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How the Scientific Method Works

by William Harris

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Introduction to How the Scientific Method Works

We hear about the scientific method every day. Middle and high school students learn about it in science class and use it in research competitions. Advertisers use it to support claims about products ranging from vacuum cleaners to vitamins. And Hollywood portrays it by showing scientists with clipboards and lab coats standing behind microscopes and flasks filled with bubbling liquids.

flashfilm/Getty Images

You don't have to wear a white coat and goggles to use the scientific method.

So why does the scientific method remain such a mystery to so many people? One reason has to do with the name itself. The word "method" implies that there is some sacred formula locked in a vault -- a formula available to highly trained scientists and no one else. This is absolutely untrue. The scientific method is something all of us use all of the time. In fact, engaging in the basic activities that make up the scientific method -- being curious, asking questions, seeking answers -- is a natural part of being human.

Up Next

- **How Evolution Works**
- **How Telescopes Work**
- **Curiosity Proiject: What is the "astonishing hypothesis?"**

In this article, we'll demystify the scientific method by breaking it down to its basic parts.

We'll explore how the scientific method can be used to solve everyday problems, but we'll also explain why it is so fundamentally critical to the physical and natural sciences. We'll also examine a few examples of how the method has been applied to make landmark discoveries and support groundbreaking theories. But let's start with a basic definition.

Ask a group of people to define "science," and you'll get a lot of different answers. Some will tell you it's a really difficult class wedged between social studies and math. Others will tell you it's a dusty book filled with Latin terms that no one can pronounce. And still others will say it's a useless collection of facts, figures and formulas. Unfortunately, most dictionaries don't shed any significant light on the subject. Here's a typical definition:

> Science is the intellectual and practical activity encompassing the structure and behavior of the physical and natural world through observation and experimentation [source: Oxford American Dictionary].

Sounds difficult, right? Not if we break this long-winded definition into its most important parts. By doing so, we'll achieve two things: First, we'll support the argument that science isn't mysterious or unattainable. Second, we'll demonstrate that the method of science is really no different than science itself.

Scientific Method Definition

Let's break down the definition of science.

Part 1

Science is **practical**. Although science sometimes involves learning from textbooks or professors in lecture halls, its primary activity is discovery. Discovery is an active, hands-on process, not something done by scholars isolated from the world in ivory towers. It is both a search for information and a quest to explain how information fits together in meaningful ways. And it almost always seeks answers to very practical questions: How does human activity affect global warming? Why are honeybee populations suddenly declining in North America? What enables birds to migrate such long distances? How do black holes form?

Part 2

Science is based on **observation**. Scientists use all of their senses to gather information about the world around them. Sometimes they gather this information directly, with no intervening tool or apparatus. Other times they use a piece of equipment, such as a telescope or microscope, to gather information indirectly. Either way, scientists will write down what they see, hear and feel. These recorded observations are called **data**.

Part 3

Data can reveal the **structure** of something. This is **quantitative data**, which describes an object numerically. The following are examples of quantitative data:

- The body temperature of a ruby-throated hummingbird is 40.5°C (105°F).
- The speed of light is 299,792,458 meters per second (670,635,729 mph).
- The diameter of Jupiter is 142,984 kilometers (88,846 miles).
- The length of a blue whale is 30.5 meters (100 feet).

Notice that quantitative data consist of a number followed by a unit. The unit is a standardized way to measure a certain dimension or quantity. For example, the foot is a unit of length. So is the meter. In science, the International System (SI) of units, the modern form of the metric system, is the global standard.

Ron Levine/Photographers Choice/ Getty Images

Scientists of all ages use all of their senses to observe the world around them.

Part 4

Data can also reveal **behavior**. This is **qualitative data**, which are written descriptions about an object or organism. John James Audubon, the 19th-century naturalist, ornithologist and painter, is famous for the qualitative observations he made about bird behavior, such as this one:

> Generally, scientists collect both quantitative and qualitative data, which contribute equally to the body of knowledge associated with a certain topic. In other words, quantitative data is not more important or more valuable because it is based on precise measurements [source: Audubon].

