

## The Hypothesis

One of the major cornerstones of any good science is a testable hypothesis. As a review I have include the definition from Merriam-Webster and a few notes as a refresher on the basics of a formal scientific hypothesis. As we embark on our fieldtrips to collect data, having a sampling plan, or framework, built on a testable hypothesis will help us collect relevant data once in the field.

### Hypothesis – as per Merriam-Webster

Etymology: Greek, from *hypotithenai* to put under, suppose

**1 a :** an assumption or concession made for the sake of argument **b :** an interpretation of a practical situation or condition taken as the ground for action

**2 : a tentative assumption made in order to draw out and test its logical or empirical consequences**

**3 :** the antecedent clause of a conditional statement

**HYPOTHESIS** implies insufficient evidence to provide more than a tentative explanation (e.g. a *hypothesis* explaining the extinction of the dinosaurs).

**THEORY** implies a greater range of evidence and greater likelihood of truth (e.g. the *theory* of evolution).

**LAW** implies a statement of order and relation in nature that has been found to be invariable under the same conditions (e.g. the *law* of gravitation).

A hypothesis is a tentative statement that proposes a possible explanation to some phenomenon or event. A useful hypothesis is a **testable** statement which may include a prediction. Notice that these statements below contain the words, **if** and **then**. They are necessary in a formalized hypothesis. Formalized hypotheses contain two variables. One is "independent" and the other is "dependent." The independent variable is the one you, the "scientist" control and the dependent variable is the one that you observe and/or measure the results. The ultimate value of a formalized hypothesis is it forces us to think about what results we should look for in an experiment or a field study.

- "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]."

Once you are comfortable with the "dependant" and the "independent" variables of a study, alternate scientific language can be used to re-state the hypothesis for a scientific report.

### What Makes a Good Hypothesis?

Is the hypothesis based on information contained in the Research Paper?

Does the hypothesis include the independent and dependent variables?

Have you worded the hypothesis so that it can be tested in the experiment?

For an engineering or programming project, have you established your design criteria?

*A formal scientific hypothesis should not, however, be confused with:*

#### Prediction

A prediction or forecast is a statement about the way things will happen in the future, often but *not always based on experience or knowledge*.

#### Assertion

An assertion is a positive statement or declaration, *often without support or reason*.

#### Opinion

1. a belief or judgment that rests on *grounds insufficient to produce complete certainty*.
2. a *personal view, attitude, or appraisal*.