

# Innovative Design and Application of Han Dynasty Four Symbols Pattern under Shape Grammar

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**Abstract:** This article explores the innovative application of the Four Symbols pattern from the Han Dynasty in modern design, using shape grammar theory to deconstruct and recreate these traditional patterns. The research analyzes the Four Symbols pattern from historical and artistic perspectives, and through data collection and feature analysis, proposes an innovative design method that combines traditional and modern aesthetics. Practice has shown that the new application of the Four Symbols pattern in cultural and creative products and visual design not only inherits cultural value but also demonstrates its new charm in contemporary society. This study emphasizes the inheritance and development of traditional cultural elements in modern design, providing innovative ideas and practical cases for the design community.

**Keywords:** Han Dynasty Four Symbols pattern; Shape grammar; Innovative design; Cultural inheritance; Modern application

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## 1. Introduction

In the magnificent history of the Chinese nation, the Four Symbols pattern of the Han Dynasty, with its unique artistic charm and profound cultural connotations, has become a dazzling treasure in the ancient Chinese art treasury. The Four Symbols — Azure Dragon, White Tiger, Vermilion Bird, and Black Tortoise—symbolize not only the order of the universe and the power of nature but also carry the ancient people's philosophical thoughts and worship of heaven and earth, and the changes of seasons. This study aims to explore the innovative transformation and application of the Han Dynasty Four Symbols pattern in the context of modern design, using the systematic design method of shape grammar theory to reinterpret and construct traditional elements, aiming to create patterns that are both novel and have a profound cultural heritage. This paper will start with the historical origins, artistic characteristics, and symbolic meanings of the Four Symbols pattern, deeply analyze its application potential in modern design practice, and thus provide new perspectives and paths for the inheritance and innovation of traditional culture.

## 2. Overview of the Four Symbols Pattern in the Han Dynasty

### (1) The historical origin of the Four Symbols pattern

The Four Symbols pattern of the Han Dynasty, as a brilliant treasure of ancient Chinese art, not only provides a

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strong aesthetic experience visually but also carries profound symbolic significance and historical value culturally. Its origins can be traced back to the Warring States period, and later, against the backdrop of the comprehensive prosperity of society, politics, economy, and culture in the Han Dynasty, the Four Symbols pattern achieved unprecedented development and innovation, and was endowed with richer symbolic connotations and social functions. The four divine creatures, Azure Dragon, White Tiger, Vermilion Bird, and Black Tortoise, guard the east, west, south, and north directions respectively, and correspond to the four seasons of spring, autumn, summer, and winter, reflecting the ancients' worship of nature and the universe<sup>[1]</sup>. Their images held an important position in the architectural art of the Han Dynasty, especially in architectural decorations such as tile ends, where the Four Symbols pattern, with vivid shapes and rigorous composition, not only showed the high level of craftsmanship in the Han Dynasty but also demonstrated the perfect combination of Han Dynasty art and practicality<sup>[2]</sup>.

## **(2) Analysis of the artistic features of the Four Symbols pattern**

### **1) Formal features**

The Four Symbols pattern of the Han Dynasty shows its unique composition and aesthetic modeling in its formal features. These patterns are not only visually symmetrical and harmonious but also deeply rooted in the Han people's philosophical understanding of the universe and nature. The Azure Dragon, White Tiger, Vermilion Bird, and Black Tortoise, each occupying a direction, are outlined with smooth and powerful lines, reflecting the beauty of dynamics and the characteristics of living beings in nature, while also integrating rich imagination and exaggeration, reflecting the Han Dynasty artists' high mastery of form beauty. The Four Symbols pattern in architectural decorations such as tile ends often appears in symmetrical or rotational compositions, reflecting the order and dynamic rhythm of Han Dynasty art. In detail, the fine depiction of each scale and feather endows the Four Symbols with a lifelike vitality. The curvature and thickness changes of the lines enhance the three-dimensional sense and visual impact of the pattern. In addition, the use of traditional colors, such as the Azure Dragon's blue, the White Tiger's white, the Vermilion Bird's red, and the Black Tortoise's black, not only form a distinct personality in visual contrast but also contain profound cultural symbolism, making the Four Symbols pattern vivid and emotionally resonant with the viewer<sup>[3]</sup>. These elements together constitute the aesthetic characteristics of the Four Symbols pattern, reflecting the Han people's worship of the four directions of heaven and earth and their praise for the vitality of life.