Next we'll learn about science as a systematic, intellectual pursuit.

Scientific Method Parts

Part 5

Science is an **intellectual** pursuit. Making observations and collecting data are not the ultimate goals. Data must be analyzed and used to understand the world around us. This requires **inductive reasoning**, or the ability to derive generalizations based on specific observations. There are many classic examples of inductive reasoning throughout the history of science, but let's look at one to understand how this intellectual exercise works.

In 1919, when **Edwin Hubble** (of Hubble Space Telescope fame) arrived on California's Mount Wilson to use the 100-inch Hooker Telescope, then the world's largest, astronomers generally believed that the entire universe consisted of a single galaxy -- the Milky Way. But as Hubble began making observations with the Hooker Telescope, he noticed that objects known as "nebulae," thought to be components of the Milky Way, were located far beyond its boundaries. At the same time, he observed that these "nebulae" were moving rapidly away from the Milky Way. Hubble used these observations to make a groundbreaking generalization in 1925: The universe wasn't made up of one galaxy, but millions of them. Not only that, Hubble argued, but all galaxies were moving away from each other due to a uniform expansion of the universe.

Margaret Bourke-White/Time & Life Pictures/Getty Images

Astronomer Edwin Hubble looks though the eyepiece of the 100-inch telescope at the Mt. Wilson Observatory in 1937.

Part 6

Science makes predictions and tests those predictions using **experiments**. Generalizations are powerful tools because they enable scientists to make predictions. For example, once Hubble asserted that the universe extended far beyond the Milky Way, it followed that astronomers should be able to observe other galaxies. And as telescopes improved, they did discover galaxies -- thousands and thousands of them, in all different shapes and sizes. Today, astronomers believe that there are about 125 billion galaxies in the universe. They've also been able to conduct numerous experiments over the years to support Hubble's notion that the universe is expanding.

One classic experiment is based on the **Doppler effect**. Most people know the Doppler effect as a phenomenon that occurs with sound. For example, as an ambulance passes us on the street, the sound of its siren seems to change pitch. As the ambulance approaches, the pitch increases; as it passes, the pitch decreases. This happens because the ambulance is either moving closer to the sound waves it is creating (which decreases the distance between wave crests and increases pitch) or moving away from them (which increases the distance between wave crests and decreases pitch).

Astronomers hypothesized that light waves created by celestial objects would behave the same way. They made the following educated guesses: If a distant galaxy is rushing toward our galaxy, it will move closer to the light waves it is producing (which decreases the distance between wave crests and shifts its color to the blue end of the spectrum). If a distant galaxy is rushing away from our galaxy, it will move away from the light waves it is creating (which increases the distance between wave crests and shifts its color to the red end of the spectrum).

To test the hypothesis, astronomers used an instrument known as a spectrograph to view the **spectra**, or bands of colored light, produced by various celestial objects. They recorded the wavelengths of the spectral lines, and their intensities, collecting data that eventually proved the hypothesis to be correct.

Part 7

Science is **systematic**. It is rigorous and methodical, requiring that tests be repeated so results can be verified. The hypothetical redshift described above has been proven in repeated experiments. In fact, it's so well documented that it has become an integral part of the Big Bang, a theory that describes how the universe expanded from an extremely dense and hot state.

So, science can be thought of as a way of thinking, but also as a way of working -- a process requiring scientists to ask questions, make hypotheses and test their hypotheses through experimentation. This process is known today as the scientific method, and its basic principles are used by researchers in every discipline, in every part of the world.

And yet it was not always so -- the move to scientific inquiry evolved slowly over time. In the next section, we'll look more closely at the history of the scientific method to better understand how it developed.

History of the Scientific Method

The **Dark Ages**, circa A.D. 500 to 1100, were characterized by a general erosion of civilization. Knowledge from the ancient Romans survived in only a few monasteries and cathedral and palace schools, while knowledge from ancient Greece almost disappeared completely. From right before the Dark Ages until about a century after, there were almost no important scientific advances. The Catholic Church became very powerful in Europe, and religious dogma governed much of what people thought and believed. Those whose beliefs or practices strayed from the church were "rehabilitated" and brought back into the fold. Resistance often led to persecution.

