

# *A Study of Design Concepts in “Artificer’s Record”*

Yining Wang<sup>1,a,\*</sup>

<sup>1</sup>South China University of Technology, No. 382 Waihuan East Road, Panyu District, Guangzhou, China

a. nn-15@qq.com

\*corresponding author

**Abstract:** “Artificer’s Record” is an important part of the Confucian classic “Zhou Li” and the earliest extant Chinese document on handicraft technology. It encompasses various categories and has a wide range of disciplines, especially rich in design and artistic thoughts. Currently, there is an incomplete condensation and generalization of the design theory of this book, and a lack of research on the linkage between Chinese and Western, ancient and modern design history. Through consulting “Artificer’s Record” and a large number of literature, this paper summarizes three fundamental design concepts that run through the entire book: “Following Nature,” “Using Fine Materials and Skilled Craftsmanship,” and “People Oriented.” Finally, combining with the current status of industrial design and exemplifying some mainstream design concepts, this paper explores and reflects on the deep-level resonance of thought consciousness spanning millennia.

**Keywords:** Artificer’s Record, Following Nature, Using Fine Materials and Skilled Craftsmanship, People Oriented

## 1. Introduction

“Artificer’s Record” is an important component of the Confucian classic “Zhou Li” and one of the earliest extant Chinese documents on handicraft technology, representing one of the earliest craft texts in the world. The book not only records the specifications and production techniques of various crafts in state-owned handicrafts during the pre-Qin period of China, but also documents the production management system and construction methods of that time. It encompasses various categories and has a wide range of disciplines, especially rich in design and artistic thoughts. Due to its rich and detailed graphical records and profound historical background, it has been widely explored and studied in many fields such as science, technology, engineering, and traditional crafts. However, most of these studies focus on specific details of the text and particular areas, with fewer condensed and generalized discussions on design theory, especially concerning the deep-level thoughts of the book in different real-life contexts and design trends over time. For “Artificer’s Record,” a pioneering work in traditional classics, how to perceive the coexistence of ancient and modern design concepts within it and how to “extract its essence” to apply the wisdom of the ancients and innovate development in contemporary life are questions that require contemplation.

## 2. Exploring the Core Design Concepts in “Artificer’s Record”

### 2.1. Following Nature

The opening passage of “Artificer’s Record” states, “Heaven has its timing, Earth has its energy, materials have their beauty, and craftsmen have their skill. Only when these four elements are combined can something be of good quality.” The meanings behind “Heaven’s timing,” “Earth’s energy,” “beautiful materials,” and “skillful craftsmanship” are worth exploring. From the placement of words, it is evident that ancient people emphasized “Heaven’s timing” and “Earth’s energy” first, implying the concept of “heaven’s timing, earth’s advantage, and harmony among people,” highlighting the fundamental position of “following nature” in design and creation. The book mentions, “Heaven has its timing for life and its timing for death; plants have their timing for growth and their timing for withering; stones have their timing for hardness and their timing for brittleness; water has its timing for freezing and its timing for thawing; this is heaven’s timing.” People realized that under the influence of changing seasons, the movement of the sun and moon, and various complex weather conditions, the same natural object would exhibit different states. This discovery implies that people recognized that creation and design must adhere to the laws of nature. Thus, it can be inferred that the ancient practice of following nature not only permeated religion and politics but also manifested in the “hundred trades” of craftsmanship and design.

“Artificer’s Record” covers a wide range of categories, involving the “Five Materials,” namely “wood, metal, leather, jade, and clay,” each with its own craftsmanship. In the article “Making Arrows,” the ancients meticulously described the process and requirements for arrow making. The making of arrow bows must go through the cycle of four seasons: “Winter for wood splitting,” “Spring for horn soaking,” “Summer for tendon processing,” and “Autumn for assembling the three materials.” Each timing serves a specific purpose: Winter, when wood is easily split, is chosen for selecting and cutting trees to make bow blanks; Spring, when horn softens easily, is used for soaking horn components; Summer, for processing tendons, is less troublesome and suitable for making tendon ropes; Autumn, when the three materials are easily assembled, is suitable for assembling bows and arrows with silk glue and lacquer. After testing and adjusting in the following winter, they can finally string the bow and put it into use in the spring of the next year. For example, regarding the manufacture of bronze ware, the ancients wrote, “The knives of Zheng, the axes of Song, the whittling of Lu, the swords of Wu and Yue, when moved to other places, could not be made of good quality, due to the local energy.” They believed that the conditions for making bronze ware varied in different regions, similar to “mandarins becoming bitter oranges north of the Huai River.” If interpreted with modern knowledge systems, different geological conditions and climates would affect the grade and composition of ores and also influence the smelting process. Although the technological level at the time was insufficient to research the specific reasons, the ancients had keenly observed regional and seasonal climate differences and made preliminary judgments and analyses on the timing and location of creation.

