
THE CHINA SYNDROME: A CAUTIONARY TALE

EDWARD TELLER



The expression "China syndrome" had its origin in an inappropriate joke of the late 1940s: What would happen if a reactor melted down and its containment vessel was breached? The answer: The fuel would end up in China.

In the United States in the 1960s a reaction against technology became widespread. It bears some resemblance to a development in fifteenth century China. That event was real and can appropriately be called the "China syndrome".

CHINESE PROGRESS

In ancient times, China was far ahead of the rest of the world in technology. Ch'in Shih Huang Ti, the man who created the Chinese empire in about 200 B.C., connected the defensive structures along the northern and western borders of China into a single great wall. That wall now stands as a monument of peaceful defense. It actually served to exclude the savage Mongol tribes from China for 1,400 years. While invasion destroyed the Roman empire, China, the Middle Kingdom, remained peaceful in its imagined position half-way between heaven and earth.

Even before Ch'in Shih Huang Ti, the Chinese had invented silk. That invention remained a secret process for millennia and contributed to a trade imbalance in the West. Tiberius, the emperor of Rome in the first century A.D., forbade men (but, being a wise politician, not women) to wear silk so as to decrease the "specie hemorrhage to the East".

The Chinese invented printing, gunpowder, rockets. They also invented a harness that allowed horses to pull loads. The harness used in the West was appropriate for cavalry but choked a horse when used for draft purposes. Many centuries later, around A.D. 1000, when the Chinese-style harness was introduced in the West, the horse became most important in European agriculture for plow-

ing. A beneficent revolution followed as a result of an imported improvement in technology.

The list of Chinese technical accomplishments is long. In A.D. 600 a canal was built connecting North and South China. It strengthened the unity of that huge country through improved transportation. The Grand Canal did a great deal to prevent local famine. Nothing comparable to that canal was built anywhere in the world until more than a thousand years later.

One of the most remarkable of ancient Chinese devices was the compass, which was used before the birth of Christ. By the middle of the thirteenth century, it had enabled China to establish trade with countries ranging from the East Indies to India to the Persian Gulf to Madagascar and the east coast of Africa. Modern archeologists exploring the ancient remains in east Africa have found that from the tenth century onward, Chinese porcelain is present in great quantity.

During the first decade of the fifteenth century, the Chinese amassed a powerful fleet - 3,000 ships, including 250 galleons roughly five times the size of Portuguese vessels that sailed later in the century. The Chinese ships, with crews of more than five hundred men, also were armed with cannon more sophisticated than contemporary arms in Europe. In the years following 1405, Cheng Ho, the eunuch admiral of sixty-two huge ships and tens of thousands of men, embarked on seven expeditions. On the last trip, begun in 1431, he visited twenty realms and sultanates, including many along the east coast of Africa.

The Chinese came as traders, exchanging gifts of gold and other treasures for exotic curiosities. One serious military action during those journeys was recorded. The King of Ceylon demanded excessive presents and eventually sent his troops to burn and sink Cheng Ho's ships. Cheng Ho captured the king and his court, fought his way back to the coast, routing the army on the way, and took the prisoners back to China. There they were received kindly and sent home again after agreeing to choose a relative of the king as his successor. Armed might was used discreetly by the Chinese.

The motives for those trips, for the most part, can only be guessed. Apparently, one of the purposes was to impress the world with the idea that China was a leading political and cultural power. There was also a proto-scientific purpose. Cheng Ho was accompanied by numerous physicians, astronomers, and naturalists. A Chinese writer of the period says:

In my youth, by reading such as the *Record of Strange Countries*, I learned the vastness of the surface of the earth, the differences in customs, the diversity of human beings, and the variety of natural products - which are all truly astounding, lovable, admirable and impressive.

During the same century, when Henry the Navigator established his famous laboratory in Sagres, Portuguese ships started to explore the west coast of Africa. But long before that the Chinese had begun to explore the globe. The distance from Portugal to west Africa is small; the distance from China to east Africa is almost halfway around the world. In the middle of the fifteenth century, there was every reason to guess that China would rule the world.

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FOR LIFE, LIBERTY AND PROPERTY

CHINESE DECLINE: POLITICS VERSUS SCIENCE

But that splendid beginning came to naught. This is how history records and interprets the change. The Chinese wall was not a hundred percent effective. Around A.D. 1200 China was conquered by Genghis Khan. His descendants ruled China for more than a century. In the end the Chinese revolted, and a Chinese adventurer-turned-emperor founded the Ming dynasty.

In the Ming court, and also at earlier times, were two opposing groups of considerable power. One group contained the Confucian bureaucrats who had earned their position by literary examinations open to everyone. The high officials, the Mandarins, appointed on the basis of their knowledge of the great old philosophers, were the custodians of ancient Chinese values and literature. The other group, the eunuchs, purchased as children by the emperor, were completely loyal to his person. They were interested in technology and on the whole were a much more innovative lot.

The Confucian scholars and the eunuchs represented two cultures that may have differed more widely than the two cultures of literati and engineers in the present-day West described by C. P. Snow. The emperor used the less refined eunuchs to check on the august and highly polished Mandarin governors. The eunuchs occasionally discovered an irregularity. Not much love was lost between the two groups.