William Radcliffe/Science Faction/Getty Images

Copernicus observed that the planets revolved around the sun, not Earth.

Then, in what is now known as the **Renaissance** of the 12th century, came a period of reawakening. As European scholars became exposed to knowledge and cultures cultivated in the Islamic world and other regions beyond their boundaries, they became reacquainted with the works of ancient scholars like Aristotle, Ptolemy and Euclid. This provided a common platform and vocabulary on which to build an extended scientific community that could share ideas and inspire creative problem-solving.

Some of the important thinkers to emerge during and after the Renaissance include:

- **Albertus Magnus** (1193-1250) and **Thomas Aquinas** (1225-1274), two students of **scholasticism**, a philosophical system emphasizing the use of reason in exploring questions of philosophy and theology. Magnus made a distinction between revealed truth (revelation of something unknown through a divine power) and experimental science and made many scientific observations in astronomy, chemistry, geography and physiology.
- **Roger Bacon** (c.1210-c.1293), an English Franciscan friar, philosopher, scientist and scholar who called for an end to blind acceptance of widely accepted writings. In particular, he targeted Aristotle's ideas, which, while valuable, were often accepted as fact even when evidence did not support them.
- **Francis Bacon** (1561-1626), a successful lawyer and influential philosopher who did much to reform scientific thinking. In his "Instauratio Magna," Bacon proposed a new approach to scientific inquiry, which he published in 1621 as the "Novum Organum Scientiarum." This new approach advocated inductive reasoning as the foundation of scientific thinking. Bacon also argued that only a clear system of scientific inquiry would assure man's mastery over the world.

Francis Bacon was the first to formalize the concept of a true scientific method, but he didn't do so in a vacuum. The work of **Nicolaus Copernicus** (1473-1543) and **Galileo Galilei** (1564-1642) influenced Bacon tremendously. Copernicus proposed from his observations that the planets of the solar system revolved around the sun, not Earth. Galileo was able to confirm this sun-centered structure when he used a telescope that he designed to collect data on, among other things, the moons of Jupiter and the phases of Venus. Galileo's biggest contribution, however, may have been his systematic study of motion, which was based on simple mathematical descriptions.

By the time of Galileo's death, the stage had been set for a true revolution in scientific thinking. **Isaac Newton** (1642-1727) did much to drive this revolution forward. Newton's work in mathematics resulted in integral and differential calculus. His work in astronomy helped to define the laws of motion and universal gravitation. And his studies in optics led to the first reflecting telescope. A common theme running through all of Newton's work was an uncanny ability to develop a few relatively simple concepts and equations that held enormous predictive power. His unified systems of laws have withstood centuries of testing and scrutiny and continue to enable scientists to explore ongoing mysteries in physics and astronomy.

It's safe to say that the span of Newton's career marks the beginning of modern science. As the 19th century dawned, science was established as an independent and respected field of study, and the scientific method -- based on observation and testing -- was being embraced all over the world. A classic example of how science had evolved into a collaborative endeavor leading to incremental knowledge can be found in the development of what we know today as the **cell theory**.

Cell Theory

The discovery of the cell was made possible by the invention of the microscope, which was made possible by improved lens-grinding techniques. **Antoni van Leeuwenhoek** (1632-1723), a Dutch tradesman, learned to grind lenses and assemble them into simple microscopes. His contemporary **Robert Hooke** (1635-1703) used such an instrument to observe cork cells, sketches of which appeared in his 1665 publication "Micrographia." Inspired by Hooke's work, Leeuwenhoek began making microscopic examinations of his own. In 1678, he reported to the Royal Society that he had discovered "little animals" -- bacteria and protozoa -- in various samples. The society asked Hooke to confirm Leeuwenhoek's findings, and he did.

Aaron Bell/Visuals Unlimited/Getty Images

In 1678, Antoni van Leeuwenhook reported that he had observed "little animals" -- protozoa -- through a microscope.

