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Interpretation and Regeneration of Ming Dynasty Blue-and-White Porcelain Patterns from a Peircean Semiotic Perspective

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Abstract: Traditional scholarship typically regards porcelain patterns as decorative imagery affixed to specific vessel forms, overlooking their structural consistency across diverse carriers and contexts. Drawing upon Peircean semiotics, this study examines the layout of Ming Dynasty blue-and-white patterns across multiple porcelain categories. Through comparative imagery and observational experiments, it investigates whether identical images retain recognisability and semantic reference when applied across different vessel types. Findings reveal that while patterns exhibit diverse appearances across ceramics due to form variations, their spatial and compositional similarities enable observers to form consistent interpretations even without explicit cultural cues. Results indicate that this image stability stems from relational visual arrangements. This discovery offers a fresh perspective on understanding the continuity of traditional imagery across media and provides empirical support for the cross-contextual use of symbols in contemporary design.

Keywords: *Peircean semiotics; Ming Dynasty blue-and-white porcelain; patterns; cultural transmission*

1. Introduction

The development of commerce and urbanisation in the early Ming period laid the foundation for the flourishing of porcelain production. In the second year of the Hongwu reign, workshops were established at the foot of Zhusan Hill in the town to produce ceramics for the imperial court, termed 'official kilns' to distinguish them from private kilns" **(Lan Pu, 2019)**. Porcelain production was thus integrated into the imperial system at both ritual and administrative levels. By the mid-Ming period, the expansion of social division of labour, changes in the corvée and tax systems, and the development of a commodity economy created a production landscape where "white smoke obscured the sky by day, while red flames scorched the heavens by night" **(Wenlan Fan, 2004)**. The competitive market between official and private kilns, alongside the practice of official kilns supporting private firing, gradually expanded, presenting new opportunities for the porcelain industry. As the most prolific category of Ming ceramics, blue-and-white porcelain achieved remarkable maturity in materials, techniques, forms, and decoration. Its patterns emerged as core visual symbols within specific social contexts and historical conditions, their meanings continually reconfigured by shifts in cultural conventions among users. Thus, they became both potent historical witnesses and ideal carriers of culture. Through the interplay of patterns and colours, these motifs intertwined with social customs to form multi-layered cultural references, rendering each piece a tangible embodiment of social experience and cultural identity.

Current scholarly discourse on Ming Dynasty blue-and-white patterns primarily unfolds through three perspectives: Firstly, the history of craftsmanship. Scholars such as Hsieh, E. et al., focusing on blue-and-white porcelain from the Jingdezhen kilns of the Ming Dynasty, attribute its distinctive hues primarily to changes in craftsmanship and firing conditions during the transition from imported to domestically produced cobalt pigments

in the Chenghua period **(Hsieh et al., 2023)**. Second, stylistic dating. Ferreira, L.F.V. et al. employed the X-ray diffraction technique (XRD) to establish foundational correlations between Iranian blue pigment, mixtures of Iranian and Chinese pigments, or purely Chinese pigments, and the stylistic dating of each sample **(Ferreira et al., 2025)**. Secondly, subject identification: Jin, X et al. proposed a reliable acoustic identification method for ancient ceramics and established a digital code for their acoustic characteristics, providing multiple practical applications for audible signal feature recognition in exhibitions, conservation, trade, identification, and security management of ancient ceramics and other cultural relics **(Jin et al., 2023)**. Deng, Z et al. addressed the challenges of localised fading in ancient ceramic decorative patterns and image noise by proposing a multi-level watershed segmentation method **(Deng et al., 2025)**. Thirdly, decorative styles: Bao, Q et al. employed a grounded theory combined with a KANO-AHP hybrid model to classify and quantify the core aesthetic characteristics of blue-and-white porcelain, thereby establishing a multidimensional aesthetic feature database for its patterns **(Bao et al., 2025)**; Wang Aihong et al. explored the compositional methods, patterns, and principles of decorative motifs in Ming Dynasty Zhengde imperial blue-and-white porcelain through formal analysis, interpreting the cultural connotations conveyed by Islamic-style vessels during the Zhengde period within Sino-foreign cultural exchanges **(Wang & Luo, 2021)**.

While existing research has achieved a relatively thorough understanding of the temporal characteristics of Ming Dynasty blue-and-white patterns, further exploration is warranted regarding how these patterns function as symbols within their contexts: How did the symbolic meanings of Ming Dynasty blue-and-white patterns emerge through social interaction? How does the social embeddedness of these symbolic meanings shape their historical connotations and influence their application value in contemporary design? These questions render the boundaries of Ming Dynasty blue-and-white patterns as visual symbols somewhat ambiguous, thereby diminishing their potential as a traditional medium for enhancing sociocultural understanding and public awareness.

2. Opportunities

In light of this, discussions surrounding the interpretation and regeneration of Ming Dynasty blue-and-white patterns may be developed along the following lines:

a. The stability of blue-and-white patterns. Focusing on how Ming Dynasty blue-and-white motifs evolved from specific images into highly recognisable symbols through prolonged usage, laying the groundwork for subsequent interpretation and regeneration.

b. The generation and convergence of meaning. Re-situating the meaning of patterns within processes of viewing, usage, and dissemination, examining how interpretative responses at different levels gradually accumulate to form a stable social consensus.

c. Whether symbols can serve as conditions for preserving cultural memory. This explores how historical narratives, visual experiences, and collective memory participate in sustaining a pattern's meaning, enabling certain interpretations to remain activated across generations.

d. The potential for design experimentation. Directing attention to the contemporary design context, this examines how pattern regeneration can become an observable, comparable semiotic process through the adjustment and validation of symbolic conditions, without presupposing the inevitability of meaning.

This paper proposes to examine, from a Peircean semiotic perspective, the symbolic process by which Ming Dynasty blue-and-white patterns derive cultural symbolic meaning from their foundational forms through social contextualisation. This offers a fresh perspective for subsequent discussions on contemporary expressions of traditional elements.