When Genghis Khan moved the capital of China to Peking, supplying food to the new capital became a problem, because the Grand Canal did not reach that far north. For a number of years, while the canal was being extended, food was brought in by sea. The eunuchs led the political party that supported the development of the navy. The party of the bureaucrats, with their connections to the rural landlords, bitterly opposed that development.

The Ming emperors varied in their attitudes to the navy. In 1424, an emperor came to the throne who ended the expeditions, but he died within the year, and the next emperor sent Cheng Ho off on his last mission. That emperor died in 1435, however, and the policy was again reversed, this time permanently. An edict in 1448 made it clear that the fight between the two groups had been won by the Confucian scholars. Not much is known of the struggle, or even of the details of Cheng Ho's journeys. Once the bureaucrats consolidated their power, they burned the books describing the overseas adventures.

Is that the whole story? I doubt it. Perhaps there are deeper factors that govern the fate of individuals and empires. I have asked many of my Chinese friends. None of them would even guess. The events and people that brought about the change covered their own tracks.

The result of the edict, however is clear: all exploration stopped. Eventually the ships were destroyed. The Ming emperor said in effect: in the whole world, the only thing that matters is the Middle Kingdom. All the real needs of food and clothing, including goods of fine craftsmanship, are available at home. Why spend money on foreign objects? The funds spent on the navy could be better used for water-conservation projects or granaries.

Most remarkably, from that time on there were no more great technological developments in China. China had had enough of innovation, and the leader of the world at that time started to turn into an underdeveloped country. During the same period, the ancient Chinese ceramic art blossomed, and beautiful multicolored porcelain of outstanding excellence was produced. A choice had been made for culture and against technology.

Four hundred years later, East and West met. The Chinese emperor accepted with disdain the barbarian Englishmen bearing tribute. However, it soon became clear who possessed the real power. A series of tragedies for China followed: Western intrusion, the Opium Wars, and internal disorders like the Tai Ping rebellion, which alone cost millions of lives. For two centuries the Middle Kingdom was a place closer to hell than to heaven.

The West began technological development just at the time when the Chinese stopped being interested. Westerners in various ways - some horrible, some helpful - accomplished the exploration and col-

onization of the world. The peculiar situation in China, the unexplained recoil from technology, is one of the most significant events in recorded human history. This was the real China syndrome. China invented it. The United States is imitating it today.

AMERICAN DECLINE?

Not many years ago, Americans landed on the moon. The NASA budget was cut soon afterward. The belief seemed to be that public interest should be confined to what happens in the United States. Technology, even science, came to be seen as irrelevant, perhaps even dehumanizing. Today, four-fifths of American high school students take no science or mathematics courses beyond tenth grade. There can be no doubt that currently a larger proportion of high school and university students in the Soviet Union and Japan concentrate on science and technology.

Throughout the history of the United States, increasing productivity has been the pattern. In 1980, productivity declined for the first time. There are many reasons for that. The energy crisis is only one of them. Young people during the 1960s turned away from engineering and science. Their productive years have been directed toward other activities.

In China, four hundred years passed from the time of the original edict to the time when its harsh consequences became evident. In the United States, some effects have become noticeable in less than twenty years. The modern world changes at a rapid rate.

There are relatively few poor people in the United States, but more than three-quarters of the people on earth are wretchedly poor. The American standard of living and American security are due to advances in technology. At present, a historic change is occurring in the world: the globe is being engulfed by the industrial and scientific revolution. The poor nations are not confused about the source of well-being for their peoples.

As technology spreads and increases, there will be new common interests, new cooperations, and new conflicts. Modern development, modern technology, has the inescapable consequence of increasing interrelationships over the globe. Interdependence will occur within the lifetime of many of those living today.

When actions in one country influence what happens in another country, then complete national independence is gone. Those changes cannot occur without some kind of world order, although not necessarily world government. One practical time-honored way in which to deal with such situations is to impose imperial control by force. The fate of nations in Eastern Europe following World War II and more recent examples such as Afghanistan, indicate that such control has not gone out of style. The Soviet Union is prepared to enforce its domination using military technology.

The postwar recovery of Japan and Germany, with American help, shows that there is a different possibility. If technical development in the United States were resumed, then the order required in an interdependent world might be produced not by force but by reason. Democratic arrangements for worldwide collaboration might then occur, not on command but by agreement. This is something new and miraculous. It will not happen if the United States loses leadership in technology, if the nation follows the China syndrome. That syndrome leads into the abyss.

How long will a nation dependent on science and technology flourish if the majority of its people cannot make technically informed decisions? If most people entering the job market are scientific illiterates? We are living off our technological capital. Clearly, it is about to run out. An out-of-control reactor producing a melt-down headed for China is a fantasy. A nation moving in the direction of China's past error is not.

Chineses history is vitally important to our future. Technology alone does not suffice. The eunuchs alone could not have governed China well. Neither could the Confucian literati. The two cultures are complementary. They must not remain separate. A synthesis is necessary. It will not be easy. It is, however, a requirement for the survival of our civilization whose roots reach down to the Renaissance, to Sagres, and beyond.