### **2) Color features**

The use of color in the Four Symbols pattern of the Han Dynasty not only gives a strong visual impact but also reflects the ancients' worship of natural elements and the philosophical thinking of the Five Elements theory. The Azure Dragon's blue, the White Tiger's white, the Vermilion Bird's red, and the Black Tortoise's black, each color corresponds to a specific divine beast, symbolizing growth, purity, passion, and wisdom. The selection and combination of these colors not only enhance the artistic effect of the pattern but also reflect the ancients' deep understanding of the laws of the universe. Over time, modern designers have inherited and developed this tradition, combining the color aesthetics of the Four Symbols pattern with modern aesthetics, and through modern technical means, have made these colors shine with new vitality in contemporary design, applied to various fields such as fashion, home furnishings, and graphic design, becoming an important symbol connecting the past and the present, inheriting culture, and showing the world the profound cultural heritage and unique charm of the Chinese nation.

### **3) Symbolic meaning**

As a symbol of ancient Chinese culture, the Four Symbols pattern contains rich philosophy and cosmology. The Azure Dragon, White Tiger, Vermilion Bird, and Black Tortoise, guarding the east, west, south, and north respectively, correspond to the four seasons of spring, summer, autumn, and winter, symbolizing the cycle of nature and the

rhythm of life. The Azure Dragon's blue represents the east and spring, symbolizing the growth of all things and vitality; the White Tiger's white represents the west and autumn, symbolizing the power of maturity and harvest; the Vermilion Bird's red represents the south and summer, conveying passion and brightness; the Black Tortoise's black represents the north and winter, symbolizing wisdom and tenacity (Table 1). These patterns not only reflect the Han people's reverence for the laws of nature but also reflect the pursuit of social order and moral norms. They show us the ancients' yearning for a harmonious society and their blessings for a good life through the form of art [4]. In modern society, through the reinterpretation and application of modern design, the stories and meanings of the Four Symbols pattern continue, and the connotations of these ancient symbols are revitalized in modern design works, reminding us to respect nature, seek balance, cherish tradition, and find inner peace and wisdom in a rapidly changing world.

Table 1: Symbolic Meanings of the Four Symbols Pattern in the Han Dynasty

Pattern	Azure Dragon	White Tiger	Vermilion Bird	Black Tortoise
Color	Blue	White	Red	Black
Direction	East	West	South	North
Season	Spring	Autumn	Summer	Winter
Element	Wood	Metal	Fire	Water
Meaning	Growth, Vitality	Harvest, Strength	Passion, Light	Wisdom, Stability

### 3. Innovative Design Scheme of the Four Symbols Pattern

#### (1) Shape Grammar theory

"Shape Grammar (SG) was initially proposed by George Stiny and James Gips and applied to painting and sculpture creation. It was later expanded to the fields of product brand recognition and innovative design, becoming a design method primarily based on shape operations." [5] Shape Grammar was first applied in the field of architectural design and then extended to graphic design, product design, and other areas. It involves making certain changes to shape elements and evolving them according to specific rules to create new graphics. These new graphics not only inherit traditional elements but also possess a degree of innovation.

The derivation process of Shape Grammar is divided into generative and derivative rules. The generative rules include translation, mirroring, rotation, and replication, with mirroring further divided into horizontal and vertical mirroring (Figure 1). Taking the letter F as a representative of the original shape, there are five generative rules. Rule 1: Unit translation; Rule 2: Vertical mirroring; Rule 3: Horizontal mirroring; Rule 4: Central rotation; Rule 5: Rotation around the origin. Among these, Rule 1 involves translation in the initial direction indicated by a red dot; Rules 2 and 3 involve mirroring around the central axis indicated by the red dot; Rules 4 and 5 involve rotation around the center indicated by the red dot.