In design, the ancient concept of “following nature” is also reflected in “imitating nature,” specifically in the decorative arts by imitating and reproducing natural objects. Taking ancient chimes as an example: the “sun ju” is the bracket for ancient suspended bells and chimes. To complement bronze bells and other instruments, the “sun ju” is decorated in the likeness of animals or the natural human form. [1] (See Figure 1, left) In the figure, the bronze figure of the “sun ju” is dressed in a long robe, wears a sword at the waist, and both arms are raised upwards in a supporting posture, with the head and hands forming a triangle support point, providing good stability for the chimes. A set of chimes consists of three layers of “sun” (See Figure 1, right), located at the ends of the crossbeam, decorated with dragons, flowers, and so on. Another type of design pursues a symbolic representation of nature, expressing a “cultured nature” through this approach, which reflects people’s cognitive

mapping of nature. Taking “Yu Ren Wei Che” as an example, the carriage box is generally rectangular, the shaft is square, symbolizing the earth, the cover is circular, symbolizing the sky, the wheel spokes represent the sun and moon, and the car’s canopy often has twenty-eight ribs, symbolizing the twenty-eight constellations. Regardless of the method of imitating nature, it all reflects the ancient reverence for nature.

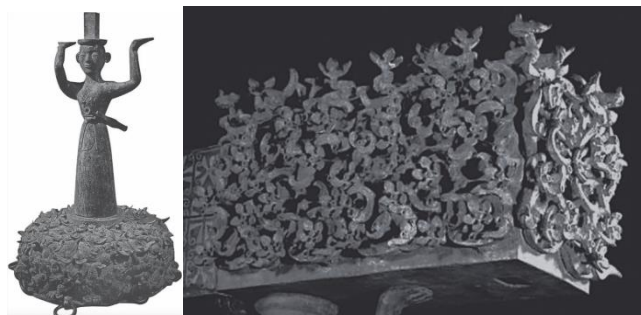


Figure 1: Partial View of Ancient Chimes

## 2.2. Using Fine Materials and Skilled Craftsmanship

In addition to the aforementioned adherence to the principles of nature, the opening passage of the book also mentions “beautiful materials and skilled craftsmanship,” where “materials” and “craftsmanship” are also considered essential elements for the production of high-quality products. Although humans cannot control nature, they can exert their subjective initiative within the premise of understanding and following nature, “to control destiny and use it,” utilizing natural laws for the benefit of humanity. This is the background against which the design principle of “using fine materials and skilled craftsmanship” is proposed in “Artificer’s Record.”

“Materials” refer to the raw materials, and “craftsmanship” refers to both manual and mechanical processes. Materials are the foundation, and craftsmanship is the guarantee. “Using fine materials and skilled craftsmanship” emphasizes the complementary and collaborative role of materials and craftsmanship.

Chinese handicrafts have been relatively developed since ancient times, with complete categories, detailed division of labor, and rich experience. Most materials used in crafting are natural materials with vastly different properties and textures. Therefore, there needs to be a unified standard for identification and selection, i.e., “beauty.” The ancient judgment of “beautiful materials” is mainly based on three aspects: first, selecting materials based on their characteristics and needs; second, ensuring proper compatibility between materials and functions, meaning that the quality characteristics of the materials must meet the functional requirements; third, ensuring that the processed materials possess a certain aesthetic appeal. Overall, the ancient requirement for “beauty” not only focuses on visual effects but also emphasizes the supportive role of materials in functionality and their fundamental and foundational role in creation. The book specifically records “beautiful materials” such as “swallow’s wings, stems of Chinese catalpa trees, bamboo slips from Hu, gold and tin from Wu and Yue.”

