

Why Could Modern Sciences Not Sprout in Old China, But in Europe After Renaissance?

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Abstract: There were great differences between Chinese ancient culture and Greek ancient culture, both originated almost in the same time—about 500 BC, like two long rivers, both flowed to different historical directions. As a result, Europe after Renaissance inherited and developed the cultural tradition of ancient Greece, thus, European modern science-technology developed faster and faster as time went on, and finally brought Europe into industrial revolution and capitalism. On the contrary, China had kept the feudal system and ancient Chinese cultural tradition to the ending of 19 century, but the sprout of modern science was not born out yet. In this article, it will be researched, that the different natural environment and different social-political-economical systems had the decisive influence to culture, thus, the different modes of thinking and behavior of ancient people finally exerted the different results to sprout of modern science in old China and in Europe. It is not the gist of this article to do comprehensive summing-up and analysis to two ancient cultures. [The Journal of American Science. 2005;1(2):65-76].

Note: This article is the continuation of author's former article "New Concepts to the Change of Human Social-economical Formation and the Development of Human Society", which was published on "The Journal of American Science". Its website is: <http://www.americanscience.org/journal/2005/current>. In that article, it was pointed out that old China had kept feudal system over 2,000 years and could not turn into capitalism, because no other motive power produced by modern science-technology except manpower and animal-power was used in production.

Key words: ancient Chinese culture; ancient Greek culture; sprout of modern science; modes of thinking and behavior

Introduction

Einstein said: "The western modern science is built on the bases of two great achievements. They are: the system of formal logic invented by old Greek philosophers, and the causality was possibly found out through systematic experiments. So far as I know, it would not be surprised that Chinese old sages did not walk those two steps, but should be surprised that many scientific discoveries were still made up in old China.^[1]"

Dr. Zhen-ning Yang recently pointed out: "<Yi-jing> had exerted influence to the mode of thinking in Chinese culture, such influence was one of important reasons that sprout of modern sciences had not borne out in China.^[2]"

Two great physical masters, winners of Nobel Prize, Einstein and Dr. Yang had almost got a common sense that the backwardness of sciences-technology in

old China was caused by lack of correct mode of thinking and behavior in ancient Chinese sages and intellectuals, who had excessive superstitions to Heaven and monarchical power, and almost only advocated virtue philosophy. On the contrary, the ancient Greek sages from Aristotle, almost regarded nature as the observed and researched object. In addition, after Renaissance, European scholars had done away with the superstition to theocracy; the sprout of modern science accorded with the social needs then, and was produced from navigation and observation to celestial bodies. Viewpoints of two great physical masters struck home, because the modern science is built up on the base of integrating strict theory with systematic experiment, on the base of consistency of theoretically calculated numerical with the experimental numerical, only through the strict logic thinking, the results of systematical experiments could be refined to become the correct scientific theory.

Why could western ancient sages and intellectuals apply formal logic and experiments to develop science-technology, but Chinese ancient sages and intellectuals not do so? The roots bearing different modes of thinking and behavior in two ancient cultures should be found out from their different history, geography, social-economical formation and political system in ancient times. Just those great differences produced in modes of thinking and behavior in old Greek and old Chinese sages finally let that the sprout of modern science was born out and developed in Europe, on the contrary, until the latter half of 19 century, old feudal China just started to import modern science-technology from west countries and Japan.

1 The origin of Chinese ancient culture

Chinese ancient culture originated from Confucius about 2,500 years ago.

(A). Confucius (551--479 BC),^[3] as the greatest delegate of Chinese culture, was born in East-Zhou dynasty. His great contributions were perfection of <Yi-jing>, and <Lun-yu>--a book of Confucian quotations recorded by his students. His central idea was "benevolence". Its main contents were: "Everybody should love others like loving himself, just as Heaven and Earth love everybody. Personal thought and behavior should accord with the will of Heaven and Earth; otherwise, misfortune would come down to him. The integration of Heaven, Earth and mankind should become a harmoniously **natural Trinity**. Mankind should respect and fear Heaven. Confucius taught: "Everybody must revere Heaven's will and sage's teachings." "Everybody should not blame Heaven and others but his own." Personal action should obey Heaven's will, King's rule, officer's supervision and sage's teachings, because King was Heaven's son, officers were people's parents. Disasters were punishments of Heaven to bad actions of people. For safeguarding feudal hierarchy, all intellectuals from king to officers could only revere and worship Nature—Heaven and Earth. Nature could not be treated as the researched object. In old society before 1949, there was always an altar on the centric wall in the main hall of every family, and always a memorial tablet written "Heaven, Earth, king, ancestors, and teachers" was stood on altar for worship by whole family. Everybody must observe cardinal guides and virtues. People should not go against his master and not stage an armed rebellion in order to maintain the social normal orders.

As a result, all people's ideas and actions needed by the sprout of modern science was shackled by superstitions to Heaven, monarchical power and Confucius ethics or other sage's teaching.

(B). In Confucian time, there was another great philosopher, Lao-zi (about 571 - 471), he created Taoism.^[4] His thoughts had produced tremendous influence to Chinese culture too. He advocated that, on one side, everyone should be "scanty of personal desire" and should "hold himself aloof from the world". Thus, somebody might live alone in a deep mountain or in a big jungle as to stand aloof from worldly affairs, if he was not satisfied to his current situation. Probably there were too many mountains or wastelands in Chinese mainland at that time for people to escape reality. On other side, any Emperor or Duke as a good ruler should govern his country and people by doing nothing that goes against nature. He taught: "All things would be duly regulated by doing nothing."

