

Science and the Enlightenment ^[1]

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(Part I)

While the Renaissance, with its roots in Christian art and doctrine, created solid foundations for the flourishing of art, architecture, philosophy, science and mathematics, free thought was still restricted. This period of restriction continued until the Enlightenment, a period where, free of the shackles of religious dogma, free thinkers could expand human knowledge at a rate never before seen.

Science And The Enlightenment - Part II ^[3]

"Mankind's final coming of age, the emancipation of the human consciousness from an immature state of ignorance and error."

Immanuel Kant (1784)

The Renaissance and the Scientific Revolution

The Biblical worldview of the Renaissance ^[4] held sway and any scientific findings deviating from this were regarded as bordering upon blasphemy. Copernicus and Galileo ^[5] the two foremost casualties of theological interference, with Galileo placed under house arrest by the notorious Inquisition. This period of restriction continued until the Enlightenment. The evidence building up against religious doctrine, irrefutably contradicting the Biblical timeline, burst forth in an unstoppable torrent, aided by the work of scholars and philosophers across Europe. This Scientific Revolution, which began during the 17th century, became a catalyst for a new philosophy, one that permeated every level of human society and placed the emphasis for change on humanity rather than intangible gods. The Age of Enlightenment, a phrase coined by the German philosopher, Immanuel Kant (22 April 1724 – 12 February 1804), represents the change from antiquity to modernity, the period in history where the modern world began and science replaced superstition.

When Was the Age of Enlightenment?

Isaac Newton type unknown

Isaac Newton, painted by
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It is extremely difficult to state exactly where the Age of Enlightenment began, because it blended into the Renaissance and varied from discipline to discipline, but many historians point to the Scientific Revolution of the 17th Century as the precursor. The later half of this century saw minds such as Descartes, Newton, Leibniz, and Galileo begin to change scientific thought, their views even trickling downwards to the common man. For the intents of this article, we will begin the Enlightenment at the time of Newton's publication of *Principia* (1687), and end it with the French Revolution of 1789, a time of social change in continental Europe, and a period when the Industrial Revolution of England had gathered momentum. Isaac Newton ^[6] (4 January 1643 – 31 March 1727) devised a physical model of the universe that tore apart the intricate models created by the Ancient Greeks, building his system upon gravity and mechanics and fuelling an explosion of humanistic thought.

Science, the Enlightenment and Religion

This change in thought coalesced around the philosophy of minds such as Newton and John Locke (1632 – 1704), and it was based upon transforming society and describing knowledge in terms of human experience rather than Biblical tenets.

John Locke

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John Locke, portrait by
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Western Europe, largely due to the wealth flowing in from colonialism, moved away from agrarian economies, and underwent a rapid process of urbanization. Not only did this population migration generate wealth, but urbanization also allowed academics and thinkers to congregate and share ideas, with cities such as London, Paris, and Edinburgh becoming strongholds of Enlightenment thought. Away from Catholicism, England flourished and began to produce some of the greatest philosophers, scientists, engineers, and fomented the Industrial Revolution, as wealth flowed from the New World and Asia. During this Age of Reason, scholars adopted empiricism, proposing the idea that theories should be based upon human observations and experience. The universe operated like a soulless machine, without the hand of God behind every unexplained phenomenon, although many scholars, even Newton, felt that there was room for a creator, the Uncaused Cause of Aristotle. This new definition of knowledge permeated every aspect of human society, including art and culture, and the rapid accumulation of knowledge, free from religious overtones, saw science start to split into separate disciplines as the age of the great polymaths ended. Scholars and philosophers rebelled against the restrictions of Christianity and used science and metaphysics to question and probe the universe. Reflecting the politics of the time, Europe became much more secular and science, in turn, tore apart the roots of Biblical literalism and absolutism. Philosophers, such as Descartes (31 March 1596 – 11 February 1650), had already questioned the nature of the soul and envisioned a purely physical and mechanical universe, postulating that animals and the body were automatons, with only the soul elevating

humanity. Money began to flow into research, and the easy availability of such inventions as the microscope, telescope, and barometer gave scholars the means to make accurate observations, conducting experiments as they refined the scientific method into its modern form. Books were cheaper than ever before, and the improvement in roads and transportation allowed ideas to flow freely, with men such as Newton and Leibniz (July 1, 1646 – November 14, 1716) conducting fierce debates by letter. Scientific societies sprang up, offering places to share and refine ideas, as well as give some semblance of peer review and criticism.

Science, the Enlightenment and Social Reform

Rene Descartes

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Rene Descartes (Public Domain)

The overarching goal of the Enlightenment thinkers was social reform, and they provided the first real challenge to the autocracy and theocracy that had dominated society for so long, with science one of the foremost tools for promoting change. Trade and commerce replaced agriculture, which largely became outsourced to the colonies and the New World. Europe, after the earlier deprivations of plague, famine and war, transformed into rich and abundant societies, with more time devoted to the pleasures of life. As was the case with the Greeks and Islamic scholars, this allowed resources to be channeled into academia and research. The Age of Enlightenment was characterized by optimism, a feeling that humanity could change the world and rectify any mistakes of the past. Rather than Aristotelian metaphysics and abstract musings about the philosophical framework of the universe, philosophers began to look at the nature of knowledge itself, throwing out theology and understanding that humanity could influence nature rather than be subject to the whims of fickle Gods. Knowledge served humanity, not religion, and the ideas of original sin and asceticism declined. According to the Enlightenment philosophers, man was governed by Natural Law, not archaic commandments written in a pre-historic book, and science expanded, away from the strongholds of physics, astronomy, natural science and alchemy/chemistry into economics, social science and political science. This trend was an offshoot of the belief that anything could be studied and broken down by science, that explanations were available through observation and experimentation rather than philosophy.

The Legacy of the Age of Enlightenment

This idea of a mechanistic framework for human society and for the universe itself became the bedrock of modern society, with Francis Bacon (1561-1626), Isaac Newton and John Locke becoming the founding fathers of the Enlightenment, possibly the biggest change in human society of all time, the transition from the ancient into the modern world. The science of man became the dominating force.

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