3. Methodology

3.1 The Hierarchical Classification and Applicability of Peircean Semiotics

Unlike symbolic theories centred on linguistic systems, Peirce regarded symbols as universal cognitive tools, positing that human understanding of the world is invariably achieved through symbolic activity. The meaning of a symbol requires interpretation via another symbol; new symbols may be viewed as fresh metaphors superimposed upon older ones, constituting a universal rhetorical process **(Zhang, 2022)**. The core of Peirce's semiotics rests upon a triadic relational model: "Sign—Object—Explanatory Note" **(Peirce & Lisker, 2014)**. A sign is a perceptible or recognisable form; the object is the thing or concept signified by the sign; the explanatory note transcends individual psychological responses, representing the phased outcome of meaning generated during the sign's comprehension process. These three elements continually unfold through processes of understanding and reinterpretation **(Yoshiji Mise, 1981)**. This dynamic process endows sign meaning with extensibility and generativity (**Figure 1**).

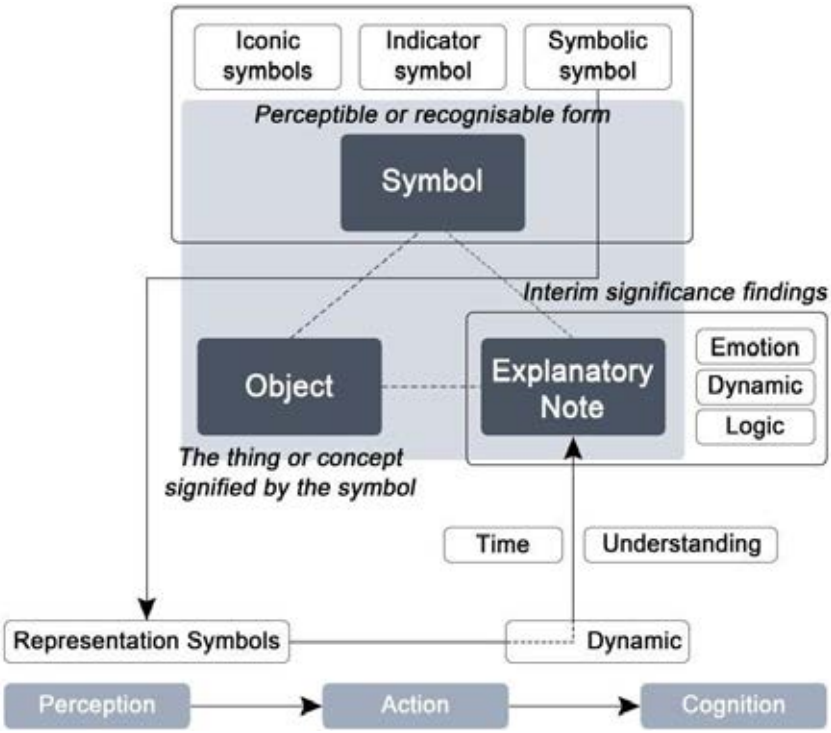

Figure 1 Pierce's Hierarchical Classification Diagram.

To clarify how symbols function, Peirce proposed a hierarchical classification. His most representative categorisation comprises three levels **(Peirce & Hoopes, 1991)** : first, symbols are distinguished by their mode of existence into indexicals, indicials, and symbols. Indexicals establish connections through formal, structural, or qualitative resemblance to objects, relying on perceptual comparability; Indexicals point to objects through actual spatio-temporal or causal connections, focusing on the direct link between the sign and the real-world situation; Conventions are predicated on social conventions and rules of usage, established upon habitual cognition within the internal system of the sign. This foundational classification clarifies the different referential levels of signs, ranging from intuitive perception to social norms. Secondly, based on the internal relationships within the first-level symbolic sign, it distinguishes between the signifier, the object, and the interpretant. The signifier refers to the perceptible form of the symbol; the object is divided into immediate objects and dynamic objects; the interpretant may also manifest as meaning outcomes at different stages. This level of classification can be viewed

as a structural activity unfolding continuously over time and through the process of understanding, where the same symbol may present different types of interpretants at different stages of interpretation. Thirdly, concerning the function of interpretants in meaning generation at the preceding level, Peirce proposed a further distinction in their nature: affective, performative, and logical interpretants. Aesthetic interpretants constitute the immediate sensations evoked by symbols at the perceptual level; dynamic interpretants manifest as behavioural responses and practical inclinations prompted by symbols; logical interpretants emerge as stable understandings and cognitive rules formed through repeated use. These three tiers of interpretants progress sequentially, traversing a journey from perception to action, culminating in the establishment of cognitive structures.

The visual motifs employed in Ming Dynasty blue-and-white porcelain—such as traditional patterns depicting figures, animals, plants, and landscapes—maintain recognisable contours and structural relationships to their real-world counterparts. This likeness establishes an initial perceptual connection between the motif and its subject, forming the intuitive foundation for the pattern's comprehension and acceptance. Through similarity, the viewer is guided to complete an initial recognition of meaning. Yet Ming blue-and-white patterns transcended mere formal reproduction; their elements assumed referential functions within specific contexts. The arrangement of motifs, their precise positioning, and the vessel types to which they were applied often further guided viewers to associate them with particular usage scenarios, thereby establishing more explicit referential relationships. As a particular series of patterns recurs in social usage, its meaning gradually transcends direct associations with specific objects or situations. Through prolonged cognitive accumulation, it solidifies into a universally comprehensible visual symbol. At this stage, the interpretation of patterns increasingly relies on established cultural experience and aesthetic conventions, continually forming and refining itself through the processes of viewing, usage, and dissemination. Viewers from different historical periods and social statuses may generate divergent interpretations of the same pattern, embodying what has been termed "infinite derivations" **(Zhao, 2016)**. The incremental identification of individual pictorial elements gradually diminishes. This transition transforms blue-and-white patterns from concrete figurative representations into a recognisable cultural language, solidified through repeated use and social consensus.