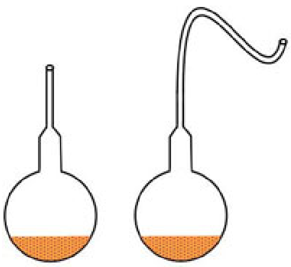
This paved the way for wide acceptance that a hidden world existed just beyond the limits of human vision and encouraged many scientists to take up the microscope in their investigations. One such scientist was German botanist **Matthias Jakob Schleiden** (1804-1881), who looked at numerous plant samples. Schleiden was the first to recognize that all plants, and all the different parts of plants, are composed of cells. While having dinner with zoologist **Theodor Schwann** (1810-1882), Schleiden mentioned his idea. Schwann, who came to similar conclusions while studying animal tissues, quickly saw the implications of their work. In 1839, he published "Microscopic Investigations on the Accordance in the Structure and Growth of Plants and Animals," which included the first statement of the cell theory: All living things are made up of cells.

Then, in 1858, **Rudolf Virchow** (1821-1902) extended the work of Schleiden and Schwann by proposing that all living cells must rise from pre-existing cells. This was a radical idea at the time because most people, scientists included, believed that nonliving matter could spontaneously generate living tissue. The inexplicable appearance of maggots on a piece of meat was often given as evidence to support the concept of spontaneous generation. But a famous scientist by the name of **Louis Pasteur** (1822-1895) set out to disprove spontaneous generation with a now-classic experiment that both firmly established the cell theory beyond doubt and solidified the basic steps of the modern scientific method.

Pasteur's Experiment

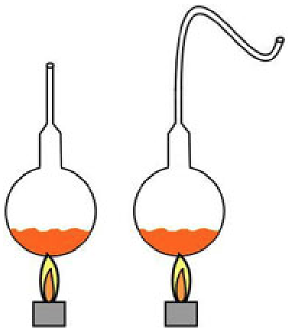
The steps of Pasteur's experiment are outlined below:

1. First, Pasteur prepared a nutrient broth similar to the broth one would use in soup.
2. Next, he placed equal amounts of the broth into two long-necked flasks. He left one flask with a straight neck. The other he bent to form an "S" shape.

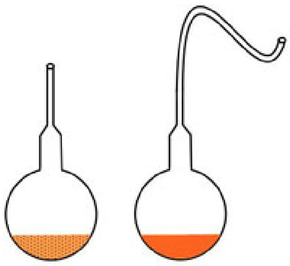


Images courtesy William Harris

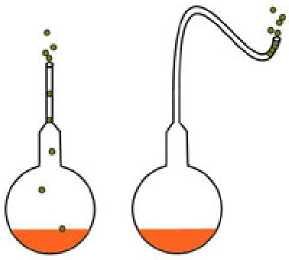
3. Then he boiled the broth in each flask to kill any living matter in the liquid. The sterile broths were then left to sit, at room temperature and exposed to the air, in their open-mouthed flasks.



4. After several weeks, Pasteur observed that the broth in the straight-neck flask was discolored and cloudy, while the broth in the curved-neck flask had not changed.



5. He concluded that germs in the air were able to fall unobstructed down the straight-necked flask and contaminate the broth. The other flask, however, trapped germs in its curved neck, preventing them from reaching the broth, which never changed color or became cloudy.



6. If spontaneous generation had been a real phenomenon, Pasteur argued, the broth in the curved-neck flask would have eventually become reinfected because the germs would have spontaneously generated. But the curved-neck flask never became infected, indicating that the germs could only come from other germs.

Pasteur's experiment has all of the hallmarks of modern scientific inquiry. It begins with a hypothesis and it tests that hypothesis using a carefully controlled experiment. This same process -- based on the same logical sequence of steps -- has been employed by scientists for nearly 150 years. Over time, these steps have evolved into an idealized methodology that we now know as the scientific method.

Let's look more closely at these steps.

Scientific Method Steps

As more proof that there is no one way to "do" science, different sources describe the steps of the scientific method in different ways. Some list three steps, some four and some five. Fundamentally, however, they incorporate the same concepts and principles.

