preparation for death. One of the famous expressions of the cult of death was the custom of *seppuku*, or belly cutting.

During the Tokugawa era, these elements and customs were largely lost. The majority of samurai turned into bureaucrats educated according to Neo-Confucian ideology, and compared to the ages of incessant war and unrest, this period was characterized by a sharp decline in the standards of military practicability of their fighting skills. The decline in the utility of military arts was accompanied by conceptual speculations on the principles of these arts, along with an emphasis on their practice for the sake of character perfection and the development of empty psychological theories of combat. This was the beginning of a broad sociocultural phenomenon in samurai society: cultivation of the warrior's spiritual side through impractical military means, without much awareness of the ineffectiveness of the latter in actual combat. This dissonance between means and goals persisted through the Tokugawa era and survived well into modern Japanese society.

Since about the end of the 19th century, in the process of building of a new nation-state by the Meiji government, the image of the samurai has been actively exploited by the Japanese establishment and businesses to promote conservative sociocultural agendas both inside and outside the country. This included the reinvention of the samurai ethos, *bushidô*, and its nationwide dissemination. At the time when Japan won successive wars of expansion over China and Russia, the Japanese government urged the entire nation to identify with traditional native "warrior" values, even though the vast majority of Japan's population never belonged to the samurai class.

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See Also: Japanese Emperors and Shoguns; Nationalism; Shogunate Government.

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Science

Until the arrival of Westerners, the primary cultural influence throughout Asia was China. When surveying the history of technology, many noteworthy accomplishments are found in east Asia in general and in China in particular. Science as a mode of applied reason and production did not arrive in southeast Asia until the late 19th century; however, many noteworthy accomplishments can be found in southeast Asia, including the erection of great Hindu and Buddhist centers (e.g., Angkor Wat in Cambodia, Luang Prabang in Laos, and the Borobudur Temple Compounds in Indonesia) by living god kings similar in motivation and function to Karnak in Egypt and Tenochtitlán in Mexico. Nevertheless, the diffusion of innovations, including science, eventually revolutionized southeast Asia.

In terms of mechanization, many examples can be found. For instance, legend has it that Wang Ju built wooden automata, including an otter that could catch fish (ca. 790). Wang Jie printed the first book, a scroll of the *Diamond Sutra*, in 870, which included a woodcut picture. Qiao Weiyo invented the first lock for a canal in 983. He was trying to stop crowds from looting boats that would often break apart when hauled overland.

Around the same time, Zhang Sixun invented a chain drive for use in a mechanical clock (gearing for water clocks appears in Arabia at this time). In 1044, a Chinese commoner, Bi Sheng, invented movable type made of baked clay ideographs that he arranged in a frame, embeded in resin and tightened with wedges of bamboo. In 1044, the Chinese alchemist Zeng Gongliang published the first recipes for three varieties of gunpowder. Around 1045, in his *Compendium of Important Military Techniques*, Tsêng Kung-Liang described magnetized iron "fish" that would point

south as they floated in water. In 1086, the Chinese writer Shen Kuo in his *Dream Pool Essays* made the first reference to the use of a magnetic compass for navigation. Around the same time, Su Song drew plans for a giant water clock, an orrery (a model of the solar system), and a mechanical armillary sphere about 35 feet tall, which is considered the finest mechanical achievement of its time.

The Chinese invented the rocket in 1150. In 1509, Wan Hu attempted to build a flying machine by tying 47 gunpowder rockets to the back of a chair; the contraption exploded, killing Wan. The oldest known depiction of a fishing reel appeared in China around 1195. In 1337, a century before Guttenberg, Korea printed the first book, *Jikji*, using movable metal type.

The Spread of Knowledge

Southeast Asia has a long history of creating complex mechanical devices and tools. Many techniques and ideas found throughout east Asia are the consequence of the diffusion of innovations originating in China including fashions in art, clothing, ways of governing, and religious doctrines. However, did the Chinese, or anyone else in east Asia, develop science on their own prior to the arrival of missionaries, diplomats, and traders from the Occident? Did they seek a natural explanation for how a compass works or venture to ask what combustion is and how chemicals react in a more fundamental sense than using trial and error to arrive at gunpowder? There is a fundamental difference between free inquiry, an essential element of science, and received authority.

All people use methods. A method is a sequence of steps which if repeated should yield similar results and so Paleolithic people had methods for creating types of stone spearheads and hammers, but they did not have science. Science is not a thing, an object, or artifact. It is a style of communication. It is a mode of investigation that requires a broader cultural propensity toward individualism and freedom of expression along with a public sphere that encourages sharing of information and critical testing of claims. These things were not common in Asia from 1200 to 1900. Instead, the path to success in Asia was conformity to traditional teachings and acceptance of inequality as a normal fact of life. Even in the arts, artists typically strove to faithfully copy past masters rather than deviate. Progress requires deviation from old ways of doing things. And in Asia, deviation was not rewarded while conformity was.