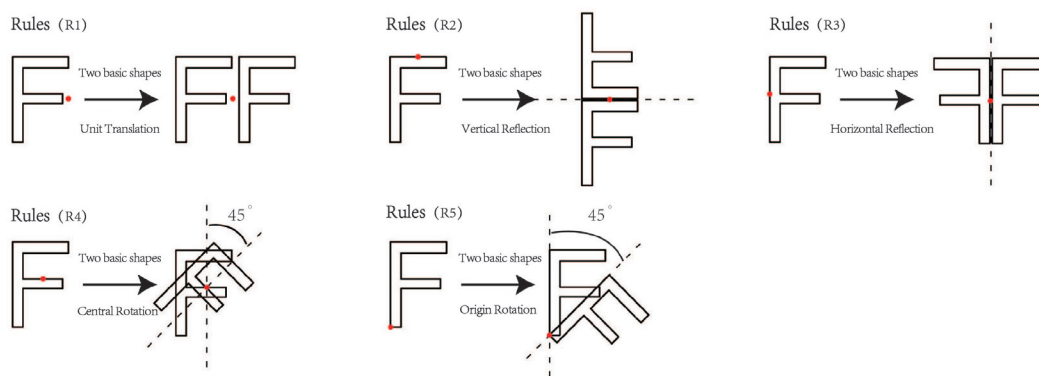


Figure 1: Generative Rules Diagram of Shape Grammar

The derivative rules of shape grammar are based on variations of the generative rules, where a basic unit pattern is established within the generative rules, as shown in the initial graphic of Figure 2. This basic unit pattern is then subjected to further transformations. There are six derivative rules in total. Rule 6: Unit translation; Rule 7: Horizontal mirroring with the left vertex of the unit pattern as the axis; Rule 8: Horizontal mirroring with the right vertex of the unit pattern as the axis; Rule 9: 90 clockwise rotation with the bottom end of the unit pattern as the pivot point. Rule 10: Vertical mirroring with a point at the bottom end of the unit pattern as the axis; Rule 11: Vertical mirroring with a point at the top end of the unit pattern as the axis.

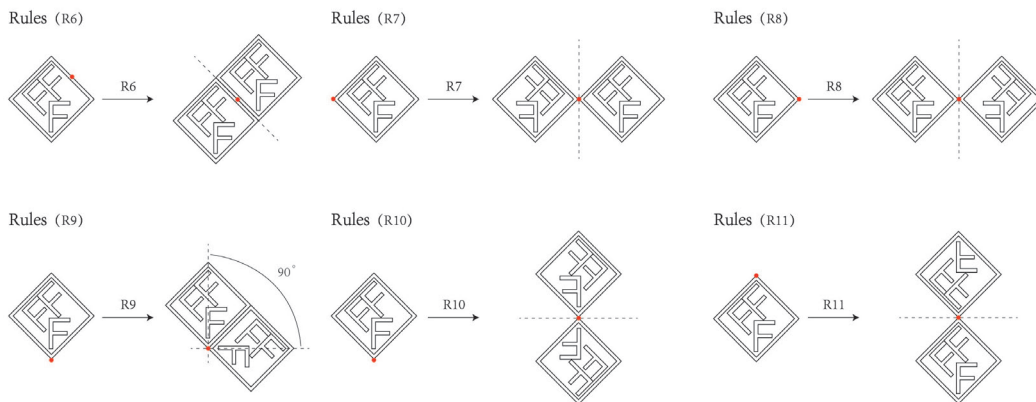


Figure 2: Derivative Rules Diagram of Shape Grammar

**(2) Research process of the Four Symbols pattern**

In the process of exploring the profound cultural heritage and artistic charm of the Han Dynasty's Four Symbols pattern, we have followed a series of systematic research processes. First, by extensively collecting relevant materials, we gained an in-depth understanding of the historical origins of the Four Symbols pattern and uncovered its significant role in Han Dynasty culture. Next, we conducted a detailed examination and documentation of the form, structure, and style of the Four Symbols pattern. Subsequently, we applied the theories and techniques of shape grammar to deconstruct and simplify the traditional patterns, making them more suitable for modern aesthetics and application needs. In the color extraction phase, we extracted the core colors from the Four Symbols pattern, which not only carry the symbolic meanings of ancient culture but also provide a rich visual language for our design.