Materials form the foundation, and different materials require different processes and manufacturing methods. For example, wood involves processes such as sawing, planing, cutting, and joinery, while metal materials involve forging, smelting, and hammering processes. Different materials have different uses due to their distinct characteristics. As mentioned earlier in “Making Arrows,” the materials for making “bows” include “handle, horn, tendons, glue, silk, and lacquer,” each serving its purpose according to its principles. Even the same material can have different grades and differences due to differences in internal texture, external wear, and orientation. For instance, in making the hub of a wheel, “it must square the Yin and Yang. Yang, being dense and firm; Yin, being

loose and soft.” When making bows and arrows, it is necessary to counter the inherent texture of the bow material. If powerful penetration is required, thick and straight wood should be selected.

To create a high-quality product, comprehensive and exquisite craftsmanship is also crucial. “Artificer’s Record” records numerous handicraft professions, with vehicle construction occupying a significant portion due to the importance of vehicles as symbols of national power and elite status in ancient times, as well as due to factors such as warfare, leading to a significant demand for vehicles. The book provides detailed and extremely precise regulations on the responsibilities of carriage craftsmen. For example, the “wheel maker” is specialized in making wheels, mainly responsible for manufacturing the hubs, spokes, teeth, and covers of vehicles; the “carriage maker” is responsible for building carriages, mainly involving parts such as the shaft and axle; the “harness maker” is specialized in making wooden parts related to the carriage’s harness, such as the yoke, axle, and yoke. This not only illustrates the importance attached to vehicle manufacturing by the state and the significance of vehicles in ancient times but also demonstrates the advancement and sophistication of carriage manufacturing techniques.

### 2.3. People Oriented

The traditional Taoist philosophy emphasizes human natural attributes and pursues the spiritual realm of “unity of man and nature,” advocating neither dominating nature nor destroying it, but rather focusing on spiritual elevation and striving for harmonious unity between man and nature. [2] Some of the ideas in “Artificer’s Record” inherit Taoist teachings, as mentioned earlier, such as “Heaven has its timing, Earth has its energy, materials have their beauty, and craftsmen have their skill.” The sequential relationship of these four conditions to some extent reflects a design principle of respecting nature and the unity of man and nature.

“Artificer’s Record” advocates a human-centered design principle. The “People Oriented” design principle mainly manifests in the following three aspects:

Firstly, it emphasizes the relationship between people and machines, focusing on human comfort. Prior to production, the design of products such as vehicles, vessels, and weapons in “Artificer’s Record” is based on the average human body size (“Artificer’s Record” mentions “a person is eight chi tall” multiple times), with each having different strict production standards. After production, one of the criteria for assessing whether a product is qualified is based on human sensory experience. For example, in designing the height of carriage wheels, the book mentions, “If the wheel is too tall, people cannot climb onto it. If the wheel is too low, the horse’s hooves will scrape the ground.” Therefore, the height of the wheels needs to be moderate, and detailed adjustments need to be made according to different carriage models and even horse body types.

Secondly, it harnesses human subjectivity and creativity to process natural materials to meet functional needs. For example, in the records of bronze ware in “Artificer’s Record,” craftsmen used chemical principles to forge higher-quality bronze materials by strictly proportioning natural red copper. The emergence of new materials improved the usability and robustness of vessels.

Thirdly, it embodies Confucian ritual governance and feudal hierarchy. Unlike the current rule of law society, the pre-Qin period advocated for human-centered governance. [3] Therefore, for rulers, the dominance of personal will also embodies the design principle of “People Oriented.” Taking urban planning as an example, the book records in “The Craftsman’s Role in National Affairs,” “The craftsman constructs the nation, with a square perimeter of nine li, and three gates on each side. Inside the nation, there are nine main roads and nine subsidiary roads, with nine crossroads and nine tracks. There are ancestral halls on the left and temples on the right, with the marketplaces in front and the government offices behind. The marketplaces are managed by a single person.” In just a few dozen words, it summarizes the scale, layout, spatial form, functional zoning, and road hierarchy of urban planning. The meaning of the city itself has surpassed being merely a place for living and has become

a symbol of ritual governance and social order, all reflecting the will of the ruling class.

