


The Meaning of Science



Science has improved our lives and helped the human race progress through time. The advances made in many scientific disciplines explain how and why particular phenomena occur. Yet, the question "What is science?" does not have a simple answer. In Stephen Jay Gould's "What does the dreaded 'E' word *mean* anyway? A Reverie for the Opening of the New Hayden Planetarium," science is proven to be either variational or transformational. Jasper Becker's essay, "Selections from *Hungry Ghosts: Mao's Secret Famine*" defines science as daring yet also expresses Mao's theories as pseudoscience. Science is daring and capable of either taking on a transformational or a variational form, yet it can only be considered as true science when these theories are supported by factual evidence. If theories have no tested evidence to support their claim or if they are based on intuition, then the theories cannot be considered scientific.

The idea that science is daring accurately describes an essential aspect of its nature. Kang Sheng correctly describes:

Science is simply acting daringly. There is nothing mysterious about it. In Hefei, Anhui province, he continued on the same theme: 'There is nothing special about making nuclear reactors, cyclotrons or rockets. You shouldn't be frightened by these things: as long as you act daringly you will be able to succeed very quickly...You need to have spirit to feel superior to everyone, as if there was no one beside you...You shouldn't care about any First Machine Building Ministry, Second Machine Building Ministry, or Qinghua University, but just act recklessly and it will be all right. (Becker 119)


Daring acts, as described by Sheng, are vital to scientific advancement. Breaking away from traditional views and standards makes way for scientists to examine theories in previously unknown ways. When science deviates from traditional views, new ideas are surfaced. These new and unique ideas will be the basis for upcoming scientific theories. While the building plans for nuclear power plants or rocket ships will not come instantly


from one individual's thought, these complex creations will be fashioned from the coherent combination of many daring and cutting-edge ideas and practices. Science has always been a controversial topic yet it has led way for a brighter future. Many scientists tried to disprove traditional beliefs in their era and the evidence that they gathered contradicted every law that was currently accepted by the society and government. By taking risks and looking at ideas from unusual perspectives, new scientific discoveries are generated. 

 As daring discoveries and solutions in science are generated they take either a transformational or variational form. Regarding unpredictable and indirect theories, Gould states, "For this fundamental reason, we call such theories of change *variational* as opposed to the more conventional, and more direct, models of *transformational* change imposed by natural laws that mandate a particular trajectory based on inherent (and therefore predictable) properties of substance and environments" (327). Variational theories do not have a predictable future and carry an inexplicable aspect with them. While transformational theories lack a mysterious element, they pose a challenge when natural laws are in conflict with traditional beliefs. These transformational sciences attempt to prove a linear theory since it follows an unchanging path. An example of a transformational theory is Mao's eight-point agricultural, Lysenkoist blueprint. The basic belief for this theory is, "Lysenkoists believed that, on the contrary, environmental factors determine the characteristics of plants and animals. Just as Communists thought that people could be changed by altering their surroundings, so Lysenko held that plants acquire new characteristics when their environment is changed and that these changes are transmitted to the next generation" (Becker 121). This communist idea of science depicts that a final goal of a perfect human society was intended to be reached is. If the communist government wanted people to have a particular characteristic, then the government could modify the environment to enforce and hasten this characteristic. Transformational science always has an intended final goal. The processes leading to that final scientific destination are predictable and directional. 

Another feature of science is its variation aspect. The vast amounts of deviation in Darwin's natural selection theory, supports the variational scientific model:

In short, if the traditionally 'highest' of all triploblasts—the vertebrate line, including our exalted selves—appears in the fossil record at the same time as all other triploblastic phyla in the Cambrian explosion, and if the most anatomically simplified of all parasites can evolve (as an adaptation to local ecology) from a free-living lineage within the 'higher,' triploblastic phyla, then the biological, variational, and Darwinian meaning of 'evolution' as unpredictable and nondirectional gains powerful support from two cases that, in a former and now disproven interpretation, once bolstered an opposite set of transformational prejudices. (Gould 334)

Biological evolution is considered to be unpredictable and changeable since it is impossible to foresee. Many complex organisms are created from simple strata while also vice-versa, many simple organisms stem from complex strata. Displaying neither direction nor cycle, variational science adds a sense of mystery to our future. As time progresses, our understanding of variational theories will always be accompanied by a sense of mysteriousness due to its random and unpredictable nature. As we try to comprehend variational science, more theories will be discovered. The knowledge that is gained as events fall into place will force scientists to learn more about the uncovered variational mysteries. Darwin's theory has been tested multiple times, and while his facts have been proven accurately, many new enigmas are breaking the surface. Variation science is always changing as time passes by. 

 However, despite the opposing characteristics in variational and transformational science, proven factual content is a common ingredient for science. While Mao's theory can be used in conjunction with transformational scientific models, his true practices were pseudoscience. Becker explains, "Everything connected with traditional beliefs was smashed in the Great Leap Forward ... but, ironically, what Mao put in place of these beliefs was a pseudoscience, a fantasy that could not be validated by science, or stand up to

rational examination, any more than could the peasant superstitions which the Party ridiculed" (Becker 119). Mao believed that intuitive knowledge was the key to science. Intuition is a hunch purely based on opinion. It cannot be considered factual or reliable. The eight point blueprint that Mao created, which is a set of guidelines that his agricultural theories were presumed to follow, had transformational elements of science.

His ultimate goal was a perfect China, but the only way to get there was by directly following his structured plan. Yet the techniques and theories of deep ploughing and close planting did not increase crop production because they were strictly based on Lysenko's intuition and not on actual scientific experiments. Even if the peasants acted daringly, in no way could Mao's beliefs be considered true science since his theories were never tested. Intuition alone cannot be the basis for science since it lacks proven factual content. Darwin's natural selection theory is true science since his hypothesis were actually tested and backed with evidence. Regarding the term astronomical evolution, Gould states, "Earth, however, has become so modified during its geological history that we cannot use this inferential method to reconstruct the initial state of our own planet (330). Although inferred predictions such as the laws of astronomy were originally formulated through opinion, they were proven through considerable amounts of research. Factual evidence is needed to support ideas.

Unique approaches to finding solutions causes science to be a daring discipline. Both the transformational and variational sciences are capable to deviate from traditional views to discover more innovative observations. Mao's theories followed transformational views since his intended goal was a better China. Yet the approaches that Mao took were not scientific since he did not test Lysenko's theories. True scientists, such as Darwin, perform many experiments to accurately check their theories. Science always will have transformational and variational components, but it must also be practiced and tested in order to be viewed as true science.

