

The Foundation of Enlightenment:
Science

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There is an English proverb that states, “Necessity is the mother of invention.” Humanity has wrestled with problems or difficult situations that it has faced. Problems are the source of motivation to find a method or device that will change the situation into less of a problem and during the Renaissance great changes occurred in science, art, literature, music and social government. Humanity had questions that needed to be answered and in response, it developed new methods to seek and discern those answers. New methods and ideas are often the source of conflict, but once proven they become the basis for advancement. This paper will examine some of the new methods, ideas, and innovations that contributed to human society moving toward the period of Enlightenment by way of a Scientific Revolution.

The world was changing or rather our perception was expanding giving us views we had not yet seen. The observation of the natural world as well as the cosmos has interested humanity since the beginning. We have always struggled to make sense of what we see and create explanations. Sometimes, our perceptions are imperfect and are affected by many factors leading us to the wrong conclusion, such as, “Earth is the center of the universe.” To some like Nicholas Copernicus, what they observed did not fit with that statement. He argued “that Earth was not the center ... [and] revolved around the Sun” (Sayre 647). But that was only the beginning. “Acceptance of Copernican astronomy, or the Galilean theory of motion, immediately raised innumerable questions ... What was required was a complete system of natural philosophy, able to offer an account of all phenomena” (Fitzpatrick 15). The conflict mentioned earlier was very real and dangerous to individuals who spoke too loudly. Their very lives were in danger as the Catholic Church viewed many as heresies against God’s laws. Separating religion from science is still an issue today, but religion is useful in society where it fosters a “social order and political stability” (Jacob 9). Problems occur when the rigidity of any social or

religious system becomes intolerant of anything new. There is a need to separate matters of faith from matters of observation. The two are not necessarily in conflict with one another and can coexist. The physical location of the Earth and its place in the solar system does not invalidate faith in the Divine. Acceptance of differing views is a key step toward enlightenment.

There are many factors that can alter our perceptions and lead us to an erroneous conclusion. Francis Bacon called these factors “idols” and believed that “the greatest obstacle to human understanding ... was superstition, and the blind zeal of religion” (Sayre 708) creating a barrier to our ability to accurately perceive the world and the manner in which we reason. By eliminating those factors, he believed we would be better able to discern the truth of our observations. Additionally, he believed that repeated experimentation was also important for complete understanding of a phenomenon. A different approach to reasoning was Rene Descartes who used an almost opposite but complementary approach called deductive reasoning. He also believed that our perceptions could be deceived but that they could be overcome with logic and intellect. Furthermore, he believed that there was a logical set of rules by which the universe operated and that a divine creator would use rules that made sense. “A rational god created a rational universe with rational beings in it, his argument takes the following form: if human beings use their reason to understand whatever they experience of the world, the knowledge they have thereby acquired is certain” (Fitzpatrick 37-38).

In addition to new views and ideas, new methods for supporting, demonstrating, proving and explaining them are essential to garner support and effect change in the overall system. Descartes was also a skilled mathematician and “was the first philosopher ever to provide a coherent, all-embracing system that could replace the Aristotelian system, lock, stock and barrel. For many, this had been the major strength of the Cartesian system” (Fitzpatrick 15). There was

another keen mathematical mind at work on some of the issues of the day, Isaac Newton. He was a mechanical philosopher and experimenter. He adhered to Bacon's methods, but resisted the urge to guess where there was no evidence. He "tempered his mechanistic worldview with a Baconian concern for matters of fact and avoidance of hypothesis or unsubstantiated speculation ... [and] Newton's *Principia Mathematica*, [is] still universally acknowledged as one of the greatest achievements of the human mind" (Fitzpatrick 22). Mathematics became the language of science and the key to explaining what we observe. With those tools and methods the thinkers of the day believed that nothing would remain hidden for long. Once their attention was focused, discernment followed. "Newton had successfully combined the methods extolled by Bacon and Descartes, and demonstrated how natural philosophy should henceforward be pursued. There was a genuine optimism that it was now only matter of time before all truths would be discovered" (Fitzpatrick 23). Defenders and proponents of the Newtonian approach would come to use his science as a means to foster liberal ideals about freedom of religion and the rights that we now consider basic to human existence. "Newtonians captured the imagination of educated men ... and turned Newton's scientific achievements into one of the pillars [of] ... Enlightenment" (Jacob 2).

The previous paragraph mentions one of the pillars of Enlightenment as science or the Scientific Revolution. A change that could be considered as another pillar was a significant shift in thought that was occurring at about the same time -- thought about government. Civil and political unrest was the order of the day around the time that Thomas Hobbes penned his views on the "essential depravity" of humanity and would "willingly submit to governance" (Sayre 769) by an authoritative ruler, trading some portion of the rights and freedoms to obtain security. John Locke's views were much more optimistic about the nature of man and that by cooperation

were capable of governing themselves. Both of their views contributed to the foundation of what would later be considered as basic human rights and freedoms and the essentially equal nature of all men. The American Revolution and French Revolution were some of the actions spurred by those views, in an effort to thwart tyranny and injustice.

What is true enlightenment? That may be a question that will never be completely answered. The pieces of the puzzle are everywhere if only we have the ability to see them. The advances in science and social governance that occurred during the Scientific Revolution have given us tools to search. Where will we turn our gaze? The answer is everywhere and toward everything. How long will it take? The answer is unknown but should we achieve it -- however long it takes -- it will be worth the effort. Are we there yet? Undoubtedly not, but perhaps we are on the path that leads to the invention of still newer methods and ideas that will be a necessity to advance further.

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