

Empirical Evidence [1]

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"Empirical evidence" or "scientific evidence" is evidence which serves the purpose of either supporting or counter a scientific hypothesis or theory.

The word "empirical" indicate information gained by means of observation [3], experience, or experiments [4].

Reasoning Cycle Scientific Research

A central theme of science and scientific method [5] is that all evidence must be empirical, or at least empirically based, that is, it should depend on evidence or results [6] that can be observed by our senses. It should be noted here that scientific statements are subject to and derived from our experience or observations and empirical data is based on both observations and experiment results.

In the process of accepting or disproving any hypothesis, facts (evidence) are coupled with inference which is the act of deriving a conclusion [7] on the basis of observations or experiment.

However, scientific evidence or empirical evidence [8] is evidence where evidence does depend on inference thus it enables other researchers to examine the assumptions or hypothesis employed to see if facts are relevant at all to the support of or counter the hypothesis.

For example, an infective organism, "Helicobacter pylori", has shown to cause stomach ulcers in humans. Following evidence may prove the hypothesis [9] that H. pylorus is indeed a cause of peptic ulcers in humans.

- If someone voluntarily ingests H. pylori, it results in chronic gastritis
- Experimental challenge to animals stimulates human infection and gastritis
- Proper antimicrobial therapy in patients clears infection and thus clears gastritis
- The H. pylori only found in gastric epithelium
- There is a systemic immune response seen in patients with H. pylori infection
- Antibodies against H. pylori disappears after successful antimicrobial therapy

Let's take another example of global warming which remains an ongoing dispute about the effects of humans on global climate. You may hear following evidence in favor or theory of

global warming:

- Graphs of historical trends show increasingly warming temperature
- The levels of carbon dioxide gas are on the rise in atmosphere
- The levels of methane are also rising
- We are seen more frequent extreme weather as never before
- Glaciers are disappearing rapidly
- Arctic sea ice is melting
- Antarctic sea ice is also melting
- Greenland's ice sheet is also melting
- Incidence of tropical diseases is on the rise
- Oceans are warming with Coral bleaching and disintegration

No hypothesis or theory can be called scientific or accepted if it lacks empirical evidence in favor. Therefore, empirical evidence can be use both to accept or counter any scientific hypothesis or theory.

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