Falsification

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Introduction:

The concept of falsification is paramount to validity the modern scientific process. Understanding the method and limitations of science is necessary in order to produce accurate science. As one is not able to escape one's own perception and reality, inductive reasoning is not sufficiently valid process to overcome the problem of induction. It is through this concept of falsification that one is able to determine if a hypothesis is valid. If something is not able to be proven false, it cannot be follow the concept of falsification. In order to follow this approach, a scientist must also approach a topic with a critical eye and not create excuses for why something is true. Past science often resorted to a divine creator in order to resolve a problem. In order to address this problem, Karl Popper analyzed the scientific method and determined that in order for something to truly follow the scientific method, it had to be able to be falsifiable. However, this does not mean that every scientific theory that was unfalsifiable is not important to the development of current scientific theories. One such example of this was the ancient Greek theory of atoms. They were not able to prove or disprove the existence of atoms thus rendering the theory as unscientific. However, modern science has shown that matter is made up of particles. There are three different variables within falsification which are important to the study of science. These three variables interpretations are: falsifiable, falsifiability and falsificationsm. This paper will explain the differences between these three variants and provide examples throughout the history of science.

Falsifiable:

Popper asserts that being falsifiableisfundamental to the modern scientific method. When one establishes a hypothesis one needs to consider that it must be in a form that is able be disproved, and that the structure of the experiment is such to be disproved as well as proved. This is becauseno number of positive examples canirrefutably prove a theory, but one false example can irrefutably disprove it. This is a fundamental problem with inductive reasoning. As Descartes (the rationalists)and Hume (enquiry) so eloquently established, one is limited by one's own perceptions and mortality. However, as Karl Popper discusses, this limitation does not extend to the negative as disproving a theory follows the process of deductive reasoning rather than inductive reasoning. If one can find just one example that could prove a hypothesis wrong, it is without doubt incorrect. Therefore, all scientific experiments must be constructed in such a manneras to allow for a negative result. For example in my field one posits that a gene causes a specific expression in the physical entity. First one uses multiple programs to analyze the date from existing samples to see if there is a correlation. This methodology is not sufficiently rigorous according to Popper. And is still is subject to the black swan problem. Thereefore in order o establish a sufficiently rigouous example one may try to establish a experiment where say " gene 90" is modified and ascertain whether theresultstillholds. This form allows for a negative to be existent and therefore disporove the theory. This form of an experiment accomplishes two things: it allows us to see if the correlation holds true and if there are any confounding variables.

A conforming example in chemistry is an experiment in chemistry which was based upon the periodic table of elements where the division are based upon unit charges. Therefore experiments were divided to see if there were unit charges. The methodology was to attempt to cause any of the charges which are fractional. After repeated experiments they were never able to cause fractional charges thus the theory underlying the table was proved through falsifiable experiments based upon Popper's model.

Falsifiability:

Moving beyond falsifiable , falsifiabilityis both a method and attitude. As a method, it requires that a hypothesis is set up in such a way as to falsifiable, able to be proved false. As an attitude, it requires the scientist to view theory with a cynical eye and to never invest it with the attitude of holy writ. One must always be willing to turn over the established wisdom for new theories which may be more accurate or have greater simplicity. On the other handfalsifiabilityis themindsetof the researcher. A good researcher needs to be able to hold all scientific theory with a bit of skepticism. A researcher needs to realizethat just because numerous experiments have proven a theory does not mean that there might not yet be a one that could disprove it. A classic example where this attitude was not maintained was Ptolemaic theory, the Earth at the center of the crystalline spheres. This theory was maintained and elaborated upon over many centuries and was considered to be almost holy in its status. Numerous scholars had observed and developed the theory based upon their observations. The theory at the time of Galileo was highly predictive if you considered all of the exceptions. As such even though Ptolemaic theory was considered to be well researched and all of the

exceptionswerewell explained, that did not mean that the Copernican theory was not more accurate. The acceptance of this theory was however highly controversial and not well accepted. The scientists of the time did not have an attitude of falsibility. As a conforming example to the attitude, in my field the accepted wisdom was thatgenetic variationsexplain manifestations of physical attributes. These were seen to be one gene with one attribute at the beginning. Think of Mendel's peas. This theory has been modified as experiments were devised to see if the elimination of a single gene caused a specific manifestation. It was found that one gene might actually cause more than one physical manifestation. For example, during the transcription process it has been found that one gene may produce multiple protein sequences due to splice sites. Therefore, the theory

Falsificationist Approach

Lastly, falsificationist approachis a general approach toscience which is championed by Popper. It means that all of science should structure its attitudes and research to try to establish more easilyfalsifiabletheories and thus chance to have more accurate perspectives. Just asthe Ptolemaicscience chose individual instances and proved and explained them with exceptions leading to a fundamental error, science taking this same incremental approach can lead to similar error. Creating very specific rules without reference to Occam's razor (Copleston) can cause convoluted theories full of exceptions which do not reflect the universal laws as accurately as possible. However, scientists are not dissimilar from the rest of us and often have much invested in the satus quo. Therefore, even finding funding or the ability to publish novel research may be problematic. This is a

problem which is being addressed today in much research as scientists complain that if you veer from the mainstream that it is difficult to get funding.(Kolata)Therefore modern science is not adopting the fundamental perspective that Popper feels is necessary. Even Einstein was subject to this problem His classic statement that " God does not play dice" (Dukas, 8) in relation to the modern quantum physics is a classic example. Although the models purported were highly predictive, Einstein refused to even accept their possibility. Unfortunately, particle physicists have proved him wrong. Therefore even the best minds are often subject to being in an established mold.

Albert Einstein

B Hoffmann, H Dukas – New York, 1972 – leobaeck. oxfordjournals. org ... He expressed his dislike of its denial of determinism by saying " God does not play dice." When seeking a unified field theory, he would often say of a pleasing equa- tion: " This is so simple God could not have passed it up." 8 ...