothesis.

The hypothesis must be worded so that it can be tested in your experiment. Do this by expressing the hypothesis using your independent variable (the variable you change during your experiment) and your dependent variable (the variable you observe-changes in the dependent variable depend on changes in the independent variable). In fact, many hypotheses are stated exactly like this: "If a particular independent variable is changed, then there is also a change in a certain dependent variable."

Example Hypotheses

- "If I open the faucet [faucet opening size is the independent variable], then it will increase the flow of water [flow of water is the dependent variable].
- "Raising the temperature of a cup of water [temperature is the independent variable] will increase the amount of sugar that dissolves [the amount of sugar is the dependent variable]."
- "If a plant receives fertilizer [having fertilizer is the independent variable], then it will grow to be bigger than a plant that does not receive fertilizer [plant size is the dependent variable]."
- "If I put fenders on a bicycle [having fenders is the independent variable], then they will keep the rider dry when riding through puddles [the dependent variable is how much water splashes on the rider]."

Note: When you write your own hypothesis you can leave out the part in the above examples that is in brackets [ ].

Notice that in each of the examples it will be easy to measure the independent variables. This is another important characteristic of a good hypothesis. If we can readily measure the variables in the hypothesis, then we say that the hypothesis is **testable**.

Not every question can be answered by the scientific method. The hypothesis is the key. If you can state your question as a testable hypothesis, then you can use the scientific method to obtain an answer.

Advanced Topic -- Cause & Effect or Correlation?

In some experiments it is not possible to demonstrate that a change in the independent variable **causes** a change in the dependent variable. Instead one may only be able to show that the independent variable is related to the dependent variable. This relationship is called a **correlation**. One of the most common reasons to see a correlation is that other factors not

looked at in the experiment, are responsible for the change in both the independent and the dependent variable. For example, in toddlers sticky hands and stomach aches are correlated. Meaning you see an increase in stomach aches in toddlers with sticky hand. However the sticky hands are not causing the stomach aches. Instead a third factor, candy, is responsible for both the sticky hands and the stomach aches.

Advanced Topic -- Is it OK to Disprove Your Hypothesis?

Is all science accomplished using this same method that is taught in schools and emphasized at science fairs? Should you worry if you end up disproving your hypothesis? Actually, the answers are no it's not, and no don't worry if you disprove your hypothesis. Learn more in this essay (http://www.sciencebuddies.org/science-fair-projects/project_learn_more_weaver.shtml) written by a veteran Science Buddies Adviser, Dr. Bruce Weaver.

Sample

Here is a sample containing the variables and hypothesis (http://www.sciencebuddies.org/science-fair-projects/project_sample_variables.shtml).

Our staff scientists put together a set of tips for writing Tips for Writing A Strong Hypothesis (http://www.sciencebuddies.org/blog/2010/02/a-strong-hypothesis.php).

Hypothesis Checklist

What Makes a Good Hypothesis?	For a Good Hypothesis, You Should Answer "Yes" to Every Question
Is the hypothesis based on information contained in the Research Paper?	Yes / No
Does the hypothesis include the independent and dependent variables?	Yes / No
Have you worded the hypothesis so that it can be tested in the experiment?	Yes / No
If you are doing an engineering or programming project, have you established your design criteria?	Yes / No

References

Hypothesis. (2006, December 8). In *Wikipedia, The Free Encyclopedia*. Retrieved August 29, 2006, from http://en.wikipedia.org/w/index.php?title=Hypothesis&oldid=93038705
