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# Types of Scientific Investigations

*Scientific investigations are organized attempts to seek out, describe, explain, and predict natural phenomena. Scientific investigations are often performed to explore new phenomena, verify the results of previous investigations, test theoretical predictions, and discriminate between competing theories.*

## Overview

There are many different types of scientific investigations. Some investigations involve:

- observing and describing objects, organisms, and events
- collecting specimens
- seeking more information
- performing a controlled scientific experiment
- making models

The type of scientific investigation that is chosen depends on the question to be answered, although it is possible for scientists to combine aspects of more than one type of investigation.

## Observing and Describing Objects, Organisms, and Events

Some investigations focus mainly on making observations. This type of investigation is often performed when studying objects, organisms, or events in nature.

For example, if a scientist wants to investigate how gorillas behave in the wild, he must observe gorillas in their natural habitat and describe

what he sees in a journal.



## Collecting Specimens

Specimens are often collected when a scientist wants to compare and contrast different objects, such as rocks, or organisms, such as insects.



For example, a scientist might collect specimens of a particular kind of insect from many different locations. By documenting observations about the specimens, the scientist can precisely define several general aspects of the insect, such as its color, leg length, and head size, while also comparing differences that may have developed within the species as a result of inhabiting different geographical locations.

## Seeking More Information

When new phenomena are observed, it may be necessary to seek more information. This is especially important in cases where the new phenomena appears to refute well-accepted scientific principles.

For example, if someone claims to invent a machine that can boil water at less than 100°C, it might be necessary to seek more information



about the conditions in which the machine is operating.

## Performing a Controlled Scientific Experiment

If the conditions of an experiment must be very precise, or if an object or organism is not being studied in its natural setting, it may be beneficial to perform a laboratory experiment.

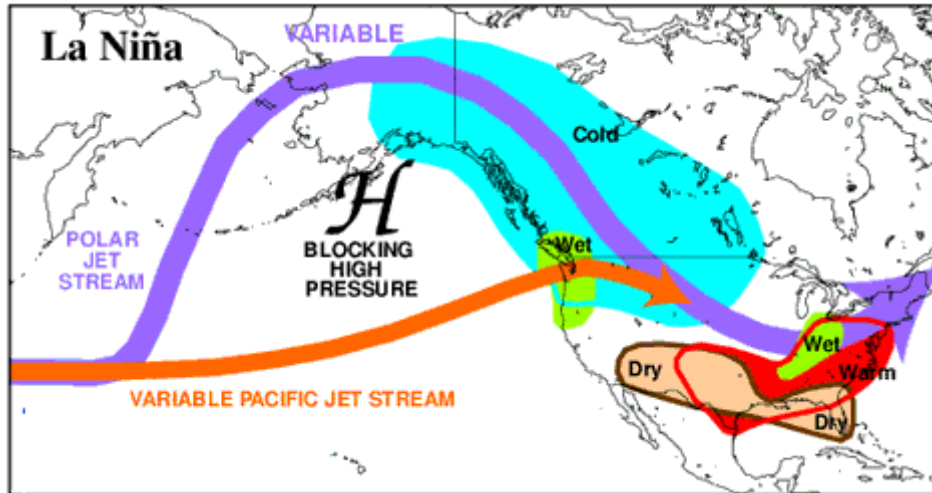


Conditions can be controlled in a laboratory experiment.

In a controlled scientific experiment, there should be an independent variable, a dependent variable, and a control. The independent variable is the factor in the experiment that is manipulated by the researcher. The dependent variable is the factor in the experiment that changes in response to the independent variable. Controls in an experiment are used as comparison factors, and they can help determine the magnitude of the experiment's results.

## Making Models

Making a model of something that is too large, rare, complex, or dangerous to fully observe in person can help scientists understand how it works.



For example, scientists might use a computer simulation program to predict weather patterns. By entering past and present weather conditions and phenomena, scientists can collect data from a large span of time and attempt to predict future weather patterns.

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