### 3. Reflections on Modern Design from the Perspective of “Artificer’s Record”

Since the Industrial Revolution, humanity has adopted large-scale and extensive industrial development models, leading to a series of severe global issues such as resource depletion and environmental degradation. Choosing a sustainable development path suitable for national conditions is the aspiration of various countries, and “green design” and “ecological design” are crucial aspects of industrial sustainable development. Green design primarily refers to the comprehensive and three-dimensional coordination of human, natural, and social relationships in product design. It involves thorough consideration of product details in terms of quality, functionality, and lifecycle, and deep optimization of related factors to achieve environmental protection at every stage of production and use. [4] In terms of its definition, green design, with its focus on respecting and fully coordinating the relationship between humans and the environment, echoes the design concept of “following the timing of heaven, abiding by the qi of the earth” in “Artificer’s Record”—a principle of “following nature” and “respecting nature.” However, green design is not limited to “understanding nature” and “following nature.” It does not merely consider production environmental factors superficially or convey core ideas through decorative arts. Instead, it integrates characteristics of the times and incorporates the complex element of “human health,” emphasizing the comprehensive consideration of economy, aesthetics, and usability. This concept focuses on environmental protection throughout the entire product lifecycle, emphasizing material selection and proposing optimization of production processes and management systems to reduce unnecessary resource waste. Additionally, amidst the surge of new technological trends, research and development of environmental protection technologies and green resources are prioritized, with a focus on enhancing user experience and safeguarding human health. Therefore, green design is a continuation of the core design philosophy of “Artificer’s Record” and represents a creatively developed design concept with significant contemporary relevance.

Despite the development of technology bringing forth numerous new materials and enriching the ways of design implementation, news about mass-produced products and designs that do not cater to human factors engineering are still common in the market. If manufacturers only consider profits and designers lack emotional care, it can easily lead to a decline in product experience and durability. Especially during the pandemic, various changes have occurred in production and design methods. Living under the influence of the pandemic has led to a widespread restructuring, with long-term protection measures and lifestyle limitations causing psychological closure among people, leading to feelings of unease, anxiety, and irritability. The post-pandemic era marks a new social stage faced collectively on a global scale across all fields. During this phase, mobile internet has become more prevalent than ever before, and the demand for constructing a better life continues to rise [5]. Self-protection awareness and health safety consciousness are also increasing. Many topics such as “human-centered design,” “emotional care,” and “restoration of human-nature and social relationships” have once again entered the public’s view and become pressing issues for designers to address. In the book “Artificer’s Record,” “humans” have always been the subjects of design. In “Making Arrows,” it is mentioned, “In making bows, one should consider the lord’s physique, with his blood and energy in mind.” This indicates that the choice of bows and arrows varies from person to person, and selection should be based on the user’s physique, temperament, and will. This shows that in the design process, ancient people not only considered the physiological characteristics of users but also took into account their personality and psychological traits. It is evident that ancient people had already begun to form a design consciousness centered around humans.



#### 4. Conclusion

“Artificer’s Record” is the earliest craftwork in China, and it holds profound influence in the history of world craft literature. This paper focuses on the field of design theory, starting with the phrase “Heaven has its timing, Earth has its energy, materials have their beauty, and craftsmen have their skill.”, analyzing and studying the three core design concepts of “Following Nature,” “Using Fine Materials and Skilled Craftsmanship,” and “People Oriented.” Examples and arguments are provided from various perspectives. Although the book has limitations to some extent, especially with the advancement of technology where some crafts are no longer applicable to modern design, its main design concepts have remained enduring through the millennia. It still holds great inspirational value for the development of the entire discipline of design, such as “green design” and “human-centered design.” Therefore, reflecting on the significance of “Artificer’s Record” not only enhances our understanding of ancient design and craftsmanship but also serves as a reflection and summary of contemporary design practices.

#### References

- [1] Li, Y. Z. (2010). “Quality Materials and Skilled Craftsmanship”: The Design Concept of “Artificer’s Record” in “Zhou Li Dongguan”. *Journal of Nanjing Arts Institute (Fine Arts & Design)*, (05), 78-81.
- [2] Wang, D. M. (2012). *Cultural Ecological Analysis of the Artistic Thought of “Artificer’s Record”*. *Qiu Suo*, (02), 69-71.
- [3] Liang, Q. C. (2004). *Chinese Academic History of the Past Three Hundred Years*. Tianjin Ancient Books Publishing House, (07), 417.
- [4] Yao, X. (2007). *Research on Green Design of Traditional Chinese Furniture (Unpublished master’s thesis)*. Hunan University, Changsha, China.
- [5] Liu, D. (2020). *Construction of Research Index System of Chinese Lifestyle: Process, Characteristics, and Prospects*. *Journal of Harbin Institute of Technology (Social Sciences Edition)*, (5), 64-71.