The interconnection of patterns across figurative, indicative, and symbolic dimensions enables their

continuous reinterpretation and transformation across historical contexts, provided their concrete forms remain recognisable. This grants them enduring potential for citation. Drawing upon Peirce's hierarchical classification and structural process of symbols, Ming dynasty blue-and-white patterns can be progressively understood not merely as static decorative forms, but as stable symbols possessing an intrinsic structure. It is precisely in this sense that this theoretical framework can more clearly explain the temporal and open characteristics of meaning generation in Ming Dynasty blue-and-white patterns, providing a reliable theoretical premise for their transition from historical to contemporary contexts and enabling their interpretation and regeneration.

3.2 Sample typing sources and processing

The selection of samples for this study was designed to capture the representativeness and diversity of Ming Dynasty blue-and-white patterns, with a view to exploring the stability of symbols and underlying patterns. A total of 24 items were selected, comprising platters (13), bowls (4), cups (4), jugs (2) and vases (1). They are primarily sourced from museums and relevant collections in China, Japan and the United Kingdom. This cross-regional approach to sample acquisition has, to a certain extent, broadened the diversity of material sources and helped to mitigate potential biases arising from differences in collection systems. Furthermore, in the selection of overseas samples, this study has deliberately included representative cases characterised by distinct cultural contexts. Japan, as a key partner in Ming-dynasty maritime trade, maintained close circulation links with Jingdezhen blue-and-white porcelain; its reception largely occurred within the East Asian cultural sphere, where the objects' original

contexts and aesthetic structures were preserved at the level of use; In contrast, Britain served primarily as a key node in modern global trade and museum collection systems. The blue-and-white porcelain in its collections has largely been detached from its original context of use, entering a knowledge-constructing system centred on appreciation, classification and research. During this transition, the symbolic meaning of the patterns has also undergone reinterpretation within a cross-cultural context.

Furthermore, to ensure the validity and comparability of the research analysis, this study has introduced a clear geographical restriction in the sample selection process: all samples are either attributed to, or can be highly reliably identified as, products of the Jingdezhen kiln system in Jiangxi. As the core region for the production of Ming Dynasty blue-and-white porcelain, Jingdezhen possesses a relatively stable production tradition in terms of raw materials, techniques and decorative patterns, providing a basis for comparison between different artefacts in terms of form and meaning.

To ensure comparability and cross-cultural reference, contemporaneous blue-and-white porcelain circulated abroad and relevant historical paintings were consulted, with selections made through museum catalogues. Criteria for sample selection included: clear and recognisable patterns, structural integrity, and maintainable distinctiveness across different vessel forms and layouts. Preliminary observation and formal analysis of Ming Dynasty blue-and-white patterns revealed that landscapes, figures, plants, and animals constituted the most frequently occurring motifs. Other relatively common themes, such as purely decorative geometric patterns, provided limited information in the analysis of pictorial symbols and were less directly identifiable than the aforementioned four categories. Consequently, these were categorised as supplementary patterns within the analytical scope of this study.

During the symbol extraction phase, guided by Peircean semiotics, the principal motifs within patterns were regarded as the core elements of the signifier. The extraction process relied on a multi-layered reference system, combining the inherent morphological characteristics of the patterns with auxiliary motifs to identify key symbols maintaining high recognisability across different vessel types. The objective of this stage was to abstract operational symbolic elements from the complex decorative context, providing a clear foundation for subsequent implementation.

During the analysis and experimentation phase, extracted symbols were first categorised to clarify their semantic origins. Subsequently, representative symbols were selected for derivative combinations, generating diverse design proposals. These were tested under varying compositional conditions to assess symbolic interpretability and semantic directionality. Design proposals were presented to observer groups through experimental sessions, documenting logical interpretations, emotional interpretations, active interpretations, and patterns of interpretative variation. This analysed convergence and deviation trends in symbol interpretation under varying conditions, yielding verifiable data while offering fresh perspectives for the cross-contextual application of ornamentation and contemporary design.

3.3 Symbolic Interpretation

Iconic symbols represent the most fundamental referential form within symbolic systems. Their core lies in visual comparability – the intuitive similarity between the symbol's form and its object is activated through visual perception, enabling viewers to extract the pattern's content at the primary perceptual level without linguistic reliance. Landscape motifs represent the most systematised category within Ming Dynasty blue-and-white patterns, characterised by simple yet distinctive contour lines of peaks, flowing curves of water, silhouettes of trees, and spatial structures created through layered perspective (**Table 1**). Typical mountain compositions establish symbolic rhythms through repeated triangles, arcs, and curves, ensuring high perceptual recognition of the mountain forms. Rivers convey directionality via continuous curves and the interplay of solid and void elements, while tree forms

utilise branching trunks and leaf outlines to provide semantic cues of vegetation. Landscape scenes are often accompanied by auxiliary forms such as vegetation and mist. These supplementary features reinforce object boundaries through contrast, repetition, or rhythmic lines, thereby enhancing intuitive recognition. For instance, the layered brushstrokes along mountain edges create structural cues through variations in thickness and negative space relationships. This renders the image more readily interpretable while maintaining an objective resemblance to natural forms.

Table 1 Extraction Table of Symbolic Elements in Landscape Patterns

Sample		
Name	Blue-and-White Porcelain Plate with Landscape and Figures	Blue-and-White Porcelain Plate with Sailing Ship Design
Collector	Tokyo National Museum	The British Museum
Pattern characteristics	The mountain massif predominantly adopts a segmented block-face construction.	Pavilions with geometric outlines nestle amidst the hills and waters, while vessels dot the surface of the water.
Subject symbol	Mountains, Trees, Cloud, Pavilion, Towers, Small boat	
Sample		
Name	Jade Hall Fine Ware Marked Blue-and-White Bowl with Landscape and Figures	Landscape and Figures: Hexagonal Inkstone
Collector	The Palace Museum	Tokyo National Museum
Pattern characteristics	The dwelling is situated at the foot of the slope, with selected features presented in isolation to emphasise their contours.	The size of the peaks and the interplay of foreground and background obstructions exhibit variation.
Subject symbol	Houses, Trees, Hillside, Plank bridge, Pavilion, Mountains	

The figure motifs on Ming Dynasty blue-and-white porcelain predominantly drew inspiration from literati lifestyles or narrative scenes. Their creative purpose transcended mere pictorial representation, further employing

the lines of human movement to provide recognisable clues for identifying figures (**Table 2**). Within patterns depicting figures dwelling, standing, or interacting, the connecting lines at key junctures and the simplified contours of garments became pivotal points for discerning character intent and status. The pronounced proportions and dynamic postures of the figures also enabled viewers to swiftly grasp visual units during initial observation, without requiring additional cultural interpretation.

