

Mathematical Thinking and Aesthetic Thinking: An Analysis of "Observing Traditional Culture with Mathematical Thinking"

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Abstract: *Since ancient times, the development of mathematics in China has been deeply influenced by philosophical thinking, historical background, and cultural traditions, which together shape a unique Chinese mathematical thinking mode. By applying mathematical logical reasoning and rigorous thinking, we can observe and understand the rich connotations and unique charm contained in traditional culture more deeply. Cultural traditions are reflected in the expression and solution of mathematical problems, often with strong Chinese cultural characteristics. Therefore, by studying and researching Chinese mathematics, we can not only master mathematical knowledge, but also deeply understand the profoundness of Chinese culture.*

Keywords: *mathematical thinking, aesthetic thinking, traditional culture*

I. How is mathematical thinking related to traditional Chinese culture

Thinking is an advanced psychological activity in which humans use language as an indirect medium to understand objective things through language patterns. This psychological activity is an advanced form of human cognition. The thinking ability of mathematics refers to the ability to apply the logical and rigorous disciplinary perspective of mathematics to think and solve problems. Luo Liangsheng once pointed out that "formal logic" and "systematic experimentation" are missing but crucial ways of thinking in traditional Chinese culture.^[1]

Mathematics is not just a science, it is also a culture, a philosophy, closely related to our lives, reflecting human cognition and understanding of the world. In China, the combination of mathematics and philosophy is particularly close. Ancient works such as the "Zhoubi Suan Jing" and "Jiuzhang Suan" not only showcase mathematical knowledge, but also contain profound philosophical ideas. The historical background has also had a significant impact on the development of mathematics, for example, the practical needs of ancient Chinese agriculture, astronomy and calendar have driven the progress of mathematics. However, looking back on China's history and culture, thinking and solving problems with mathematical thinking seems to be a weak link for us countrymen people, who have always been looking back on China's history and culture and thinking and solving problems with mathematical thinking. Therefore, the logical awareness of whether thinking can ensure the correctness and certainty of conclusions is rarely discussed in traditional Chinese culture. How to view mathematics not only as a form of knowledge, but also to explore its philosophical concepts as an indispensable thinking tool, to combine mathematical thinking with philosophical research methods, and to integrate science

and rationality. This important issue has not received sufficient attention in the inheritance of traditional Chinese culture. In traditional Chinese culture, concepts are often confused, lack clear definitions, or have multiple meanings. This has led to certain defects in Chinese thinking, such as unclear definition of concepts, unclear reasoning, preference for association, conjecture, analogy, metaphor and other thinking habits that are fundamentally different from logical and normative reasoning; Or it may be generalized, treating temporary phenomena as eternal and individual phenomena as universal, lacking systematic experimental data or rigorous deduction to confirm the correctness of the theory^[14]. In the process of ethnic integration in China, the result of the policy of "rejecting all schools of thought and prioritizing Confucianism" has led to the disappearance of the nascent ancient form of logical thinking.

Therefore, traditional Chinese culture has always lacked formal and logical thinking, and even if it appears briefly, it is incomplete and full of defects. Although later generations aspire to inherit traditional Chinese culture, they often unconsciously adopt incorrect methods, imposing modern interpretations on traditional culture and giving new connotations to certain concepts or texts. Their discoveries, inventions, or creations are actually products of later generations' thinking; Or by substituting concepts and applying later generations' achievements to ancient concepts or texts, under the guise of interpretation, one may actually fall into a situation of suspected plagiarism.

We receive education, inherit excellent traditional culture, aim to preserve the excellent knowledge and culture of our predecessors, accumulate cultural knowledge of historical civilization, promote social civilization progress, and ensure stable development of production. Therefore, how to understand traditional culture requires us to have a clear understanding. We must deeply understand the connotation of traditional culture, recognize the wisdom and values contained in traditional culture, and also be aware of the limitations and shortcomings that may exist in traditional culture. Only in this way can we better inherit and promote traditional culture, adapt it to modern society, and contribute to the development and progress of society.

II. Western and Eastern thought patterns

When exploring the differences between Eastern and Western cultures, we can clearly see that there are significant differences between the two. Western culture, especially Western philosophy and scientific tradition, tends to use logical and analytical methods to understand the world, while Eastern culture, especially Chinese culture, is better at grasping the essence of things through visual thinking and intuition. This intuitive thinking plays an important role in Chinese culture, not only reflected in daily life, but also deeply influencing the development of Chinese art and philosophy. The three major traditions of Chinese culture and art each have their own unique historical context and cultural connotations. Firstly, the tradition of the Hundred Schools of Thought in the Pre Qin period gave rise to numerous thinkers and philosophical schools, such as Confucianism, Taoism, Mohism, etc., which had a profound impact on later generations. Secondly, since the reign of Emperor Wu of Han, when Dong Zhongshu proposed the idea of "expelling all schools of thought and revering Confucianism alone", Confucianism gradually became the dominant ideology in society, influencing China's politics, education, and social life for thousands of years. Finally, the traditional coexistence of Confucianism, Taoism, and Buddhism originated in the Wei and Jin dynasties and matured in the Sui and Tang dynasties. During this period, Confucianism, Taoism, and Buddhism influenced and integrated with each other, forming a multicultural pattern based on Confucianism while absorbing the thoughts of Taoism and Buddhism. Although these three traditions have their own characteristics and independence in the long river of history, there are also common origins and cultural continuity between them.

