**Scientific Knowledge**

Scientific knowledge is knowledge derived from scientific approaches to gathering information such as the scientific method. The scientific method describes a way for scientist to approach asking and answering questions. The strength of this reasoning and how well it is performed determines whether the conclusion drawn from the scientific method is accurate or not. For this reason, it is important to understand the scientific method, and the pros and cons of using this method. Francis Bacon first proposed this scientific method in his book “Novum Organum” in 1620.

The scientific method Francis Bacon proposes in his book “Novum Organum” is an application of inductive reasoning. Inductive reasoning uses premises to provide strong evidence for the validity of a conclusion. Bacon takes this reasoning and applies it to scientific knowledge and developed the scientific method. The idea behind this methodology is to take several observations, and use those to induct more general axioms. However, the generalization must not stray beyond what the facts or observations they actually demonstrate. This form of inductive reasoning can be repeated to establish more complex and thorough knowledge. The reason inductive reasoning seems to fit into scientific knowledge well is because it is based on the observation of causes and effects. The observations of causes and effects can be used to inductively reason conclusions and axioms based on those observations because there seems to be a direct connection between the cause and the effect.

While Bacon uses induction to demonstrate how to develop scientific knowledge, he is careful to distinguish between science and pseudoscience. Bacon stresses that inductive reason must still be demonstrated by the observations and facts it is using. Making too general of an inductive conclusion would be a bad methodology and would imply a methodology using this type of reasoning to be pseudoscience. An example of this might be astrological signs. While there may be some observations that certain people have similar behaviors when born in the same month, Bacon would argue that saying all people Born in the same month would be too general of a conclusion drawn from the observations. This is what separates Bacon’s scientific method from other forms of logic and provides a more rigorous approach to developing scientific knowledge. Bacon believes this is the only way to develop true knowledge because of the careful and rigorous approach his method takes.

While inductive reasoning appears useful due to its strong connection to causality, there are some who believe that this inductive approach is not a good approach for building scientific knowledge. Karl Popper, for example, believes that inductive reasoning is not correct or a good way to perform scientific research. Popper thinks that inductive reasoning cannot be logically justified because it lacks justification of the conclusion. Inductive reasoning is inherently uncertain, and the conclusion relies on it being probable. Instead, Popper favors deductive reasoning instead of inductive reasoning. Deductive reasoning forms logically certain conclusions, instead of the uncertain but probably conclusion from inductive reasoning. Popper focuses his deductive reasoning on how easy it is to falsify a proposition, if even possible. This is better because a theory of the natural sciences can never be proven, however it can be falsified.

An example of this would be a theory that the sun will rise every morning. This theory can never be proven, because it is unknown if the sun will rise tomorrow, until the sun is observed rising the next morning. This theory, however unlikely, could be immediately falsified if the sun did not rise the next morning. However, due to the low chance of this theory being falsified, it makes the theory not a strong falsifiable, or deductive, theory. This will make for a strong inductive theory, however, because it is based on years of observations from the past. For this reason, Popper would think this is not a very strong theory. This sort of deductive reasoning is put to practical use by people such as Einstein. His theory of relativity Popper argues is a strong theory because it has a high risk of being falsified. For this reason, theories which tend modify their wording in order to appear less feasible are pseudoscience’s.

I tend to favor Popper’s view of scientific knowledge. While Bacon’s scientific method is useful in some cases, I think it tends to limit the depth of scientific knowledge we can acquire. This is because the scientific is limited to the types of observation humans can observe through our own sense. However, human sense are not perfect and can miss a broad spectrum of observations. For example, Einstein’s theory of relativity or String Theory are good examples of theories which would not have come about through the scientific method alone. This is because these theories deal with higher dimensional logic above the three dimensions our human sense are capable of observing. The scientific would be unable to explain these theories because they cannot be directly observed. While it is unlikely that these theories can ever be fully proven, it can be falsified through observations of the scientific method. For this reason, I think deductive reasoning is a better form of reasoning for scientific knowledge.

There are many different forms of methodologies and reasoning’s for developing scientific knowledge. Bacon believes in inductive reasoning as the best way to gain knowledge, while Popper believes deductive reasoning is a better for of reasoning. While these are not the only approaches to scientific knowledge, they are by far the most popular, and both have shaped the development and growth of scientific knowledge. Both methodologies rely on the observations of causes and effects to either support or disprove their theories. While inductive reasoning searches for causes and effects in favor of a theory, deductive reasoning will be searching for the causes and effects to disprove a theory. I think methodology is more precise, because it only takes one contradiction to disprove a theory. So time is better spent trying to disprove a theory than to prove it.