After over 100 years of Confucian death, his follower Mencius, (about 372—289 BC)^[5] inherited and developed Confucian ethics, besides "benevolence", Mencius emphasized the importance of "righteousness" in Confucian ethics, in addition, Mencius especially opposed "profits" or "struggle for personal profits".

No "personal profits" and "personal desire", the motive power of sprouting modern science would not appear in ancient society.

About 200 AD, Buddhism ^[6] began to spread in ancient China. There were no more great difference in ethics between Buddha's (566 – 486 BC) and Confucian teaching. Buddha taught: "To do no evil. To cultivate good. To purify one's mind." The most important specialty of Buddhism much different from Confucius and Taoism was advocacy to "karmic retribution and transmigration", "soul could go up to paradise after death" and "practice Buddhism for next life". About 230 – 630 AD, ancient China had big disasters of wars about 400 years. People's life would be in long and deep sufferings. The evil could not be proper punished. People believed Buddhism to wish himself to have a better next life as to enhance personal confidence living in difficult position.

All above doctrines could be widely spread, because they accorded with social and people's soul needs. However, people's scientific thinking and behavior could be impossible to grow up from feudal ethics and superstition, which were far away from rationality and logic thinking.

Above sages commonly advocated; "Everybody should do goodness", "Mankind should be submissive

to nature and Heaven's will"; "Everybody should be scanty of personal desire". Lastly, about after 10 century in Song dynasty, doctrines of Confucius, Lao Zi and Buddha had been fused together as a **cultural Trinity**, it became a main stream in Chinese ancient culture, and the guide of old Chinese thinking and behavior.

(C). In Confucian time, East-zhou Dynasty had much declined; many dukes in the name of Emperor really ruled respective territory and people. It was a period of social transformation from disintegrated slavery system into the newborn feudal system. Agriculture was gradually becoming the main production. At that time, every duke's country almost had more land, but was short of population, labor force and advisors. Thus, common people, especially scholars of all kinds could free enter and depart some duke's country. Each duke's country was almost completely independent, and each duke could apply special modes and means to rule his own country as he liked. No duke had so strong strength enough to unite whole mainland in that period, but frequent wars would occur between duke's countries due to contending for hegemony. It was a new epoch of comparatively prosperous economy and of hundred-flower blossom of Chinese culture. As a result, various doctrines and theories vigorously sprang up and developed. At that time, a politician or military scientist could wander about many countries as to persuade some duke who could accept and practice his political or military propositions. As to which doctrines could be a choice as the nationwide orthodox ideas afterwards, it was decided by political and social needs then.

In Confucian time, most Chinese people lived on great plains close to river basins; the warm weather and adequate rainfall would be better for agricultural development. Only if big flood or severe drought had happened or cruel rule of duke had existed, most people could live and work in peace and contentment. The change of weather of four seasons in any year would hardly be unpredictable. The people's life and destiny lived on such great plains would often be much less dangerous than people lived on sea and ocean. Therefore, common people were naturally lack of adventuresome spirits. Intellectuals or scholars would be lazy to research the laws of nature and science, and lazy to struggle for changing the current productive conditions. The first wish for people was not able to violate Heaven's will in order to get the favors from Heaven. The second illusive wish for people was: "rulers should do as good rulers, officers should do as

good officers, and people should do as good people." Thus, Chinese ancient philosophers would only like to build up some special ethics as to keep the harmonic relationship between various people, but not like to research nature. The appearance and spread of Confucian thoughts was in accordance with the political, economical and social condition in that times and later on. His thoughts were beneficial to agricultural economics, to maintain the social stability and feudal political system, especially beneficial to maintain a united, strong and great feudal dynasty on Chinese mainland.

As a result, most people had to satisfy the current living conditions of small agricultural production, and had no desire to research science of no profits. Just some needed technologies could be developed in ancient Chinese society, such as gun powders, compass and weapons needed by war, printing and papers needed by literature and official documents, Chinese medicine needed by everyone, especially needed by imperial family and officers .

(D). Owing to that, China had almost been a great unified feudal country over 2,000 years, after the First Emperor of Qin dynasty completed a unified China in 221 BC, a strong, united dynasty accorded with the needs of agricultural production on great plains. However, democratic system in the ruling class had no possibility to appear, because democracy would lead to split of a great-unified Empire and lead to internal war. At the same time, Constitution, courts, litigations, laws and statute books, arguments and consultations, which needed the logic and accurate language and words, had no existent condition because of no democracy, it was the great differences with ancient Greece. Thus, the strict logic thinking in old Chinese intellectual's mind would not be possible to be built up.

(E). However, rulers and officers could almost do no good, it was the most important cause for everybody's good or bad fortune in future. It was why Confucian <Yi-jing> could be prevalent in China over 2,000 years, because everybody, especially officers and intellectuals, would always expect to know his destiny in future from divinations of <Yi-jing>. What was the mode of thinking of <Yi-jing>? It used analogous mode instead of concrete analyses, thinking of images instead of thinking of logic, unsure qualitative alteration instead of certain quantitative analyses, inductive method instead of deductive method, empty talk instead of precise words, contrasting the illusory behaviors of heaven, earth and things with the behavior of people, etc. Scholars of <Yi-jing> always used ambiguous language

for foretelling other's destiny and paraded his enigmatic learning to benefit himself.