Table 2 Extraction of Symbolic Elements in Figurative Patterns

Sample						
Name	Blue-and-white porcelain plate depicting narrative scenes			Ancient Blue-and-White Dish with Arhat Motifs		
Collector	Sir Butler, United Kingdom			Tokyo National Museum		
Pattern characteristics	The central section depicts the scene of 'climbing over the wall under cover of night', while the surrounding motifs feature geometric patterns and Western floral bouquets.			The figure's fundamental form is constituted by the proportions of its complete torso and limbs, possessing an immediately recognisable human shape.		
Subject symbol						
	Figures	Bouquet 1	Bouquet 2	Figures	Geometric pattern 1	Geometric pattern 2
Sample						
Name	Auspicious Landscape with Swirl Pattern: Sake Cup Inscribed "Fortune" in Blue-and-White Porcelain			Blue-and-White Porcelain Bell with Arhat Design and Animal-Shaped Handle		
Collector	Tokyo National Museum			The Palace Museum		
Pattern characteristics	Geometric patterns serve as background elements, accentuating the central figure on horseback as the focal point.			The ensemble cast distinguishes characters through varied postures, each maintaining distinct physical recognition.		
Subject symbol						
	Figures	Geometric 1	Geometric 2	Figures	Bouquet 1	Bouquet 2

Unlike the narrative representations of landscape spaces or human movement, botanical motifs in Ming

Dynasty blue-and-white patterns predominantly rely on the abstraction of natural forms to achieve highly recognisable linear characteristics (**Table 3**). For instance, the Basket-Carried Flowers establishes a visual focal point through the repetitive layering of petals and stamens, emphasised by the contours of its edges. Similarly, the Peony Pattern employs layered petals to create texture alongside foliage, resulting in a densely patterned whole where the core form remains clearly discernible. The representational quality of botanical motifs further manifests in their dynamic flow and compositional equilibrium. The rhythmic rotation of petals and the extension of foliage lines create movement, while the overall repetitive pattern provides visual stability and predictability. Through processes of extraction, attenuation, and emphasis, these motifs achieve a form that retains recognisable characteristics while possessing decorative appeal.

Table 3 Symbolic Elements Extracted from Botanical Motifs

Sample		
Name	Blue-and-White Basket-Handled Plate with Floral Design	Blue-and-White Floral Pattern Pitcher
Collector	Suzhou Museum	National Palace Museum, Taipei
Pattern characteristics	The flowers in the basket are arranged in bundles, with stems radiating outward from the same container opening.	Flowers serve as the visual focal point, while leaves provide filler and connect the elements.
Subject symbol	Figures; Bouquet 1; Bouquet 2; Figures; Geometric pattern 1; Geometric pattern 2	
Sample		
Name	Blue-and-White Porcelain Bowl with Strange Rock and Peony Design	Blue-and-White Bowl with Floral and Bird Designs
Collector	The Palace Museum	Tokyo National Museum
Pattern characteristics	The peony pattern is rendered with a full, double-petaled structure, its petals layered upon one another.	The continuous extension of branches provides the structural foundation for birds to perch.
Subject symbol	Figures; Geometric 1; Geometric 2; Figures; Bouquet 1; Bouquet 2	

Animal motifs within the blue-and-white decorative system encompass both real-world creatures and

mythological beings. Image extraction often relies on exaggerated bodily contours and dynamic postures: fish motifs typically employ curved body lines and fin outlines to convey swimming motion; bird motifs convey position and movement through extended wings and feathered lines; while beasts maintain key points for object recognition within exaggerated structural forms (**Table 4**). These clues constitute the object's typical characteristics at the formal level, enabling the immediate schema to serve as a decorative layout while preserving the recognisable bridge between the object and its identifiable form.

Table 4 Extraction of Symbolic Elements in Animal Motifs

Sample						
Name	Blue-and-White Rabbit Motif Flower-Patterned Dish			Large Blue-and-White Plate with Branching Boughs and Sash-Tied Birds		
Collector	Tokyo National Museum			Tianjin Museum Collection		
Pattern characteristics	characterised primarily by slender ears, with clean, continuous lines and relatively intricate auxiliary patterns.			The positions and postures of the two birds are clearly distinguishable.		
Subject symbol						
	Rabbit	Geometric pattern 1	Geometric pattern 2	Bird	Plants	Cloud pattern
Sample						
Name	Large Blue-and-White Bowl with Fish and Waterweed Design			Blue-and-White Horse-Riding Cup		
Collector	The Palace Museum			The Metropolitan Museum of Art		
Pattern characteristics	The fins and tail are depicted in an outstretched position, forming a harmonious arrangement with the curved surface of the cup			Depicted in a sideways, slightly downward-facing pose, with the limbs rendered in an abstract style that contrasts with the body's central axis		
Subject symbol						
	Fish	Plants 1	Plants 2	Horse	Geometric pattern 1	Geometric pattern 2

Landscape, figure, plant, and animal motifs in Ming blue-and-white porcelain exhibit distinct stylistic characteristics. Landscape patterns convey rhythmic vistas through linear composition and layering; figure motifs achieve vividness through action and posture; plant designs establish visual cadence via floral and foliage contours and arrangement; animal motifs maintain intuitive recognition through characteristic features and movement. Beyond singular representations, Ming blue-and-white patterns frequently combine multiple natural subjects into unified compositions. When patterns carry narrative elements or depict highly complex action sequences, their visual comparability diminishes, requiring cultural context or story knowledge for deeper interpretation. Such combinations often adhere to specific narrative logic.

