

# Confucian Perspectives on Science and Technology

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Confucianism is traceable to China more than 2,000 years ago. Its best known representative was Confucius, or Kong Zi (Master Kong, 551–479 B.C.E.). Kong Zi lived during one of the formative periods of Chinese culture, when numerous philosophical schools, such as Daoism (Taoism) and Mohism, vied for social influence. Other major early thinkers in the Confucian tradition include Mencius, or Meng Zi (371–289 B.C.E.), and Xun Zi (298–238 B.C.E.). Confucianism was established as the state ideology during the Han dynasty (206 B.C.E.–220 C.E.). As an original thinker, a powerful persuader, and a successful educator, Kong Zi became the defining philosopher of Chinese culture and one of the most influential cultural philosophers in East Asia and beyond. In the early twenty-first century Confucianism stands for a distinctive voice in global dialogues on issues that range from human rights to gender equality. As a living tradition, Confucianism also provides a unique perspective on science, technology, and ethics.

## Confucian Foundations

The primary text of Kong Zi's thought that is still in existence is the *Analects (Lun Yu)*, a posthumous collection of his sayings and his disciples' reflective remarks on his teachings. Other major Confucian classics include *The Book of Meng Zi*, *The Book of Change*, *The Book of History*, *The Odes*, *The Book of Rites*, and *The Spring and Autumn*. Although the precise dates of these works cannot be ascertained, scholars generally believe they were compiled from the Spring–Autumn and Warring States (770–221 B.C.E.) to the Han period (202 B. C. E. to 220). The development of Confucianism usually is divided into three phases. Classical Confucianism was developed by Kong Zi and other early thinkers. Neo-Confucianism was developed during the Song (960–1276) and Ming (1368–1644) dynasties by thinkers such as Zhu Xi (1130–1200) and Wang Yangming (1472–1529). The third phase is contemporary New-Confucianism, represented by thinkers such as Xiong Shili (1885–1968) and Mou Zongsan (1909–1995).

Historically, however, Han-Confucianism as it developed during the Han dynasty is also an important episode not only because that was the period when the tradition first became dominant in China but also because Han-Confucians extensively incorporated the notions of *yin-yang* and the Five Phases (Water, Fire, Wood, Metal, and Earth) into Confucianism. Those notions later had a great influence on the relationship of Confucianism to science and technology.

Confucianism is primarily a moral philosophy with ethics as its core. Confucian ethics has been characterized as virtue ethics. It is concerned with developing a virtuous person rather than

emphasizing the following of ethical principles. Confucians see human life as a journey toward the goal of forming a virtuous character in the context of the family and society.

Confucianism is not a theism. Its moral philosophy does not rest on a god or a divine being. However, it holds that there is a cosmic moral order that serves as the foundation of the moral life. This order is not carved in stone and is not a static entity; it has to be sought through human endeavors and realized through human activities. In comparison with Daoism, Confucianism places more emphasis on a person's accomplishments in society and on the positive consequences of moral edification. Whereas Daoism leaves room for supernatural forces, Confucianism is focused firmly on the earthly world and its mundane affairs. Over a long period of history Confucianism and Daoism formed a unique complementary relationship in Chinese society.

## Key Concepts

Key concepts of Confucian ethics include *dao*, *de*, *ren*, *li*, and *yi*. The first of these concepts, *dao*, or the Way, defines the cosmic moral order. Confucians understand the cosmos as a triadic unity of Heaven, Earth, and Humanity. The *dao* is found and realized in a harmonious interaction among these three components. When it is realized and properly maintained, the entire world goes smoothly and the myriad things in it thrive.

Human beings participate in the realization of the *dao* by developing their *de*, or virtues. Confucians have what may be called a "person-making" ethics: One makes one's own person through learning and by extending one's knowledge and social skills. Every person is born with the potential to become a sage. Whether a person realizes his or her moral potential depends on that person's own effort. A good person is one who realizes his or her moral potential and develops into a virtuous person, one with a good character.

Whereas *de* points to particular virtues in various aspects of human life, *ren*, or humanity, as the Confucian moral ideal, stands for holistic human excellence. A *ren* person is a fully developed and well-rounded individual. Kong Zi said that a *ren* person is one who can achieve five virtues: earnestness, consideration for others, trustworthiness, diligence, and generosity.

The meaning of *li* is complex. It has been translated into English as *rites*, *rituals*, *propriety*, and *rules of proper conduct*. In the Confucian moral life *li* is the social grammar, providing guidelines for socially appropriate behavior. Unlike *ren*, *li* is tangible in that it tells people what to do in specific circumstances. For example, it is *li* to yield a seat on the bus to an elderly person and not to speak loudly in the library. Learning *li* is a necessary step for a person to develop moral virtues and become *ren*. Observance of *li* is the natural path for a person of *ren*. A society without *li* is chaotic and uncivilized; an un-*li* person is socially retarded and culturally backward.

Confucians, however, do not take *li* to be absolute. Recognizing the complexity and the dynamic nature of social life, Confucians value the ability to determine a course of appropriate action in complex situations.