The indetermination of Chinese language and thinking are sufficiently exposed in <Yi-jing>. It had hindered Chinese old scholars to do accurately scientific and logic thinking. Any divinatory symbol in <Yi-jing> analogized the people's destiny with Heaven's or Earth's phenomena. As a result, a lot of wise scholars in the past indulged in the mysterious metaphysics of <Yi-jing>, they did not study concrete laws on Heaven or earth different with human society and all things on earth, later, they even contrasted every star on the sky with each personal destiny on earth. The contents of Chinese ancient culture mainly drawn out from <Yi-jing> and Confucian thoughts, which had almost become the common senses of most people in old agricultural society, especially were needed by king and officers for maintenance of feudal systems.

(F). In old society, every intellectual did nothing except reading past literatures and past political-historical books, because that knowledge would be the sole opportunity for him to take an official position under the imperial examination system in feudal dynasty. They did not personally participate productive labor, or experiment or observation to physical world. The sole mission, or the sole "interest" and "desire" of old intellectuals in whole life was according to Confucian teaching "to cultivate his moral character, then to make whole family do with one mind, then to run the whole country well, at last, to make the world peace and tranquility."

(G). In old Chinese society, teachers taught students not with the heuristic, conversational and equal method, but with the method of delivering sermon. Every student in old society had to revere his teacher and to observe doctrines of Confucius and Mencius, thus, student was impossible to have the critical and creative spirits needed by science.

(H). Year in year out, the agricultural economy to depend upon nature had gradually let people to produce thoughts of paying much more attention to agriculture than commerce and handicraft industry, it led to decrease in personal desire for seeking wealth, science and truth. In addition, the other backward nationalities around old China were not the plundered objects of feudal rulers and traded objects, so, the adventured spirit and the desire for plundering wealth to exterior world was skimpy.

(I). Words are carrier and tool of thought. Chinese characters are pictographic, polysemous or more meanings, better for thinking in images and analogy.^[7]

For example, as the proverb well-known by everybody says: "It is easy to change rivers and mountains but hard to change a person's nature." In reality, there is no certain causality between river or mountain and person's nature. Such analogy might be often seen anywhere in Chinese ancient literature. In ancient Chinese language, there were almost no grammar or hardly to have predicates. A complete and precise meaning in whole sentence can only be sensed and guessed in many cases. It may be an important reason for Chinese language to apply formal logic and accurate concepts hardly.

In analyses above, ancient Chinese culture was deficient in some positive factors needed by sprout of modern science and technology (such as thinking of formal logic, curiosity and spirit of researching the natural mysteries through doing experiments, accurately numerical concepts), conservative modes of thinking and behavior in Chinese intellectuals would certainly have been shaped in long historical period. Just above historical, social, political and geographical reasons resulted in backwardness of science and technology in old China. For example, most intellectuals in old China strived for securing some official position all his life.

In a word, a united great Empire, the nationwide small agricultural production, and the united Chinese words as well as united moral doctrines formed a **super integrated Trinity** in old Chinese history, it sternly controlled old intellectual's mind to do scientific and logical thinking. Such Trinity was built on the foundation of small agricultural production on the great plains.

Above three Trinities let old China to have no possibility to appear the sprout of modern science.

However, after modern Chinese intellectuals recognized above shortcomings in Chinese ancient culture, they would not be difficult to correct those shortcomings through learning logic thinking and doing systematic experiments. The Chinese traditional culture, after getting rid of the old deficiencies produced from feudal system and after having effectively learned modern western science-technology, will certainly become a splendid, new Chinese culture, because it has the most magnanimity and adaptability. For example, modern Chinese language has been westernized. Many modern intellectuals have gotten great success from learn western science-technology.

2 The origin of Greek ancient culture

Western culture originates from Greek ancient culture about 500 BC.

Socrates (469--399 BC.), Plato (427--347 BC.) and Aristotle (384--322 BC.), called three sages in ancient Greece, were the greatest delegates of Greek ancient culture, and Aristotle epitomized the thought and the learning of that culture. Three sages all advocated rationality, which was needed by scientific thinking. Some advantages of Greek ancient culture inherited by European led to sprout and development of modern science-technology in Europe after Renaissance. How was Greek ancient culture born out from Greek natural environment and ancient social-political-economical systems?

(A). Socrates^[8] was born in 469 BC, after 10 years of Confucian death. In Socrates' age, it was the golden time of Athenian Empire. Especially in 15 years (443--429 BC) of Pericles' as the chief marshal in 10 person executive committee, it was the brilliant summit of slavery democratic system in Athenian Empire. In Pericles' era, Athenian Empire ruled over 200 dependencies, over 10 million populations, and built a enormous fleet of about 1,000 vessels. Aegean Sea became an inland sea of Athenian Empire; Athens was a biggest trade harbor at that time.

In geography, Greece is a small peninsula, its three sides are surrounded by seas, at its back is a mountain range. There are much more hills on peninsula, but less great plains or great grasslands. Thus, agriculture and animal husbandry had no good circumstance to be greatly developed in Athenian Empire. Its broad masses had no choice but to work on sea trades, or plunder wealth from outside city-states. The ocean weather would often be roaring waves, change swiftly and violently. People lived on sea would gradually be tempered to have the spirits of adventure, conquest, struggling with nature, doing the solid works and experiments, and to have the strong desire for earning or plundering wealth from outside. All those spirits hid in the ancient Greek and western culture, and were beneficial to sprout modern science.