In interpreting Ming blue-and-white patterns, the fundamental reason viewers can swiftly recognise an image as a specific figure, natural form, or life-form lies not only in the aforementioned 'likeness' but also in these images having been repeatedly incorporated into literature, painting, and everyday narratives. Based on this assessment, we reverse-engineered the earlier samples to identify recurring themes across different media with highly consistent outcomes, thereby elucidating how meaning becomes crystallised.

The prevalence of opera narratives and character-based stories as motifs in Ming Dynasty blue-and-white patterns constitutes a common phenomenon, gradually evolving into a significant decorative category, most notably exemplified by The Romance of the West Chamber **(Li, 2024)**. From the mid-Wanli period of the Ming dynasty, the stylistic approach to The Romance of the West Chamber illustrations became increasingly refined and intricate. Concurrently, with the development of private printing houses and the popularity of vernacular literature, illustrations across different regions began to influence and borrow from one another, leading to a gradual stabilisation of compositional forms for classic scenes **(Teng, 2021)**. Take the classic composition "Climbing the Wall Under Cover of Night" as an example. The illustration (**Figure 2**) has formed a cross-media dialogue with blue-and-white porcelain patterns (**Figure 3**). The image captures the moment just before Zhang Sheng leaps from the wall, the most suspenseful instant before the conflict erupts. The act of scaling the wall itself possesses potent dramatic force. The wall as a spatial boundary and the dynamic instant captured in the figure's leap combine to form a highly recognisable scene. This narrative is conveyed by minimising variations in facial depiction while emphasising the spatial division represented by the "wall" and the act of "crossing the boundary". Upon encountering this composition, the viewer transcends mere observation of nocturnal movement or physical exertion, instead conjuring a narrative pivot long established within literary and theatrical traditions. Moreover, the botanical motifs adorning the plate's rim bear similarities to floral decorations found on contemporary Turkish Iznik ceramics (**Figure 4**). The central scene depicting "climbing over the wall under cover of night" remains particularly stable, indicating that Ming Dynasty blue-and-white patterns undergo shifts in meaning through segmented transmission during cross-cultural dissemination. Decorative border patterns largely remain at the level of formal resemblance, with meanings adaptable to stylistic and regional variations. In contrast, figurative motifs rooted in literary narratives achieve high stability through prolonged exposure to repeated viewing and interpretation within cultural contexts.

Compared to figurative motifs that rely on narrative actions to achieve representational resemblance, landscape, plant, and animal patterns constitute another, more fundamental symbolic system. Among landscape motifs, the distant-view composition is selected for discussion. In blue-and-white porcelain, this type of landscape often exhibits a highly formulaic structure: foreground trees and rocks, midground water's edge, and background mountain ranges unfold sequentially. The layering of peaks and the flow of waterways create a visual itinerary, transforming the landscape from mere decoration into a symbol of the literati's idealised retreat from worldly life. This compositional approach not only recurs frequently on ceramics but also appears extensively in contemporary landscape paintings (**Figure 5**). It is precisely this cross-media repetition that gradually transformed the high-distance landscape composition into a widely accepted subjective notion of "how landscapes ought to be presented".

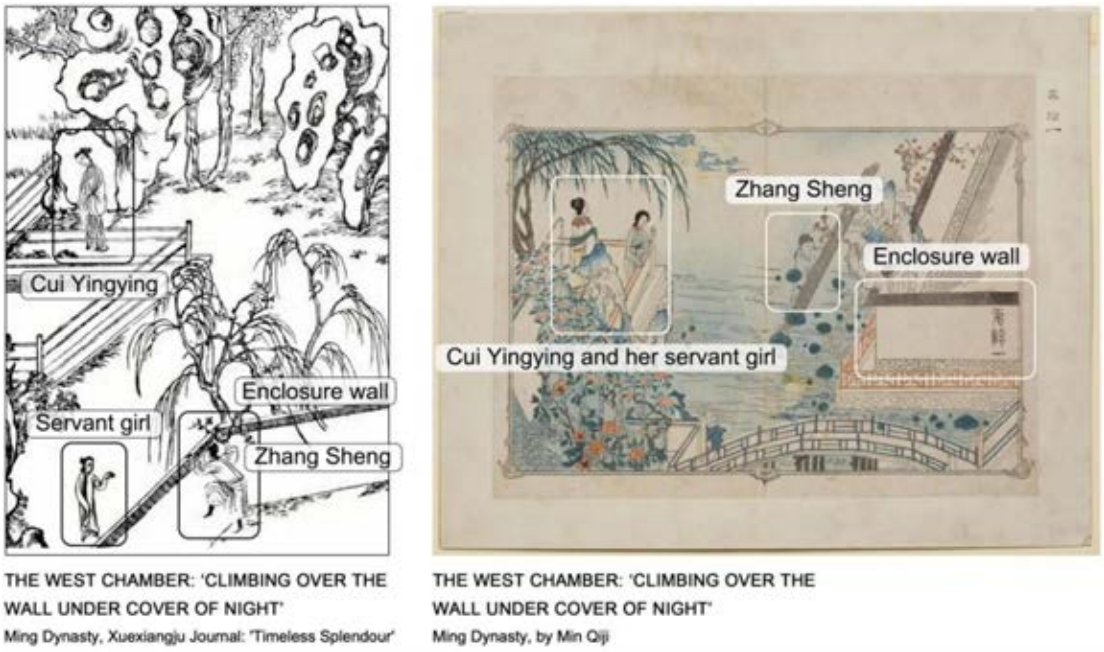

Figure 2 Illustration of "Climbing the Wall at Night" from The Romance of the West Chamber

Figure 3 Ming Chongzhen Period Blue-and-White Porcelain Plate with Narrative Motifs