Although there are differences between these traditions, they are generally inclusive of each other, forming a diverse yet unified cultural system. Hegel once pointed out that fundamentally, Chinese history seems to lack

historical continuity and is merely a repetition of monarchical changes. However, this viewpoint may overlook the deep continuity of Chinese history and culture. The secular nature of Chinese art determines its close connection with daily life, emphasizing the importance of artists' personal cultivation and the integration of art with morality and social functions. Relatively speaking, Western religious traditions encourage them to delve deeper into the origins of things, advocating for humanity, science, and rationality.^{[2]220} The difference of 220 not only reflects in art and philosophy, but also profoundly affects the development path and values of Eastern and Western societies.

Fu Lei, an esthetician, once proposed that art should reflect the characteristics of individuals and nations, and that the progress of art lies in absorbing the essence of eastern and western nations. The rule of divine and imperial power often causes damage to the healthy development of science, literature, and art. Under the constraints of divine and imperial power, the forced "creative" activities must strictly follow the will of the rulers, without any deviation. Such "creative" results are inevitably monotonous and lack vitality.^{[3]5} The Western Renaissance movement greatly liberated the minds of artists, and the ancient Greek concept of "people-centered" was re-emphasized, with the pursuit of sensory enjoyment becoming the mainstream of artistic development. Artistic creation has abandoned the previous dryness and rigidity, and the image of vitality has been more widely displayed. At the same time, traditional Chinese culture is deeply influenced by the concept of "divine right of kings", endowing culture with a mysterious color, and imagery thinking occupies a more important position in ancient Chinese culture. Therefore, myths, legends, and folk stories have been widely circulated, exerting a profound influence on the understanding and judgment of traditional Chinese culture. As for the authenticity of these stories, it seems difficult to clearly define.

For example, Confucianism, as the main ancient ideological system advocated by the Chinese government, mainly serves the ruling class with its core concepts. The founder of Confucianism, Confucius, advocated for moral knowledge in his ideas. Although he covered a wide range of fields, he mainly integrated benevolence and etiquette at the political and moral levels. His core idea, which is extensively discussed in the *Analects*, is ritual. The ritual system was a product of the regulations of the Zhou Dynasty, reflecting the hierarchical order of society at that time, and was actually a manifestation of politicization. However, the original intention of its founder was to allow multiple people to hold different interpretations. However, similar to other ancient books in China, its content lacks a clear logical reasoning process to ensure the correctness of conclusions.^{[1]181} Confucius' conclusions are often based on subjective judgments, and their logical coherence is not significant, with certain flaws. Meanwhile, due to the rulers' reverence for Confucianism, many scholars were limited in their research scope and dared not go beyond established frameworks, only being able to explore within known fields.

Given that Western cultural history presents a spiral development pattern, while the development of Chinese culture follows the laws of accumulation and inclusiveness. Chinese history has significant continuity, and future generations do not necessarily abandon the achievements of their predecessors. Instead, they should inherit the foundation of their predecessors and integrate their own insights to maintain the coherence of history. Overall, the development path of Chinese culture and art is complementary to the historical evolution of ancient Chinese civilization. As the leader of the group of classics, the *Book of Changes* covers a wide range of fields and has a profound influence on traditional Chinese culture, which has led later scholars to devote themselves to studying its philosophical ideas and regard it as the culmination of Chinese culture. However, the expression of its text and language is not easy to understand, leading to diversity and complexity in the interpretation and interpretation of it by later generations. Luo Liangsheng pointed out that the so-called philosophical elements extracted by later generations from the *Book of Changes* are often based on the interpretation of modern philosophical ideas.^{[1]30} In fact, from the perspective of logical thinking, what the *Book of Changes* lacks is a

theoretical and systematic worldview and methodology, many of which even contradict the basic principles of logical thinking. Therefore, if we fail to deeply understand the historical background and language culture of the ancients, and only interpret them from a modern perspective, it is easy to misunderstand the original intention of the ancients.