People of living and struggling in sea and ocean in the long period had gradually built and developed up a marine culture. Its contents about are: the adventurous spirit (people living on sea had to more believe his own power than Heaven's will), scientific spirit (paying the great attention to practice, no empty talks, using brain and hands together, calculating and recording the quantity of objects in detail,) the strong desire to effort, struggle and plunder for wealth, etc.

(B). Pericles (495 – 429 BC)^[9] was born from noble; he had a great deal of lands and commercial property. He had a wide range of knowledge and ability. He was an open-minded democracy in slave owners. He raised the democratic system of slave owners to the highest level. He deemed that "Humanism—people (not included slaves) is the first important", "Only after getting freedom, people can have happiness", "Equality, freedom and legal system are basic principles of democracy". Under the leadership of Pericles, Athens became a central city of prosperous economy, stable political situation and flourishing culture in Athenian Empire^[9]. Of course, the prosperous and powerful Athens Empire was built on the base of oppressing, exploiting, enslaving and murdering dependencies as well as all slaves. However, Pericles firmly persisted the complete democracy and equality among all male citizens (populaces and aristocrats) over 20 years old (excluded slaves, women and nonnative) in Athens. Two highest organs of Empire power were citizens meeting and public court of Athens.

Citizens meeting selected committee of 10 marshals as executive authority of Empire power. Candidates of 10 marshals had to do many speeches and to take part in many debates as to advocate his political programme. Pericles was one of the best speechmakers. Citizen meeting was held every 10 days to decide the important problems of internal affairs, foreign affairs, war and peace, and to punish or recall some marshals and select some new marshal, etc.

Public court had become the highest judicial organ of Athenian Empire. In Pericles' era, effects of public court had been much more strengthened; judicial officers of Athens were increased to about 6,000. All lawsuits relevant to relations between dependencies, between dependency and Athens were be tried by public court of Athens. In addition, the judicial authority of all-important civil and criminal cases was belonged to public court of Athens. Therefore, at that time, whole Athens had almost become a great conference hall full of political and various speeches as well as disputes. On all places of arguments, such as on court, on conference, on speech or on writing, accurateness and preciseness of language and words were very important. Especially, Ancient Greek would be wanted to apply mathematics and numerical analyses on courts. They would not satisfy to the empirical proofs. They demanded the universal certainty related proofs, i.e, provided proofs about viewpoints of politics, philosophy and laws should be reliable, and should have reliable numerical and mathematical confirmation. All those political,

social and history conditions of Athenian Empire would create out a good circumstance for developing mathematics, and formal logic. It let ancient Greek mode of thinking and behavior to pay the great attention to mathematics, science, and formal logic, which gradually became main contents of ancient Greek philosophy and culture.

(C). Formal logic was born from completely slavery democracy in ancient Greece. Why could such democracy appear in ancient Greece, but not appear in ancient China? It had the historical and geographical certainty. Ancient Greece in the period of Athenian Empire was composed by a great number of small and relatively independent city-states. Greece is formed by a small peninsula and a great deal of islands, no big plain or big grassland, but much more hills. Thus, it was very difficult to build up a greatly unified, permanent and stable Empire. For self-safeguarding, slaveholders and populace had to build up their own firm city-state according to their geographical position and practice democracy within themselves in order not to be defeated to become slaves or not to be plundered. In addition, democracy was beneficial to plunder wealth collectively from other city-states or to put down the rebellion of slaves. Every city-state was almost a small independent world. Democracy brought constitution, laws, courts, votes, and speeches or debates to great events for ancient Greece and most city-states. All those needed the rigorous thinking and precise language and words. Democracy would be beneficial to do away with blind faiths and to discover truth.

Ancient Greek from trade with Phoenicians^[7] had learned their letters and finally made up ancient Greek words and language, which was beneficial to do logical thinking. Therefore, the occurrence of formal logical thinking was needed by political and social conditions in ancient Greece then.

(D). During 15 years of Pericles in power, Socrates was 26 to 40 years old. He taught his students with elicitation and argument methods. Precisely, he was a great master good for argument then. It was accordance with the social needs in the golden period of Athenian Empire. Socrates created moral philosophy; he paid great attention to ethics. He emphasized: "Morality is guided by rationality". "Kindness originates from knowledge, evilness originates from ignorance". Socrates' viewpoints above might be some reflection of social reality then. Living in Pericles' period of prosperity, democracy and ruling by laws, some officers and leaders, especially such as Pericles, were full of kindness, rationality, intelligence and wide knowledge,

it led Socrates to only see one side of human kindhearted nature and built up his ethics. Besides, he advanced inductive method, and showed to people how to draw out an accurate judgment from many concrete facts. Lastly, Socrates was sentenced to death by the reason of advocating his new God come out from rationality.