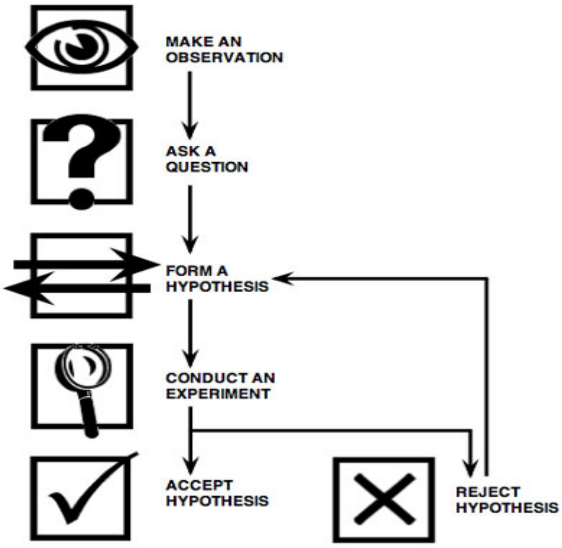


Image courtesy William Harris

For our purposes, we're going to say that there are five key steps in the method.

Step 1: Make an observation
Almost all scientific inquiry begins with an observation that piques curiosity or raises a question. For example, when **Charles Darwin** (1809-1882) visited the Galapagos Islands (located in the Pacific Ocean, 950 kilometers west of Ecuador), he observed several species of finches, each uniquely adapted to a very specific habitat. In particular, the beaks of the finches were quite variable and seemed to play important roles in how the birds obtained food. These birds captivated Darwin. He wanted to understand the forces that allowed so many different varieties of finch to coexist successfully in such a small geographic area. His observations caused him to wonder, and his wonderment led him to ask a question that could be tested.

Step 2: Ask a question
The purpose of the question is to narrow the focus of the inquiry, to identify the problem in specific terms. The question Darwin might have asked after seeing so many different finches was something like this: What caused the diversification of finches on the Galapagos Islands?

Here are some other scientific questions:

- What causes the roots of a plant to grow downward and the stem to grow upward?
- What brand of mouthwash kills the most germs?
- Which car body shape reduces air resistance most effectively?
- What causes coral bleaching?
- Does green tea reduce the effects of oxidation?
- What type of building material absorbs the most sound?

Coming up with scientific questions isn't difficult and doesn't require training as a scientist. If you've ever been curious about something, if you've ever wanted to know what caused something to happen, then you've probably already asked a question that could launch a scientific investigation.

Step 3: Formulate a hypothesis
The great thing about a question is that it yearns for an answer, and the next step in the scientific method is to suggest a possible answer in the form of a **hypothesis**. A hypothesis is often defined as an educated guess because it is almost always informed by what you already know about a topic. For example, if you wanted to study the air-resistance problem stated above, you might already have an intuitive sense that a car shaped like a bird would reduce air resistance more effectively than a car shaped like a box. You could use that intuition to help formulate your hypothesis.

Generally, a hypothesis is stated as an "if … then" statement. In making such a statement, scientists engage in **deductive reasoning**, which is the opposite of inductive reasoning. Deduction requires movement in logic from the general to the specific. Here's an example: If a car's body profile is related to the amount of air resistance it produces (general statement), then a car designed like the body of a bird will be more aerodynamic and reduce air resistance more than a car designed like a box (specific statement).

Notice that there are two important qualities about a hypothesis expressed as an "if … then" statement. First, it is testable; an experiment could be set up to test the validity of the statement. Second, it is falsifiable; an experiment could be devised that might reveal that such an idea is not true. If these two qualities are not met, then the question being asked cannot be addressed using the scientific method.

More Scientific Method Steps

Step 4: Conduct an experiment
Many people think of an experiment as something that takes place in a lab. While this can be true, experiments don't have to involve laboratory workbenches, Bunsen burners or test tubes. They do, however, have to be set up to test a specific hypothesis and they must be controlled. Controlling an experiment means controlling all of the variables so that only a single variable is studied. The **independent variable** is the one that's controlled and manipulated by the experimenter, whereas the **dependent variable** is not. As the independent variable is manipulated, the dependent variable is measured for variation. In our car example, the independent variable is the shape of the car's body. The dependent variable -- what we measure as the effect of the car's profile -- could be speed, gas mileage or a direct measure of the amount of air pressure exerted on the car.