The concept of *yi* focuses principally on what is right and fitting in particular circumstances. It calls for sound judgment and reasonableness. At times *yi* may require people to forgo personal advantages in order to do what is right. A person of *yi* demonstrates moral maturity. Other important Confucian virtues include *xiao* (filial piety), *xue* (learning), and *zhi* (wisdom).

## Applications to Science, Technology, and Ethics

As a complex philosophical tradition with a long history, Confucianism has a twofold relationship to science and technology. First, as a secular philosophy Confucianism has a natural affinity to science because it includes no superstitions and does not recognize supernatural forces. When asked, Kong Zi refused to speculate about gods, ghosts, and supernatural phenomena. His focus was entirely on this world and on things that can be known. In this respect Confucianism is not opposed to science and technology.

In ancient China technology had more to do with handicrafts than with science. The Confucian classic *Rites of the Zhou (Zhou Li)*, which was compiled during the Warring States period, contains a chapter on various types of craftsmanship in society. It attributes to early sages the invention of various handicrafts, such as the making of knives and scissors, pottery, carriages, and boats, and explicitly recognizes the important role of handicrafts in society. The chapter maintains that excellence in craftsmanship requires an integration of four things: good timing of the season, flourishing *qi* (cosmic energy) on earth, excellent material, and superior skills. From the Confucian perspective craftsmanship is not merely a matter of technique or skill but is understood holistically in the context of the Confucian cosmology. Whereas Daoism appeared to be antagonistic to handicraft, as indicated in the *Dao De Jing*, Confucianism was receptive to it because handicrafts can be instrumental to the prosperity of the family, which Confucianism values highly.

The affinity between Confucianism and science and technology has been evidenced by historical figures such as Shen Kuo (1031–1095), who was a prominent scientist in research, a successful technocrat in civic service, and a committed Confucian in his family life. His *Brush Talks from Dream Brook* is one of the most remarkable documents of early science and technology in China. Shen not only wrote commentaries on Confucian classics, a common practice among ancient Confucian scholars, but also in his theoretical discussions of scientific topics used philosophical concepts such as *yin-yang*, the Five Phases, and *qi*, which were shared by other Confucian scholars during his time. In Shen's eyes there is no contradiction between Confucianism and science and technology.

Traditional Chinese medicine has a close connection to Confucian cosmology. The *Yellow Emperor's Inner Chapters (Huang Di Nei Jing)*, the primary ancient text of Chinese medical science and techniques, is consistent with Confucian cosmology. The fundamentals of the entire Chinese traditional medicine are rooted in the philosophical notions of *yin-yang*, the Five Phases, and *qi*. Although these notions also can be found in Daoism, Confucians embrace them profoundly, and they are the converging points of Confucianism and Daoism. Acupuncture, for example, is based on the belief that human health depends on the smooth flow of *qi* and a good balance of *yin-yang*. The philosophy of the Five Phases provides the foundation for Chinese herbal medicine in its belief that the myriad things in nature have various combinations of the Five Phases and that the balance of the Five Phases is instrumental to the balance of *yin-yang* and the nurturing of *qi*. For example, when someone's body has too much *yin* and is short of *yang*, a herb rich in Fire may boost that person's *yang* to restore the balance.

Second, Confucianism places the moral life above all other aspects of human activities. For Confucians the ultimate value of human activities depends solely on their contribution or lack of a contribution to the good moral life of humanity (*ren*). In other words, apart from its contribution to the good moral life, an activity does not possess any value.

This moral view has been subjected to narrow interpretations and at times has devalued science and technology. In particular, making too direct a connection between science and the moral life may not leave room for science to grow independently, which is often a necessary condition for the flourishing of science. Confucianism is not free from criticisms of this sort: At the beginning of the twentieth century one of the two main criticisms of Confucianism was its alleged impediment to science (the other was its alleged impediment to democracy). Some criticisms of Confucianism for its hostility to science might have been exaggerated, but they were not entirely groundless.

Kong Zi apparently was not interested in technical knowledge about the natural world. When a student asked him about agricultural knowledge and skills, his reaction was negative. Xun Zi was probably the only early Confucian who had a tendency to naturalize Confucianism, a viewpoint that could have assigned natural science a larger role in the Confucian value system if it had had a broader influence. Xun Zi believed that it is human nature to learn and to know and that what people learn and know is the nature of things. However, mainstream Confucian thought has always emphasized a moral worldview. That thought focuses on moral values as the core of the cosmos and centers human existence on moral existence. Kong Zi explicitly defined true knowledge as knowledge about human affairs rather than about the natural world. This attitude was reflected in the neo-Confucian Zhang Zai's (1020–1078) formulation of the contrast between "moral knowledge" and "knowledge of the senses" and his assertion that moral knowledge cannot grow out of knowledge of the senses. Placing these two kinds of knowledge in sharp contrast or even opposition further diminishes the importance of knowledge of the natural world in comparison to the importance of moral knowledge.