(E). Plato^[10] was a Socrates' student, younger 42 years old than Socrates', born in 427 BC. After Pericles' death in 429 BC, Athenian Empire was much declined and decayed, and finally replaced by Sparta in 405 BC. In Plato's life, he experienced a destroyed Athenian Empire and the rule of Sparta. In Plato's sight, real society was very corrupt and ugly; he was increasingly disgusted with politicians, codes and conventions then. Especially, Socrates' death for his own faith in 399 BC gave Plato a very strong irritation. Plato considered that Socrates was just the true embodiment of ideal and wisdom, and finally had to be put to death. Owing to disappointment either to democratic tyranny in the end period of Athenian Empire or to the Spartan mixed political system (i.e. King plus aristocratic council plus supervisors), thus, in Plato's mind, the perceptual knowledge and world were purely imaginary, only the rational knowledge and world were real and reliable. Plato determined to carry forward the philosophical thinking of his teacher—Socrates, enlarged Socrates' concepts about rationality and kindness to the summit to become the utmost true, the utmost good, the utmost beautiful. He finally researched the theory for building up the ideal nation on the world. On one side, Plato deemed that, the ideal or kind politicians would be certainly necessary in any future system, however, kindness only originated from rationality, which was produced from knowledge. Thus, Plato created academy in Athens to teach students to learn philosophy and mathematics. Plato carried on Pythagoras' concept: "Everything is only numerical." In his mind, mathematics and geometry are the most rational, so they are most reliable, and can be actually applied to commerce, navigation, astronomy and architecture, etc. Only the rational people to have mastered mathematics and geometry had wisdom, and would lead to rational behavior and kindness, only such people could become good leaders of government. On the front door of Plato's academy, the sign was written: "No admittance for people who don't understand geometry." Many important politicians and mathematicians had learned in Plato's academy for a time. On the other side, Plato considered that some social system of Spartan military communism could be taken into his original model of

ideal nation. Therefore, integration of two sides above became the main contents of Plato's Utopia.

(F). Aristotle,^[11] one of Plato's students, was born in 384BC. He studied in Plato's academy 20 years from his 17 to 38 years old. Soon afterwards, Aristotle became a teacher of Alexander 3rd, the Great King of Macedonia. Going on his punitive expedition in 13 years, Alexander created a great Empire including partial European, African and Asian mainland. Philip 2nd, Alexander's father, united Greek city-states in 338 BC, Athens became a dependency of Alexander's Empire, and got a short peace and prosperousness. Aristotle created academy in Athens about 15 years from 338 BC to 323 until the death of Alexander, the academy got a great deal of money contribution from Alexander. Aristotle died in 322 BC after 1 year of Alexander's death.

In splendid 15 years of academy, Athens was ruled by Alexander, Aristotle was engaged in writing while teaching as a professor, he completed <Logic>, <Physics>, <Sky>, <Ethics>, <Metaphysics>, <Politics>, <On Tool>, etc. Those writings epitomized splendid Greek ancient culture. His works were critical, painstaking, and plain, and had no fervor. He was not a prophet encouraged by inspiration. Aristotle criticized many Plato's concepts, such as rationalism, Utopia, he said: "I love my teacher, but I love truth more." Plato persisted: "Idea is the original pattern of material object, its existence does not depend upon the material object. Sensation is impossible to become the source of real knowledge." However, Aristotle loved independently observation and thinking, he considered:

"Knowledge originates from sensation. Material object itself has contained its essence." Aristotle firstly put material object, reality, the being of things and world on the first and most important position in his theory of knowledge. Aristotle paid much attention to observe and research the natural phenomena as well as natural laws. He had effectively studied astronomy, meteorology, animals, birds, etc. Aristotle's concepts expressed in his writings were that, "Universe, human life and each respects in society are all the objects of thinking and analysis. Everything in universe would not be controlled by gods, chances and magic, but go on according to some certain laws. It would be worthy for mankind to research nature systematically. People should get conclusions through experiments and logical analysis." His propositions of anti-tradition, anti-mysticism and anti-superstition had exerted the great influence to western culture afterwards.

Aristotle's main political viewpoints were: "There are three kinds of good governments; monarchy is better than aristocracy, and aristocracy is better than republic. However, once the best become degenerated, it would be the worst. In his sight, oligarchy ruled by men of wealth and democracy ruled by populace are bad government." His famous thesis was: "Democracy is the enemy of politicians." Aristotle maintained doctrine of the mean. In his sight, Sparta and Athens were probably two opposite extremes. Obviously, his political viewpoints were deeply affected by his experience and political reality at that time. He clearly understood the vanish of Athenian Empire and Sparta, and Socrates' death. He experienced the confused rule of Sparta and saw that, a unprecedented, gigantic Empire of Philip and Alexander was soon established and soon crumbled in short 15 years. It would let him assure that, a powerful but not corrupt monarchy was much more superior than democracy of Athens and confused republic of Sparta.

Aristotle strived to integrate the mode of thinking with existence. In his <On Tool>, he mainly discussed the deductive method, and became the founder of formal logic. Aristotle applied formal logic to study geometry. In order to guarantee the reliability of thinking, Aristotle formulated the regulations of thinking. Those regulations were called Logic.

In fact, Aristotle had almost proposed the correct "Theory of Knowledge" or methodology in scientific research, i.e. the correct ideas and conclusions to objects could be gotten on the foundation of systematic experiments and then through logically analysis. It was just a hypothesis not recognized by most scholars in a long historical period. However, owing to the very low level of productive force and full of superstitions in ancient time, intellectuals had no way to know that nature could be considered as object of experiments. In addition, in Middle Ages, under the rule of the Roman Catholic Church and Christian creeds, almost all Aristotle's wrong viewpoints had become doctrines for maintain Roman theocracy, such as his wrong proposition of "celestial bodies would be the sacred Eternals". That was why the sprout of modern science occurred in Europe only after Renaissance.

(I). Euclid,^[14] the greatest mathematician of ancient Greece, was born in 330 BC, before 8 years of Aristotle's death. He applied successfully Aristotle's Logic to geometry in his books; he started from 5 axioms and 5 postulates through deductive method to have methodically demonstrated 467 most important mathematical theorems. It was a firstly great

achievement to apply deductive method to scientific thinking in human history and to let deductive method become standardization for building up the scientific theory. Furthermore, Euclid discovered reflecting law of light and the principle of buoyancy.