Finally, we explored the derivative applications of the pattern, allowing the Four Symbols pattern to be revitalized in modern cultural and creative products, home textile products, and poster design. This series of research and design processes have not only enriched our understanding of the Han Dynasty's Four Symbols pattern but also provided practical paths and examples for the modern inheritance and innovation of traditional culture (Figure 3)

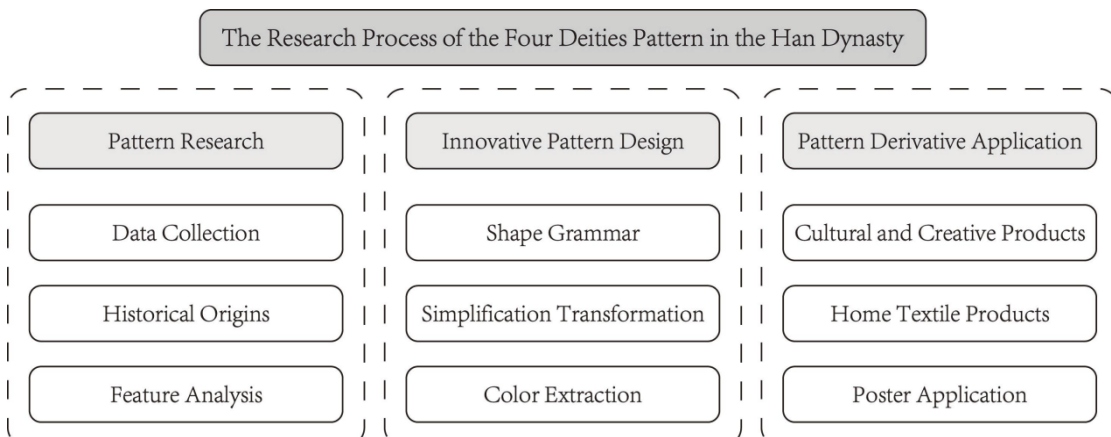


Figure 3: Research Process Flowchart of the Han Dynasty's Four Symbols Pattern

## 4. Design Practice of the Han Dynasty's Four Symbols Pattern

### (1) Design principles

Design principles play a central role in the design practice of the Han Dynasty's Four Symbols pattern, ensuring respect for traditional culture and the integration of modern aesthetics. Through these principles, the essence of the Han Dynasty's Four Symbols pattern is precisely reflected in new designs, with the aim of creating design works that respect tradition and possess a modern sense and practicality.

#### 1) Respect for tradition and cultural connotations

The design principles first emphasize respect for the traditional value of the Han Dynasty's Four Symbols pattern. This means that in the design process, we delve into the cultural background of the Han Dynasty, understanding the historical significance and symbolic connotations of the Four Symbols pattern. We are committed to maintaining the traditional characteristics of the pattern to ensure that the design works can truly reflect the artistic style and aesthetic concepts of the Han Dynasty.

#### 2) Adaptation to modern aesthetic trends

While respecting tradition, the design principles also focus on the integration of modern aesthetics. We recognize that in order for the Four Symbols pattern to be accepted and loved by modern audiences, the design must adapt to current aesthetic standards. Therefore, we incorporate modern design language and popular elements into the design, exploring new forms of expression for the Four Symbols pattern in modern design, with the hope of creating works that are both classical and modern.

#### 3) Combination of innovation and functionality

In addition to respecting tradition and adapting to modern aesthetics, the design principles also include the combination of innovation and functionality. Design is not only an expression of visual art but should also have practical application value. We explore the application of the Four Symbols pattern in different products and media through innovative thinking, such as home textiles, cultural and creative products, and poster design, ensuring that the design works are not only aesthetically pleasing but also practical, meeting the needs of modern life. Through this combination, we aim to achieve a harmonious unity of tradition and modernity, art and function.