Figure 4 Turkish Iznik Ceramics

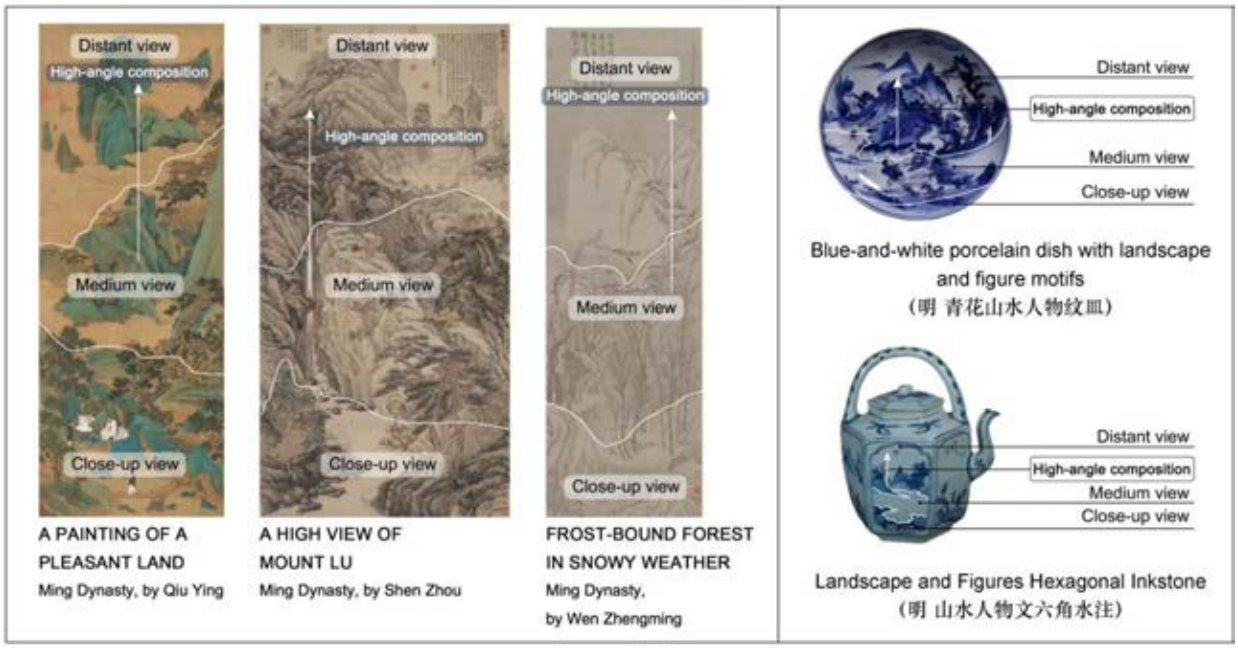

Figure 5 Diagram illustrating the relationship between high-perspective landscape painting and ceramic decoration

Floral motifs exhibit considerable variety. Patterns featuring plum blossoms, peonies, and other plants establish clear rhythms through extended branches and leaves, rotated and repeated petal arrangements (**Figure 6**). Across different vessel forms, the core structural elements of these floral designs remain consistent, while subtle variations enrich their narrative dimensions **(Jing et al., 2024)**. Within the viewer's cultural framework, these motifs are both recognisable and capable of conveying deeper meanings. Within botanical motifs, the peony has long held explicit symbolic significance in Chinese painting traditions. Since the Tang and Song dynasties, it has been regarded as the flower of wealth and nobility. This connotation is repeatedly referenced in flower-and-bird paintings, such as Zhu Zhanji's "Wealth Within the Vase," where the peony within the vase displays layered petals and a state of full bloom, its very name carrying cultural allusion. In decorative arts from the Ming dynasty onwards, peony motifs proliferated across paintings and brocades, paralleling the idealised, recurring depictions of peonies

in blue-and-white porcelain (**Figure 7**).