Marco Polo (ca. 1254–1324) personifies the exploratory attitude of a few Westerners at the time. He traveled all the way to China and returned with descriptions of some of the technological wonders he encountered there, imploring his fellow Europeans to learn from Asians. And they set out to find routes there. However, the attitude was not reciprocal. The attitude of curiosity and desire and willingness to learn from others that marked a revolution in European thinking personified by people like Abelard (1079–1142), Alfonso X (1221–84), and Petrarch (1304–74)—minds who launched the European Renaissance—was very foreign to Asia in this time period. Certainly, the people of southeast Asia demonstrated great ingenuity in solving practical problems, especially agricultural problems. An example is the great rice terraces of the Cordilleras in the Philippines, dating from 2,000 years ago and remaining practically unchanged today. However, progress and curiosity for their own sake were typically not encouraged. Until large-scale influence from the West, most of southeast Asia exhibited an agrarian lifestyle basically unchanged in its technological aspects since the Stone Age.

Intellectual questioning and critical examination were not trusted by imperial powers in southeast Asia. For example, during the Ming dynasty in China, scholarship was tied to civil service examinations, which were restricted to only the study of specific commentaries on the classics by the Neo-Confucian Zhū Xī (or Chu Hsi, 1130–1200). All other books were considered unorthodox and ignored or banned. Also, a highly formalized writing style called the "eight-legged essay" (*pa-ku*) was enforced.

Chinese scholars did not focus on nature or discovery but on memorizing Chu Hsi in order to become bureaucrats. Formality dominated over innovative thinking. What debate there was centered on Chu Hsi's doctrine, which was contested by Wang Yangming (1472–1529), one of the most illustrious scholars of the time. While Chu Hsi suggested that the study of things in nature may reveal useful knowledge, this doctrine did not lead to a Chinese science. It is said that after a few days of studying bamboo to no avail, Wang Yangming rejected Chu Hsi's idea and insisted on linking knowledge to prac-

tical political action, highlighting the innateness of knowledge, and the need to reject all outside information as a distraction from introspection where wisdom is to be found. Wang found empirical observation to have little practical value. Such an emphasis on conformity and introspection was shared by Hindu and Buddhist-based kingdoms across southeast Asia and served the various ruling dynasties' common interests in maintaining their respective social structures indefinitely.

Another example of the conservative anti-reformation attitude in Asia is illustrated by the great Chinese voyages led by Admiral Zheng He (1371–1433) from 1402 to 1433. Zheng He, acting as the emperor's diplomat, led a great armada on a series of voyages from China, visited over 30 countries (e.g., Indonesia, India, Java, Siam) and sailed as far as east Africa. However, he did not explore in the sense of Christopher Columbus or Vasco de Gama. His voyages were not for discovery, like Charles Darwin's voyages on the *Beagle*. Nor did Zheng He make it his mission to have intellectual exchanges or to build libraries wherever he traveled as Alexander the Great had done. Zheng He was sent forth to impress neighboring countries with China's power and presumed cultural superiority and to demand tribute from them. Following Zheng He's death in his last voyage, the expeditions were stopped, and the boats were burned. An imperial decree was issued forbidding Chinese to do any further foreign travel or trade, and at times, even

Made in 1439 to determine the coordinates of celestial bodies, this armillary sphere was originally kept in Beijing, China, and was moved to Nanjing in 1933. Su Song's 11th-century armillary sphere was the first with a mechanical clock drive.

fishing activities. Unmonitored exchanges between any individuals and foreigners as well as pirate activities in coastal areas were viewed as a serious threat to the imperial court. Similar policies can be found between 14th and 19th centuries in various countries throughout southeast Asia.

Oriental scholars had, before strong influences of Westernization, a strong propensity to look inward. They defined the external world to be a world of contingencies, ignorance, and suffering. For centuries, study of the external world was typically left to medical practitioners and craftsmen who sought to confront natural forces such as disease and flooding and to craft means to manipulate them. Redirecting water supplies for irrigation and terracing mountainsides in order to avert famine are profound expressions of human will and audacity. They are wonders of engineering ordered by central power but they are not science; they are not a literature that infers from practical cases general laws of nature that explain all contingent cases and enables testing of hypothesis and prediction.

The Renaissance

Around 1200 in Europe, there was a revolution in thinking, a rebirth of Classical Greco-Roman critical reflection and exploration. It was called the Renaissance. A civic culture emerged that would grudgingly, at first, tolerate a Galileo, eventually leading to widespread democratization of all aspects of life. The fact is that Chu Hsi was not the equivalent of Copernicus (1473–1543) or Galileo (1564–1642). While Wang's stance was seen as a challenge to some of the orthodox writings of Chu Hsi and a threat to the rote memorization of them for examinations, Wang effectively snuffed out any movement toward a natural and investigative science in China, and by implication, the rest of southeast Asia. Asia did not have a broad revolution in culture until the end of 1900.

Fear of being overwhelmed by foreign ideas and influences led southeast Asian nations to adopt isolationist policies, resisting Westernization and modernization until the late 19th century. However, they were forced by the power of Western technology and the demands of Western governments to have trade with them.