3 Comparisons, analyses and conclusions

(A). It is seen from above-mentioned, systematic experiments and formal logic are just the necessary condition for successful research in science, especially for the sprout of modern science. However, it must need a long time and process for scholars to consciously apply systematical experiments and logical thinking to scientific research. Social-political-economical conditions are the sufficient conditions to the sprout of modern science. In Europe, only after the bland faith to Catholic theocracy of Middle Ages had been broken in Renaissance, and after the new wealth could be brought by the advancement of navigation, astronomical observation, and other science-technology, the sprout of modern science would occur after Renaissance. It is said, only if new science-technology is needed by social-economy and can bring profits to society and scientists, it may sprout and develop. Aristotle had clearly pointed out the correct way of researching and developing science early in 320BC, but only about 2,000 years later, the sprout of modern science could occur in 16 century in Europe. On the contrary, 600 years ago, before Columbus' birth, in Ming Dynasty of feudal China, eunuch Zheng He^[12] cruised southwest ocean of China and Indian Ocean seven times with enormous fleet, once the fleet was composed by about 300 vessels near 30,000 men, the navigation technology was the most advanced in the world in those years. However, after that, the sprout of modern science had not appeared in old China near 500 years, because eunuch Zheng He's fleet did not look for or plunder new wealth, in addition, the feudal superstitions to Heaven and to monarchy had not been broken then.

(B). The sprout of modern science needs suitable soil and weather. Renaissance was the best soil and weather to the sprout of modern science, the invention and usage of telescope could be considered as the sign of sprout of modern science.

In Middle Ages or called Dark Ages, (about from 400 to 1500 AD) the Roman Catholic and Christian creeds ruled people very sternly, it advocated asceticism and scholasticism. Roman Catholic Church built up the Inquisition to punish heretics sternly, and strictly control the spread of scientific thought; even almost all

Aristotle's viewpoints became dogmas. The core creed of Christianity was human Centralism, it advocated that, earth was the center of universe, and mankind was the center of earth as well as everything. Thus, only God could dominate mankind and mankind should dominate everything on earth according to God's will; at the same time, God entrusted to every person the same rights of equality and freedom. Thus, in Middle Ages, science would impossibly sprout.

Early before Renaissance,^[13] after Marco Polo traveled to eastern to China by land over 20 years, he returned Italy in 1298. European knew many beautiful and rich eastern countries in the world. Before and in the period of Renaissance, Italy had many more free trading ports and cities, where trade economics and handicraft industry had been better developed.

Early before Renaissance, in Europe of Middle Ages, there had been a lot of universities scattered in many countries. Those universities regarded ancient Plato's academy as it predecessor to study mathematics and science.

Renaissance occurred in Italy in 15 century, it advocated humanism and broke the superstition to Catholic theocracy in Middle Ages. Renaissance brought religious reform to Europe. New Christian reform advocated equality, freedom and universal love, proposed to recover original Christian teachings and early vigor church life, and opposed current Roman Catholic doctrines. Religious reform completely accorded with humanism and ancient Greek cultural tradition. Thus, religious reform reversibly helped the development of Renaissance.

On the one side, Renaissance opposed asceticism and advocated hedonism. Renaissance favored personal freedom and individualistic heroism, which accorded with doctrines of reformed new Christianity. Thus, the personal desire to acquire wealth was more and more inspired. For seeking treasure and golden, Columbus (1451 – 1506 AD) was full of faith of earth as a ball, he wanted to go to West Indies by oceangoing voyage, but he accidentally discovered America in 1492.

On the other side, Renaissance recovered and developed the fine tradition of ancient Greek and Roman culture, especially the traditional spirits of democracy and science. Delegates of Renaissance paid the great attention to do

experiments in person. Leonardo da Vinci (1452 - 1519) said: "The true science starts from observation." "If science is not produced from experiments, and end from a distinct experiments, it will not be useful at all, and will be full of mistakes, because experiment is still the

mother of reality.” He did just as he said. With the contrary to the prevalent Aristotle’s viewpoint, Vinci deemed that “Celestial body is like a machine, it observe some certain law of nature.” In 1490, Vinci studied the action of water in capillary tube^[14] too. The outstanding personages of Renaissance revered Euclid and Archimedes more than Aristotle. After Aristotle, scientists gave up the attempt to advance an intact system in nature and turned to study concrete problems. It had been the great influence of Aristotle’s work to later scientists.

The doctrine, which earth was the center of universe, was the main pillar of Catholic theocracy in Middle Ages. Galileo (1564 - 1642)^[14] inwardly was a supporter of Copernicus’^[14](1473 - 1543) theory for a long time. Copernicus proposed that earth turned around the sun. From January 10 in 1610, for examining the correctness of Copernicus’ theory, Galileo targeted moon, Venus, Saturn and sun, etc, in the sky with telescope made by himself. After observation to moon, he said: “Originally, moon is just the same with earth.” From then on, the superstition to theocracy was thoroughly bankrupted. Thus, the sprout of modern science grew out in Europe on January,10, 1610 from Galileo’s telescope. Mankind should remember that great day forever.