Figure 6 Comparative Layout of Botanical Motifs

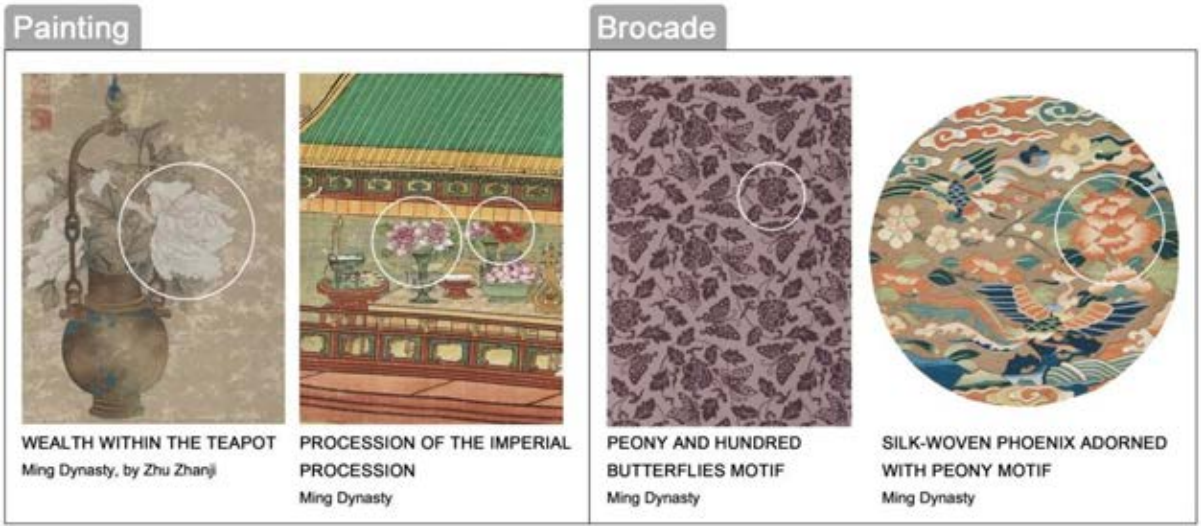

Figure 7 Correspondence of Peony Motif Forms

Animal motifs often employed repetition and standardised depictions. For instance, the fixed rabbit motif complemented surrounding geometric patterns, creating a continuous visual rhythm through arrangement and interaction (**Figure 8**). Their specific social or auspicious connotations could be understood through symbolic pathways. Compared to dragons and phoenixes—images steeped in institutional and mythical significance—rabbit motifs were less prevalent in Ming blue-and-white porcelain. Yet their symbolism demonstrated continuity: in Han dynasty stone carvings, rabbit designs featured simplified lines; in Han relief stones, silk paintings, and bronze ware, rabbit motifs frequently appeared alongside the Queen Mother of the West myth, depicted in scenes of "jade rabbits pounding medicine" to symbolise longevity (**Figure 9)**. The Ming-era treatise Zhezhong Zhi records: "For New Year, the auspicious gourd and ten-thousand-year blessings; for Lantern Festival, the lantern; for Dragon Boat Festival, the Celestial Master; for Mid-Autumn Festival, the moon rabbit. The Ming imperial court observed the custom of changing attire according to the solar terms. During the Mid-Autumn Festival on the fifteenth day of the eighth lunar month, it was customary to worship the moon for blessings. People adorned themselves with rabbit-patterned accessories (**Figure 10**) to seek auspicious omens. These seasonal observances cemented the rabbit motif's propitious symbolism within traditional understanding, reinforcing its established interpretations through prolonged usage.

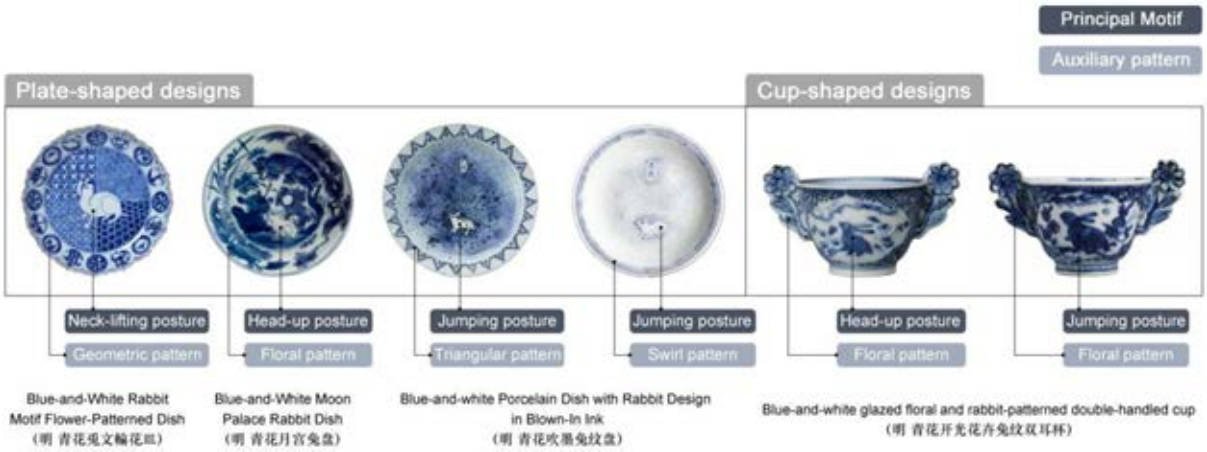

Figure 8 Arrangement of rabbit motifs on similar vessel types

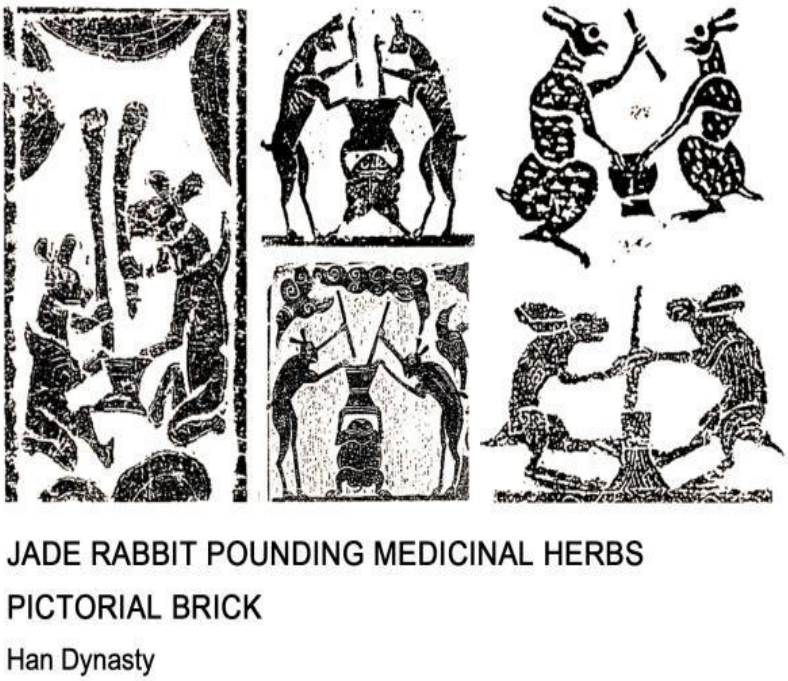

Figure 9 Han Dynasty rabbit-patterned portrait bricks

Figure 10 Ming Dynasty rabbit-pattern brocade

The perception of Ming Dynasty blue-and-white patterns initially arose from a certain comparability in form

and subject matter, with similarity facilitating recognition. However, the ultimate social sharing of symbolic meaning and confirmation within cultural memory depended on the continuous development of interpretative frameworks. This development manifested as a differentiated yet serialised process across different pattern categories, establishing stable referential relationships with specific cultural meanings (**Table 5**).