In 1509, the Portuguese arrived in Malacca and Macau. In 1521, the Portuguese navigator Ferdinand Magellan was killed in a tribal skirmish in the Philippines. Two years later, Vasco da Gama died while acting as Viceroy of Goa. In 1540, the Portuguese began to trade with Cochin China (Vietnam). By 1557, a Portuguese trading base was founded at Macau.

In 1549, Jesuit Francis Xavier preached Christianity in Kagoshima, Japan. In 1602, the Jesuit missionary Matteo Ricci was permitted to stay in Beijing. In 1621, Japan forbid overseas travel on pain of death, and a year later, Christians were crucified and beheaded in Japan. A Dutch settlement was built on the periphery of the Chinese Empire in Taiwan in 1622. In 1667, the Dutch conquered Indonesia, and a year later, the English Crown granted Bombay to the East India Company. In 1624, the Spanish were forbidden access to any part of Japan. In 1683, Dutch merchants began trading at Canton.

By 1650, most of Portugal's holdings in southeast Asia were seized by the Dutch and the French. In 1685, Chinese ports opened to foreign trade and French Jesuits established their first mission in Beijing. In 1692, the emperor of China introduced the Edict of Toleration for Catholics. In 1713, French missionaries were expelled from Tongking, Vietnam. In 1716, Ch'ing emperor Kangxi repealed the Edict of Toleration and banned Christian teaching in China because it conflicted with ancestor worship. A year earlier, the Japanese government severely restricted trade with the Dutch. In 1720, Yoshimune permitted the importation of European books to Japan, leading to advances in science and medicine.

In 1729, the Qing Emperor Yongzheng banned the sale of opium in China. Because the emperors of China cared little for the products of the West, Western powers created a market by fostering addiction to opium, which was produced in India and shipped into China. There, it was used to force open Chinese markets. In 1760, Guangzhou became the only port in China licensed to trade with Europeans. In 1773, the Jesuit order was dissolved in China.

Western Influence

A patron of the arts, Qianlong (1735–96) enjoyed Western gadgetry like the mechanical automata of the clock but did not appreciate the innovations of the West or what keeping time could mean for the reorganization of society and industrial tempo, a potential not lost, however, on the Japanese. The scientific and

astronomical knowledge the Jesuits brought to China was regarded as "amusing trifles."

In 1793, a British trade delegation was rejected by the Manchu court, and in 1796, the "Edict of Peking" reinforced earlier bans on the import of opium to China. China was by this time clearly in decline. In 1807, the first British Protestant mission landed in China. In 1811, during the Napoleonic Wars, the British took over French and Dutch possessions in Asia. In 1816, the British trade mission was expelled from China. In 1825, a revolt against the Dutch erupted in the kingdom of Java. That same year, China's balance of trade fell into deficit following the East India Company's illegal importation of tons of opium into China.

In 1827, the forced incursion of Western culture continued. By 1831, it was estimated that there were 10 million opium addicts in China. In that year, the first English language newspaper in the Far East, the *Canton Register*, was published in Guangzhou (Canton). The formal beginning of the Opium War began in China in 1840. In 1842, the Treaty of Nanjing forced China to cede the island of Hong Kong to Britain and to open five ports to foreign trade. France and Britain declared war on China in 1860 and won concessions. By the mid-19th century, China was near collapse.

Meanwhile, in 1844, the shogun of Japan refused a demand by King William II of the Netherlands to open ports in that country for foreign trade. However, in 1867, Japan underwent a profound cultural and social paroxysm, the Meiji Restoration. Japan began looking to the West for its model. Japan's first universities were launched in the late 1870s. A phrase was invented during this period to encapsulate the effort to modernize: *wakon yosai*, which translates as "Japanese spirit, Western things." A style of cultural fusion of Western practices and indigenous values (in this case Japanese values) commenced, creating a model of internationalization and modernization that spread across southeast Asia. With it came the ideas and practices of individualism, freedom of speech and inquiry, and critical scientific investigation.

In 1868, Japan's first telegraph line was laid, and a year later, feudalism was abolished and education was made compulsory. In 1889, a Western-style constitution was promulgated and a Diet met in 1890. Meanwhile, in 1871, London was connected to Shanghai via undersea telegraph cable. The first railroad was built in China in 1888, and the last of many anti-Western and anti-Christian revolts in China, the Boxer Rebellion, was crushed. In 1902, Cheeloo University, the first university in China, was established by American missionary Hunter Corbett.

Europeans had technologies, devices, and tools that enabled them to construct cathedrals, to be sure. For much of Asia, this revolution did not occur until the 19th century. In both cases, it could succeed only insofar as infallible power based in supernatural divine authority was curtailed, freeing the imaginations of the people to participate in critical thinking.

The lasting challenge can be summed up in a basic question: can a nation modernize without Westernizing? History seems to suggest that these two processes are inextricably intertwined.

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See Also: Art; Literature; Westernization.

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Shinto (Japan)

Shinto, which literally translates as "the way of the gods," has its origin in Japanese folk religion based on nature and ancestor worship. Objects of worship