Zhu Xi was the second major figure after Xun Zi to offer a chance to elevate the status of knowledge about the natural world through his interpretation of *gewu zhizhi*, an ancient concept found in the *Daxue* chapter of the Confucian *Book of Rites*. He interpreted *gewu zhizhi* to mean the investigation of things and the expansion of knowledge. According to Zhu, things in the

world have their reason or principle, which can be known through empirical observation. Zhu Xi evidently had a holistic view of the world and saw a direct connection between empirical knowledge of the natural world and moral knowledge. For him the purpose of *gewu zhizhi* is to improve people's moral knowledge. Because his notion of *gewu* includes the empirical study of the natural world, he opened a door to scientific knowledge. Presumably, the investigation of things could lead to scientific knowledge about the natural world.

Unfortunately, Zhu Xi's course was reversed by another major neo-Confucian thinker, Wang Yangming. Wang initially tried to act on Zhu's idea of *gewu zhizhi* by attempting to investigate bamboos in his yard. However, he failed miserably because he could not get any meaningful knowledge through his diligent observation. Wang then changed course and claimed that all useful knowledge is to be found within the heart-mind (*xin*); there is no need to look outside the heart-mind. Wang's judgment inflated to an extreme the Confucian conviction that a person's primary mission in life is to develop his or her humanity and failed to assign adequate value to the pursuit of the knowledge of the natural world. This tendency lasted till the twentieth century.

## Contemporary Discussions

As science started to gain ground in Chinese society in the early twentieth century, Confucian thinkers tried to preserve the territory of moral philosophy by separating science and philosophy into two distinct realms. They argued that whereas science deals with the physical world, (Confucian) philosophy deals with the metaphysical and moral realms; therefore, the two do not conflict. After the founding of the People's Republic of China in 1949, Confucianism was subjected to severe criticisms and at times brutal repression in mainland China, although it had a significant revival during the last two decades of the twentieth century.

However, Confucianism never stopped developing. Mou Zongsan, who lived his most productive years in Hong Kong during the second half of the twentieth century, articulated a new Confucian stance on science and greatly expanded the room within Confucianism for scientific knowledge. He maintained that traditional Confucian culture failed to give adequate recognition to the form of knowledge called *zhi xing* (formal, logical thinking) and argued that to embrace both science and democracy, the spirit of Chinese culture needed "to negate itself into" the mode of *zhi xing*. Mou's philosophy marked a turning point in the long debate among Confucian thinkers about the role science and technology play in the good life and was an important stage in the development of Confucianism. After Mou the importance of science and technology was no longer an issue for Confucians.

Some scholars have attempted to interpret the history of Confucianist interactions with science and technology in a different light, arguing that Confucianism has not been as unfriendly to science and technology as sometimes is alleged. They cite the fact that science and technology in early China under Confucianism flourished and that many ancient Confucian scholars were also great scientists and technological innovators. For example, it was during the Han dynasty, when Confucianism was made the state ideology, that the basic Chinese sciences were established. Those sciences included mathematics, mathematical harmonics, mathematical astronomy, and medicine. It is possible that the attitude of Confucianism toward science and technology varied at different times, affected by specific social circumstances and influenced by individual Confucian

thinkers' personal beliefs. Confucianism might have been more congenial to science and technology at certain times. It is also true that within Confucianism there is a full range of opinions on issues related to science and technology, with some being more liberal and others more conservative.

Contemporary Confucians recognize the importance of science and technology in society and in moral philosophy. Because Confucianism is concerned with the full development of the holistic person, it recognizes the indispensability of ethics in science and technology in achieving that goal. Furthermore, because the goal in Confucianism is to make the *ren* person, achieve a *ren* society, and generate a harmonious world, all human activities, including science, technology, and ethics, are to serve that purpose directly or indirectly. Kong Zi said that a good person should not be a mere tool. A committed Confucian does not engage in science for the sake of science or promote technology for the sake of technology. In addition to "Is it true?" or "Does it work?" a Confucian would ask questions such as "What purpose does it serve?" "How does it contribute to the good society?" and "Does it make the world a better place?"

A case can be made that Confucianism may be more receptive to contemporary medical research, such as embryonic stem cell research. Without a doctrine of the divinely created soul, Confucians believe that a person is not born with full moral worth and has to earn it through moral cultivation. Strictly speaking, the human embryo or the fetus is merely a potential human person, not yet a moral entity. Drawing on this notion, Confucians may not see embryonic stem cell research, which requires the destruction of the embryo, as morally problematic. After all, cracking an acorn is not the same as destroying a giant oak tree even though an acorn could grow into a giant oak tree.

Although Confucianism is not opposed to the development of technology, with the rapid technological advancement in the early twenty-first century, Confucians are concerned with its negative impact on the environment, its harmful effects on a harmonious world where humans and nature are closely integrated. If one uses the word *ethics* broadly to encompass the Confucians' goals of the moral life, ethics remains the primary concern for Confucians; science and technology are important tools that serve these purposes.

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