About 2,000 years later from Euclid, in 1687, Newton (1642 - 1727)^[14] made a copy of the same deductive method, which was used in Euclid’s geometry (Elements) written about in 300 BC, to his famous book <Principles of Mathematics>. Newton stood on the shoulders of many scientific giants, applied their great achievements and his own great achievement on calculus, which were strictly derived according to deductive method, he advanced the law of universal gravitation as well as three laws of object motion. He firstly let people know that the motion of any object in nature, whether in sky or on earth, is not irregular, but must observe some certain law described and calculated out by same precise mathematical formulas. Those laws would be the non-faded blossoms and non-rotten fruit on the big tree of modern science forever.

Kepler (1571 - 1630)^[14] discovered three laws of planetary motion through systematic observation, calculation and deduction for many years. His great success laid the sturdy foundation for Newton to discover the law of universal gravitation.

In 1784, James Watt (1736 - 1819)^[14] invented and perfected steam engine, which was the firstling of the greatest fruits in modern technology. From then on, mankind could utilize the immeasurable power in nature

to serve itself. Mankind could depend upon its intelligence other than its physical strength to work for its well-being.

Renaissance firstly brought whole Europe literature-art revolution, then brought the sprout of modern science, finally, let Europe go to science-technology revolution, capitalism and industrialism. Thus, Renaissance became the proper soil and weather for sprout of modern science.

(C). Why would ancient Greek and European like to do observations and experiments to nature and things but ancient Chinese not to do so? As above-mentioned, the different living environment of the ancients caused their different ways of life and different modes of thinking and behavior. Ancient Greek and European lived on or by the sea understood that the dangers and changeableness of personal life were hardly predicted, they had to do the observation and experiments to nature and things. On the contrary, ancient Chinese on great plains could depend upon the Heaven’s favor and lived a relatively stable life. If some dangers could fall down from Heaven, everybody included king, officers only preferred to worship to Heaven. The agricultural production at the scheduled time, but much less sudden disaster, thus, people were lazy to do observations and experiments to nature and things.

(D). The people’s modes of thinking and behavior of a nation or a country are mainly decided by its cultural contents, which are mainly decided by its way of life, in the final analysis, they would be changed with the changes of political-economical-social systems and natural environment. At the same time, the changes of the people’s modes of thinking and behavior as well as their way of life would reversibly affect the political-economical-social development. Thus, it is a circulatory system and has the circulatory affect. Especially, the fast change of modern society in science-technology, economy and culture will lead to the fast change of people’s modes of thinking and behavior as well as people’s way of life. Nothing could not be changed forever, but just changed more or less, early or later.

However, the people’s abilities of logical thinking and doing experiments would always not be difficult to be learned in education with social-economical advancement, such abilities are not innate, it have been clearly proved by rapid modernization and industrialization in many backward countries and regions. Another evidence is that many Chinese scientists, who had traditional Chinese culture and worked in America, had gotten Nobel Prize in past decades.

Personal desire and feeling in severe crisis would force somebody to rapidly change his modes of thinking and behavior as well as his way of life, it is the complete same with people of a country or a nation. It has been the source of personal, collective and national crimes, and simultaneously been the source of personal, collective and national progress.

(E). In old China, people's life was supported by the agricultural economy, which depended upon Heaven and Earth. It was the reason that Confucian, <Yi-jing's>, Lao-zi's and Buddha's thoughts produced and developed. On the one side, those conservative thoughts and cultural tradition hindered the appearance of sprout of modern science in old China. On the other side, they were beneficial to maintain a unified Chinese feudal society over two thousand years. A super stable Trinity composed by a united feudal dynasty, united Chinese words and above traditional culture, and small agricultural production had solidified the whole society and intellectual's thought. No strong shock of external force, Chinese old thought and behavior could be difficult to escape out from the control of that Trinity. Thus, old intellectuals could only be conventionalists and had no possibility to do logical thinking, observations and experiments to nature or science. Hence, the sprout of modern science in old China could not appear tardy and tardy. It is the reason, why in May 4th movement of 1921, Chinese intellectuals advocated to learn western democracy and science and wanted to overthrow Confucian temple. On the contrary, the ancient Greek culture originated from the completely slavery democracy and from marine trade. The democracy brought ancient Greek intellectuals the mode of logical thinking, the spirit of equal discussion and debate, and the spirit of obeying truth and real facts. The marine trade brought ancient Greek spirit of adventure, experimental ability, and desire of making money and plundering wealth. All those above were inherited and developed by Renaissance.

(F). To sum up, different ancient cultures to the influence of sprout of modern science originated mainly some modes of thinking and behavior of ancient people. The ancient Greek philosophy was a natural philosophy, formal logic and deductive method created by ancient philosophy and getting result through observations and experiments were beneficial to sprout modern science. However, the ancient Chinese philosophy was a moral philosophy, or a submitted philosophy or a philosophy of behavior. It was just beneficial to maintain the normal feudal orders and social system, but not beneficial to sprout modern science, because

intellectuals and common people just understood that everybody had only to rely and obey on so-called Heaven's will, king's (Heaven's son) will and sages' teaching. Is it showed that western culture and philosophy has absolutely more superior than Chinese culture and philosophy in every respect? It should be recognized that every culture and philosophy existed in the long historical period would always have merits and demerits of itself, and have the existed value of itself. It would be no exception for Chinese culture and western culture.