Controlling an experiment also means setting it up so it has a **control group** and an **experimental group**. The control group allows the experimenter to compare his test results against a baseline measurement so he can feel confident that those results are not due to chance. For example, in the Pasteur experiment described earlier, what would have happened if Pasteur used only a curved-neck flask? Would he have known for sure that the lack of bacteria growth in the flask was because of its design? No, he needed to be able to compare the results of his experimental group against a control group. Pasteur's control was the flask with the straight neck.


Noel Hendrickson/Digital Vision/ Getty Images

If this scientist is doing his job right, he's observing a control group and an experimental

Now consider our air-resistance example. If we wanted to run this experiment, we would need at least two cars -- one with a streamlined, birdlike shape and another shaped like a box. The former would be the experimental group, the latter the control. All other variables -- the weight of the cars, the tires, even the paint on the cars -- should be identical. Even the track and the conditions on the track should be controlled as much as possible.

Step 5: Analyze data and draw a conclusion
During an experiment, scientists collect both quantitative and qualitative data. Buried in that information, hopefully, is evidence to support or reject the hypothesis. The amount of analysis required to come to a satisfactory conclusion can vary tremendously. Because Pasteur's experiment relied on qualitative observations about the appearance of the broth, his analysis was fairly straightforward. Sometimes, sophisticated statistical tools have to be used to analyze data. Either way, the ultimate goal is to prove or disprove the hypothesis and, in doing so, answer the original question.

Scientific Method Applications

Remember, this is an idealized methodology. Scientists don't sit around with a five-step checklist that they feel obligated to follow. In fact, the process is quite fluid and open to interpretation and modification. One scientist might spend much of his career in the observation stage. Another scientist may never spend a great deal of time designing and running experiments. Darwin spent nearly 20 years analyzing the data he collected before he acted on it. In fact, much of Darwin's work was an intellectual pursuit, trying to fit the pieces of a puzzle together. And yet no one would argue that his theory of natural selection is less valuable, or less scientific, because he did not stringently follow a five-step process.

group.

Hill Street Studios/Getty Images

Anyone trying to solve a problem can make observations and use the scientific method.

It would also be appropriate to mention again that this method is not reserved for highly trained scientists -- anyone trying to solve a problem can use it. To illustrate, consider this example: You (or a family member) is driving to the store when the car starts to overheat. The problem is clear in this case, as is the observation (a temperature warning light) that launches the investigation. But what is causing the car to overheat? One hypothesis could be that the thermostat stopped working. Another hypothesis could involve the radiator. Still another could be that the fan belt has broken.

The simplest solution is often a good place to start, and the easiest thing to test in this case is the condition of the fan belt. If you find that the belt is indeed broken, then you can feel pretty confident that it is the source of the problem. However, a test is still required to be sure. The test in this case involves replacing the belt and running the car to see if it overheats. If it doesn't, you can accept your hypothesis about the fan belt. If the belt wasn't broken to begin with, or if the car continues to overheat even after you replace the belt, you'll need to revise your hypothesis.

Perhaps you noticed that the example above didn't contain an "if … then" hypothesis. You may have also noticed it didn't contain control and experimental groups. That's because day-to-day problem-solving doesn't require such formality. But it does require a logical approach and a progression of thinking that results in a testable hypothesis.

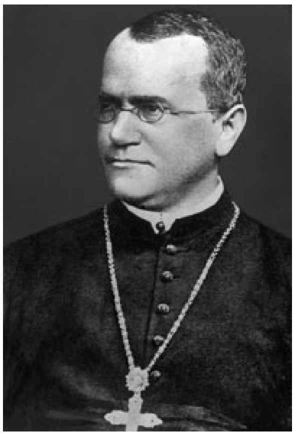
So if anyone can use the scientific method, why has it become so intimately associated with fields like biology, chemistry and physics? Because pure researchers apply the scientific method with a rigor that nonscientists don't. We'll explore why in the next section.