### (2) Extraction and evolution

In the design practice of the Han Dynasty's Four Symbols pattern, the extraction and evolution phase is the core step for the modern translation of traditional art. First, through careful analysis, the most characteristic images in the Han Dynasty's Four Symbols pattern are simplified and extracted, capturing the soul characteristics of each pattern. Subsequently, the generative rules of shape grammar, such as symmetry, rotation, and scaling, are used to perform basic transformations on these images, exploring their new expressions in the modern design context. Furthermore, the application of derivative rules brings deeper innovation, endowing the pattern with a sense of dynamics and modernity through cutting, reorganizing, and displacing techniques, greatly expanding the expressive power of the design. After this coherent process of extraction and evolution, we have obtained four pattern design drawings that not only retain the traditional essence of the Han Dynasty's Four Symbols pattern but also show a novel visual effect that keeps pace with the times. These design drawings not only provide rich visual materials for color extraction but also lay an innovative foundation for the practical application of the pattern, successfully integrating ancient art with modern design language, and opening up a new path for the inheritance and innovation of the Four Symbols pattern (Figure 4).



Figure 4: Derivative Design Drawings of the Han Dynasty's Four Symbols Pattern

### (3) Color extraction

In the modern design practice of the Han Dynasty's Four Symbols pattern, the extraction and adjustment of color represent an innovative continuation of traditional aesthetics. The original Four Symbols — Azure Dragon, White Tiger, Vermilion Bird, and Black Tortoise — with their distinctive colors of blue, white, red, and black, not only provide a strong visual impact but also reflect the ancients' philosophical considerations of nature and the cosmos. However, in contemporary design, to pursue color balance and unity, these traditional colors have been carefully reinterpreted. In particular, the black of the Black Tortoise, due to its heavy hue which has limitations in modern visual matching, has been ingeniously adjusted to a warm yellow, adding vitality and brightness to the pattern; while the White Tiger's white has been changed to a light blue, giving it a softer and more tranquil visual effect. These changes in color are not a simple abandonment of tradition but a well-considered innovation aimed at integrating the Four Symbols pattern more harmoniously into modern aesthetics and design contexts. The revised colors not only make the pattern more visually coherent but also infuse new meanings into the symbolism of the Four Symbols. The Azure Dragon and Vermilion Bird maintain their original symbols of growth and passion, while the adjusted yellow Black Tortoise and light blue White Tiger bring warmth and wisdom, and freshness and maturity, respectively. Through such color innovation, the Four Symbols pattern of the Han Dynasty has been revitalized in modern design works, becoming an important symbol connecting ancient and modern cultures, showcasing the profound heritage and unique charm of the Chinese nation's traditional culture.

## 5. Derivative Application of the Han Dynasty's Four Symbols Pattern

### (1) Cultural and creative products

The application of the Han Dynasty's Four Symbols pattern in the field of cultural and creative products is a modern interpretation and innovation of the essence of traditional culture. These ancient and mysterious patterns, with their unique historical value and artistic charm, are skillfully integrated into various cultural and creative products such as stationery, clothing, and home accessories, adding a unique aesthetic taste to the products and allowing consumers to deeply experience the profound cultural heritage of the Han Dynasty during use. In the design process, attention is paid to combining the aesthetic reproduction of the Four Symbols pattern with the practicality of the products, while also following market trends and consumer preferences. Through skillful color matching, careful selection of materials, and exquisite craftsmanship, cultural and creative products with both traditional charm and modern aesthetics are created, such as puzzles, plates, and mouse pads (Figure 5).





Figure 5: Cultural and Creative Products Image

## (2) Home textile products

In the design of home textile products, the application of the Han Dynasty's Four Symbols pattern brings a novel traditional cultural experience. These patterns, re-interpreted in a modern way, are skillfully integrated into products such as scarves and canvas bags (Figure 6), adding a touch of classical aesthetics to the home environment and making the living space more cozy and elegant. Modern home textile products pursue comfort and environmental protection in terms of materials, combined with the exquisite patterns of the Four Symbols, providing a high-quality lifestyle choice that is both beautiful and practical. Through such design practice, the Four Symbols pattern is no longer limited to the framework of history but serves as a carrier of culture, active in the daily life of modern families<sup>[6]</sup>. This innovative integration not only promotes the inheritance of traditional culture but also allows consumers to naturally come into contact with and understand the deep connotations of Chinese traditional culture while enjoying a comfortable life, enhancing the influence and identity of national culture.