III. Aesthetic thinking should emphasize rationality

When exploring the development of Western art, it is not difficult to find that rationalism played an extremely important role in it. Artists' enthusiasm for theory and in-depth research not only reflect their relentless pursuit of rationality, but also their exploration of the underlying logic and principles behind artistic creation. At the same time, the development of Chinese art presents a completely different style. In Chinese art, more emphasis is placed on the embodiment of artists' personal cultivation, as well as the inner emotions and spiritual pursuits conveyed through their artistic works. Although ancient Chinese art theory materials are rich and diverse, with broad content and profound insights, they often lack a clear systematic structure. What is the system? For Chinese art, this is not a matter that requires special consideration. Therefore, in the tradition of Chinese art, there is no universally recognized and pursued system, and artists do not particularly care about the construction of the system. However, the Western art world has a different tradition, with specialized works on art theory. Many outstanding artists have put forward their own unique insights and theories on the essence of art and beauty. The philosophical works of these outstanding artists have not only had a profound impact in the field of art, but also had a wide-ranging influence on aesthetics and culture as a whole. By studying the Western cultural system, we can learn many logical and systematic theories that provide us with different perspectives and ways of thinking for understanding art.

In China's artistic tradition, the aesthetic concept of freehand brushwork is particularly emphasized. This concept does not pursue realistic and detailed depictions of artistic objects, but rather focuses more on the profound charm and artistic conception contained in the artwork. At first glance, such works of art may not immediately catch people's attention, but once deeply appreciated, they can reveal the rich connotations and unique charm contained within. At the same time, rationalism, as a philosophical idea, first emphasizes the importance of science. The great success of Western modern civilization is undoubtedly due to the progress of science, which is a key factor. Because in history, relying solely on passion and emotion cannot break the profound influence and rule of religion over society. In traditional Chinese culture, "qi" is a core concept that not only refers to the vitality of life, but also manifests in the fields of literature and art as the smoothness and accessibility of literary qi. The so-called smooth literary atmosphere is actually closely related to human breath, reflecting the author's mental state and inner emotions. In works of art, "qi" is usually understood as the vivid and lively aura, qi is the breath of life, and rhyme is the melody and rhythm of qi. Vivid charm is not only an artistic expression technique, but also an artistic realm that reflects the artist's profound understanding of life and nature. When exploring the spirit of Chinese art, vividness is an indispensable and important criterion, which runs through various fields of Chinese art, whether it is painting, calligraphy, music, or poetry, all pursue this artistic realm of vividness.

As an artist, respecting reason is crucial. This not only helps with the artist's personal mental health and avoids excessive suppression of emotions, but also makes reason indispensable for artistic creation itself. If artists can maintain a rational attitude during the creative process, they can objectively examine their works and avoid falling into extreme self indulgence or self denial. In addition, rationality can also help artists find balance in their creations, avoiding turning artistic creation into a privilege that only serves themselves or specific groups, while ignoring the needs and expectations of the wider society. The Western art world has always

attached great importance to the social responsibility of artists. They pay attention to the dynamics of society, strive to find themes that can reflect the direction of social culture, and express and explore them through art works. This approach to artistic creation that focuses on society not only enriches the forms of artistic expression, but also endows works of art with deeper social significance and value. At the same time, Chinese art has its own unique expressive techniques and core concepts. The Chinese art technique of freehand brushwork emphasizes the creation of artistic conception and the transmission of emotions, rather than direct depiction of reality. The core concept of Chinese art is the Doctrine of the Mean, which emphasizes the spirit of harmony and advocates for harmony and balance. Therefore, Chinese art often lacks the sense of novelty and surprise commonly seen in Western art, which are exactly what Western artists pursue and emphasize. However, this does not mean that Chinese art is inferior to Western art. On the contrary, it showcases different aesthetic pursuits and cultural connotations. We can actively learn and understand Western art while respecting and inheriting traditional Chinese culture. Through cross-cultural artistic exchange and learning, we can not only broaden our artistic horizons, but also promote mutual understanding and respect between different cultures. In addition to the two major characteristics of expressing divinity and promoting humanity, Western art also has a cultural feature of advocating rationality. These cultural characteristics, whether it is the pursuit of divinity, the promotion of humanity, or the reverence for rationality, are all worthy of our in-depth exploration and learning. Through such exploration and learning, we can not only better understand Western art, but also draw inspiration from it, enrich and develop our own artistic creations.

Therefore, in addition to learning the logical thinking of Western art, we should also pay attention to artistic cultivation. Pay attention to the cultivation methods of "learning poetry outside of poetry", read more books and exercise more, the deeper the knowledge, the better the cultivation, rather than just discussing art; At the same time, we should also pay attention to understanding and comprehend deeper truths from the practice of art. To understand traditional Chinese culture, one must comprehend Chinese calligraphy and painting. Without the foundation of traditional culture, it is impossible to truly understand Chinese culture. The study of logical thinking helps to construct a systematic literary knowledge system, scientifically and standardly learn painting norms, think and solve problems with a logically rigorous perspective, and explore artistic knowledge with philosophical concepts. On the path of pursuing art, we should not be satisfied with superficial techniques and forms, but should delve into the connotation and spiritual level of art. Through extensive reading, we can absorb various knowledge, enrich our thinking, and improve our aesthetic ability. Exercising and maintaining physical and mental health is also an indispensable part of artistic cultivation. Artistic cultivation is not only the appreciation of artistic works, but also a way of life attitude and spiritual pursuit.

Reference

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