Importance of the Scientific Method

The scientific method attempts to minimize the influence of bias or prejudice in the experimenter. Even the best-intentioned scientists can't escape bias. It results from personal beliefs, as well as cultural beliefs, which means any human filters information based on his or her own experience. Unfortunately, this filtering process can cause a scientist to prefer one outcome over another. For someone trying to solve a problem around the house, succumbing to these kinds of biases is not such a big deal. But in the scientific community, where results have to be reviewed and duplicated, bias must be avoided at all costs.

That's the job of the scientific method. It provides an objective, standardized approach to conducting experiments and, in doing so, improves their results. By using a standardized approach in their investigations, scientists can feel confident that they will stick to the facts and limit the influence of personal, preconceived notions. Even with such a rigorous methodology in place, some scientists still make mistakes. For example, they can mistake a hypothesis for an explanation of a phenomenon without performing experiments. Or they can fail to accurately account for errors, such as measurement errors. Or they can ignore data that does not support the hypothesis.

Gregor Mendel (1822-1884), an Austrian priest who studied the inheritance of traits in pea plants and helped pioneer the study of genetics, may have fallen victim to a kind of error known as **confirmation bias**. Confirmation bias is the tendency to see data that supports a hypothesis while ignoring data that does not. Some argue that Mendel obtained a certain result using a small sample size, then continued collecting and censoring data to make sure his original result was confirmed. Although subsequent experiments have proven Mendel's hypothesis, many people still question his methods of experimentation.



Hulton Archive/Getty Images

Gregor Johann Mendel, the Austrian priest, biologist and botanist whose work laid the foundation for the study of genetics

Most of the time, however, the scientific method works and works well. When a hypothesis or a group of related hypotheses have been confirmed through repeated experimental tests, it may become a **theory**, which can be thought of as the pot of gold at the end of the scientific method rainbow. Theories are much broader in scope than hypotheses and hold enormous predictive power. The theory of relativity, for example, predicted the existence of black holes long before there was evidence to support the idea. It should be noted, however, that one of the goals of science is not to prove theories right, but to prove them wrong. When this happens, a theory must be modified or discarded altogether.

Limitations of the Scientific Method

Clearly, the scientific method is a powerful tool, but it does have its limitations. These limitations are based on the fact that a hypothesis must be testable and falsifiable and that experiments and observations be repeatable. This places certain topics beyond the reach of the scientific method. Science cannot prove or refute the existence of God or any other supernatural entity. Sometimes, scientific principles are used to try to lend credibility to certain nonscientific ideas, such as **intelligent design**. Intelligent design is the assertion that certain aspects of the origin of the universe and life can be explained only in the context of an intelligent, divine power. Proponents of intelligent design try to pass this concept off as a scientific theory to make it more palatable to developers of public school curriculums. But intelligent design is not science because the existence of a divine being cannot be tested with an experiment.

It's a wave, it's a particle, it's a wave ...

Most of the time, two competing theories can't exist to describe one phenomenon. But in the case of light, one theory is not enough. Many experiments support the notion that light behaves like a longitudinal wave. Taken collectively, these experiments have given rise to the wave theory of light. Other experiments, however, support the notion that light behaves as a particle. Instead of throwing out one theory and keeping the other, physicists maintain a wave/particle duality to describe the behavior of light.

Science is also incapable of making value judgments. It cannot say global warming is bad, for example. It can study the causes and effects of global warming and report on those results, but it cannot assert that driving SUVs is wrong or that people who haven't replaced their regular light bulbs with compact fluorescent bulbs are irresponsible. Occasionally, certain organizations use scientific data to advance their causes. This blurs the line between science and morality and encourages the creation of "pseudo-science," which tries to legitimize a product or idea with a claim that has not been subjected to rigorous testing.

And yet, used properly, the scientific method is one of the most valuable tools humans have ever created. It helps us solve everyday problems around the house and, at the same time, helps us understand profound questions about the world and universe in which we live.

For more information on the scientific method, take a look at the links on the next page.

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