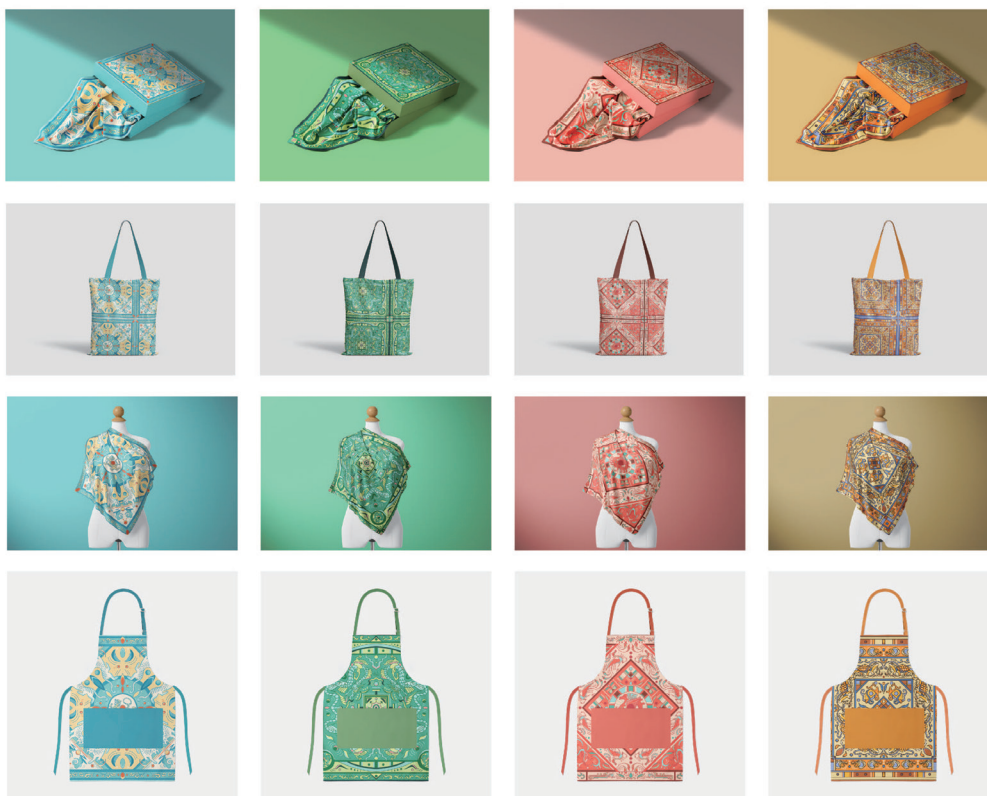


Figure 6: Home Textile Products Image

### (3) Poster application

In the field of poster application, the integration of the Han Dynasty's Four Symbols pattern brings a unique visual charm to the design. The author skillfully embeds these traditional patterns into poster creation (Figure 7), using their bright colors and profound symbolic meanings to create a visual effect that is both recognizable and full of cultural depth. The modern interpretation of the Four Symbols pattern not only enhances the attractiveness and communicability of the poster but also serves as a bridge connecting ancient wisdom with contemporary aesthetics. Through the widely disseminated medium of posters, the stories of the Han Dynasty's Four Symbols pattern continue to be passed down in modern society, allowing the essence of traditional culture to be revitalized in modern life. This innovative application not only broadens the channels for the dissemination of traditional culture but also makes poster design an important window for showcasing the profound heritage and unique charm of Chinese culture.



Figure 7: Poster Application Image

### 6. Conclusion

As this paper delves into the innovative design and application of the Han Dynasty's Four Symbols pattern, we catch a glimpse of the boundless possibilities of traditional culture in contemporary design. By exploring the extraction, evolution, reinterpretation of colors, and derivative applications of the Four Symbols pattern, this study has not only provided new design pathways for its use in the modern design field but also demonstrated an innovative example of the fusion between traditional culture and modern aesthetics. The successful application in modern design fields such as cultural and creative products, home textiles, and posters has proven the timeless artistic value and cultural charm of the Han Dynasty's Four Symbols pattern<sup>[7]</sup>. This is more than a tribute to traditional culture; it is a reflection of cultural confidence. No longer confined to museum displays, these patterns, through the skilled hands of designers, have become part of modern life, allowing traditional culture to shine with new brilliance against the backdrop of the new era.

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