

SCIENTIFIC KNOWLEDGE

I share my love of science with many other people I love science. Science is a way of thinking and a way of manipulating certain aspects of the real world in order to gain knowledge about those aspects. Science has produced a body of knowledge about the empirical world. Science explains how aspects of the world work and predicts some future outcomes. The knowledge we acquire through science is codified in language. American scientists write their findings in English; Dutch scientist write in Dutch (and sometimes in English). Knowledge is communicated through sentences in one language or the other. So the sentence 'the earth is spherical' can be thought of as resulting from scientific investigation and not so the sentence 'the earth is flat'.

Can we make deductions from a sentence that it is the result of scientific investigation? No we cannot.

So which sentences about the world should we believe as a truthful representation of it?

There is no straightforward answer to this question. But there are some clues we can find to determine which statements are the result of scientific inquiry. I will elaborate on this below, but let me make three preliminary remarks first.

[1] Science cannot explain why entities exist. It can only explain how entities are (causally) related to one another and can show how entities develop from other entities. Science can explain, for example, how a seed becomes a plant by describing the developmental stages from the beginning to the end. In this respect we may say that science is a very humble undertaking (but a difficult one).

[2] Science studies entities that are perceptible, observable. One of the most important concepts in science is the concept of causation: how some entities (events) cause some other entities to move or to change.

Causation itself is not an empirical entity, it is a concept that relates empirical entities in a temporal order to each other. A natural law of physics for example, is a statement about an empirical event that causes another event (every time).

The concept of 'God' is not a scientific concept because it does not conjugate two empirical states of affairs to each other. It is a concept that has no empirical foundation.

[3] The truthfulness of a scientific statement can be evaluated by the methods that were used to produce the statement (knowledge) in question. Methodology is the study of how science should be practiced. Methodology is a complex theory that prescribes how investigations should be performed on the basis of evaluation of practices. It is an activity (a method) we could compare with the buzz word "Best practice": the most effective and efficient way to accomplish a task based on proven and repeatable procedures.

In their book "Wat een onzin!", published in 2008 – I don't think it has been translated in English (yet) so my translation of the title would be: "Sheer nonsense!", Dutch scientists Herman de Regt and Hans Dooremalen discuss the rules a person can use to distinguish between sentences that are the product of scientific investigation (often called hypothesis or propositions) and sentences that are not (statements about ghosts, homeopathy, deities, etc.). I will discuss one rule De Regt and

Dooremalen mention, the rule of falsification. This rule states that scientific statements should be falsifiable. The statement "all swans are white" is falsifiable and can be tested to be false by finding at least one black swan. The statement "God created the world" is not a falsifiable statement because we have no means to test it; the word "God" does not refer to an empirical entity.

Summarizing: scientific research produces falsifiable statements about the empirical world and these statements are subsequently subjected to refutability tests. Falsifiable statements about the empirical world are stated in terms of observable, interrelated entities.