(G). Western culture was evolved out from ancient Greek culture, in which the perfect democracy under slave system and the adventurous spirit on ocean trade were the two main contents. Those contents derived the desires to equal rights between individuals, strong competition, individualism, heroism, hegemonism, plunder for wealth, etc. The laws of jungle that, the weak are the prey of the strong, almost became a basic principle in western culture. According to Christian doctrine, everybody would always have his original crime. Thus, social Darwinism was rather prevalent; it considered that there would be no much difference in the natural characters between mankind and animals. It seems to be an acceptable explanation to the laws of jungle. In western society, the main relationship between people would be the crosswise economical links; all other relationships are less important, but almost are equal. Thus, courts, laws and justice have become the most important things in people's life. However, in reality, the ancient Greek democracy under slavery system only recognized the equality between wolves (slaveholders), but not equality between wolves and lambs (slaveholders and slaves) at all. In addition, the Greek democracy of slavery system was more beneficial to collectively plunder wealth from outside city-states. Those early democratic specialties have remained more or less in the substance of western culture right now.

On the contrary, in ancient Chinese culture, Heaven, Earth and mankind were called a Trinity, which were all born from Nature; those three should be a harmoniously whole. Mankind was born from Earth and Heaven, so, mankind should heartily thank the kindness of Heaven and earth. In ancient Chinese culture, the vertical relationship between people, such as between king and officers and common people, between parents and children, between the principal and the subordinate, between the higher level and the lower level, between the *elite* and the lowly, etc could not be put upside down. Anybody going against his master

would always regarded as the criminal offence. Thus, no equal relationship existed between any two people. No equality would have no possibility to build up the strict laws. Everybody had to obey a lot of moral cardinal guides and constant virtues, which were made up by great sages according to their observation and imagination to the will of Heaven and earth. Such culture of feudal relationship between people has remained more or less right now.

(H). However, the development of modern science-technology at very high speed has brought people the abundant material and cultural life. On the one side, people can spend more time to satisfy his spiritual and cultural needs; hence, people need more right world outlook and life outlook as to avoid unhappiness. In the past, the unhappiness of most people mainly caused from insufficiency of living materials. In modern times, the unhappiness of most people mainly caused from vicious inflation of desire, which would lead to conflicts for benefit, feeling or for ideology between people. Thus, in present time, the people's happiness would mainly come from spiritual and cultural needs other than substantial insufficiency. Unfortunately, the current prevalent culture originated from western developed countries has become an effective tool for gaining profits. On the other side, with the increase in social wealth, people's desire are more and more inflated, it had led to the wrench of human nature and to destroy the normal relationship between nature and mankind and led to the environmental pollution endangering mankind. At the same time, the plunder and hegemonism of high-developed power country of democratic system to other countries in the world would cause the international conflicts, which may even be the real danger factor to ruin the earth civilization. Could the permanent peace between countries be effectively kept by the balance of nuclear power or by some moral and just power? It is said, only developing science-technology will have no possibility to solve above important problems, it may need some good traditional spirits in Chinese culture. For example, China had not launched any war for plundering wealth to foreign nations or countries in its history. The very interesting phenomena showed in Chinese modern revolutionary history, no matter how the great difference of revolutionary ends and means between Kang Youwei and Sun Zhongshan and Mao Zhedong, their ultimate aim would wish to build up a world of Great Harmony, but not a supremacy in the world. That is the splendid Chinese culture much different with Western culture.

(I). Culture is the soul of a country or a nation, in which social-economical development would certainly affect even change people's cultural life and mental attitude—people's inner world, outlook on life, modes of thinking and behavior, etc. However, such affections would always simultaneously appear on two contrary sides—positive and negative, good and bad. To sum up, with the rapid advancement of science-technology, the people's material life in whole society has been improved better and better. On the contrary, people's moral character in totality has become worse and worse. Such result was probably caused from some demerit in western culture, which takes personal freedom, individualism as an ultimate object. A culture lack of moral idols and moral idolatry, especial in youngsters, or a culture full of vicious desire, would be a culture of morbid state.

Thus, it can be seen that, the western culture has mainly regarded individual and material benefits as the center, and the Chinese culture has mainly regard society and morals as the center. Each culture has its own strong points and weak points. Therefore, western culture put the personal freedom on the first position, so, it is beneficial to develop the personal ability and intelligence, and has highly creative, at the same time, it would lead to vicious inflation of desire and personal crimes. Chinese traditional culture standardized personal behaviors to imitate sages and moral idols as to limit the development of personal abilities and intelligence, but it would be beneficial to unite the collective thought and action. Western culture and Chinese culture might go on two extremes; both should integrate and mix as to obtain some proper balance. It might be the doctrine of mean commonly advanced by Confucius and Aristotle. However, Chinese culture had been more magnanimous and less exclusive. Ancient Chinese culture had already absorbed many cultures of foreign nations, such as famous Indian Buddhism. Therefore, the process of Chinese culture to absorb and integrate foreign cultures would seem to swim downstream. On the contrary, western culture full of individualism and laws of jungle would be more difficult to absorb the merits in foreign cultures, no matter whether in the past or in future. The process of western culture to absorb and integrate foreign cultures would seem to swim upstream. Just as a Chinese proverb described correctly: "It would be easy from a thrifty and simple life to go to an extravagant life, and difficult from an extravagant life to go to a thrifty and simple life."

In a word, in Chinese culture, righteousness would be more important than profits. However, in western culture, profits would be more important than righteousness. In modern time, the high development of science-technology has let whole earth become a village; the various relationships between people, organizations, nations and countries have been very close. The conflicts between various cultures will not avoid. However, the better integration of different current good cultures will be certain trend in future history. I wish that armed conflicts and wars between countries and nations could be avoid owing to some exclusion of cultural differences, and look forward that many old cultures would turn over a new life from integration with other cultures in future.

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