Table 5 Symbolic Feature Translation Matrix for Four Thematic Categories

Theme	Representative Motif	Solidified Interpretive Elements	Translatable Symbolic Characteristics
Landscape	Lofty-style landscape	Ordered natural world	The hierarchical relationship between waterfronts, mountain ranges, and foreground, middle ground, and background
Figures	Excerpt from The Romance of the West Chamber	Specific Narratives	Character Movement Patterns
Plants	Peony motif	Wealth and Nobility	Layered petals, clustered at the centre
Animals	Rabbit motif	Auspicious, gentle	Long ears, crouching posture

4. Design Innovation

The preceding analysis, grounded in Peircean semiotics, conducted a layered examination of the symbolic structures within landscape, figure, plant, and animal motifs in Ming Dynasty blue-and-white porcelain patterns. It elucidated the progressive solidification of these motifs from their formal resemblance and contextual referents to socially codified conventions, sustained through reproducibility. However, merely describing the historical evolution and theoretical interpretation of these symbolic structures fails to address a fundamental question: when these highly stable symbols are detached from their original material medium and social context, do their symbolic relationships remain valid? If so, what core elements sustain them? If shifts occur, at which level do these relationships begin to unravel? Therefore, a research methodology capable of reactivating symbolic relationships must be introduced. Accordingly, design innovation is incorporated into the research framework. Representative patterns previously demonstrated to possess high symbolic stability are selected and treated as an operational process of deconstruction, extraction, and reconfiguration of existing symbols. This approach tests the elasticity and continuity of symbols during cross-contextual translation.

Through the deliberate extraction and reconfiguration of core symbolic elements, we observe whether they continue to trigger relatively consistent interpretative outcomes within new visual systems. This approach responds to Peirce's semiotic theory regarding the open-ended, progressive, and infinitely extensible nature of meaning generation.

Blue-and-white patterns exhibit significant advantages in visual adaptability and symbolic clarity. These concise, recognisable visual elements facilitate symbol reuse and modern design regeneration **(Zhao et al., 2025)**. Design innovation adopts a reverse approach from analysis to operation. Starting from established, validated stable relationships, it progressively transforms these into adjustable design elements corresponding to key variables at the symbolic level. These include: whether the symbol remains recognisable, whether meaning orientation shifts, and whether interpretative outcomes diverge. This transforms the design process into an experimental field for controlling and comparing symbolic conditions (**Figure 11**).

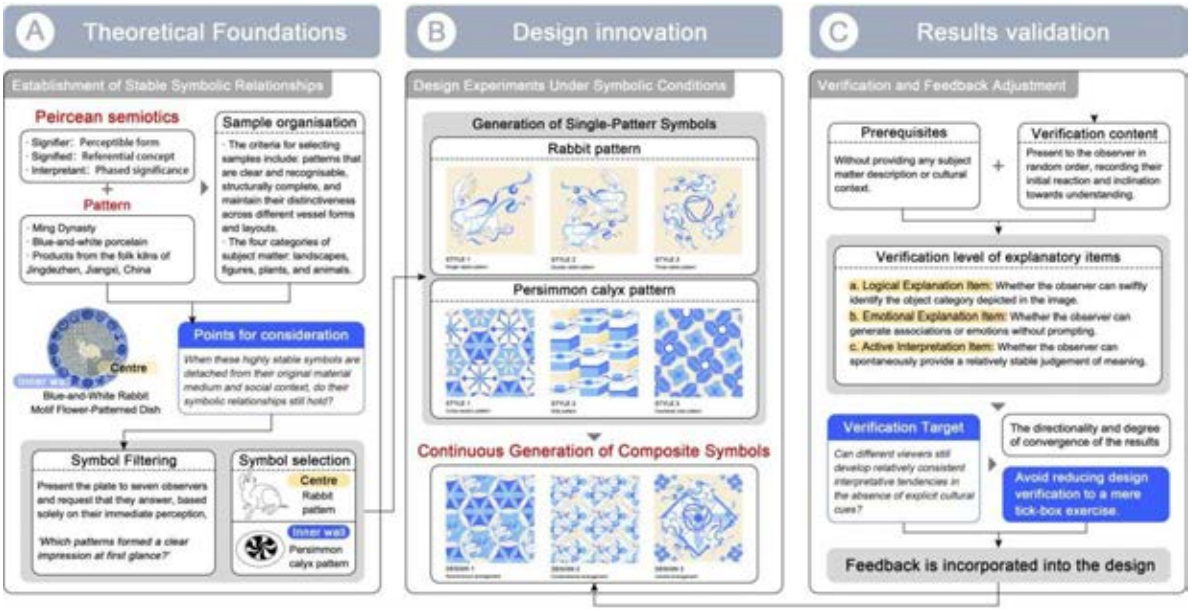

Figure 11 Design Experiment Flowchart

Building upon the preceding symbolic analysis, a selection of pattern groups rich in symbolism was chosen as experimental samples. From these, imagery underpinning the symbols' validity was extracted, with particular emphasis on identifying formative elements capable of maintaining high recognisability and semantic directionality across different vessel types and layouts. Subsequently, these extracted symbols were established as fundamental units for design operations. Experimental applications involving retention, attenuation, or reconfiguration were conducted to observe shifts in symbol recognition and semantic comprehension, thereby pre-forming a series of design proposals sharing similar conditions yet differing in relationships. This process enabled comparability between proposals of diverse themes while revealing under which conditions symbols remain stable and when interpretative shifts occur. Thus, design innovation was transformed into an experiment observing symbolic relationships.

Upon design completion, user observation verifies whether symbolic elements trigger original or analogous cognition, focusing on the directionality and convergence of outcomes. This assesses whether diverse observers, lacking explicit cultural cues, still develop relatively consistent interpretative tendencies. This approach avoids reducing design validation to mere symbol comparison. Experimental findings are then fed back into the design process to refine the innovation workflow, establishing a reusable framework for cross-contextual symbol translation and stability verification.

4.1 Deconstruction: From Blue-and-White Patterns to Symbolic Recognition

The experiment selected a blue-and-white rabbit-patterned wheel-decorated dish from the Chenghua period of the Ming dynasty as the initial observation object. A clear compositional structure exists between the centre of the dish and its inner rim (**Figure 12**). The centre features rabbit motifs as the primary decoration, with geometric patterns forming an intermediary field in the background. The inner rim is adorned with a continuous arrangement of encircling patterns. The juxtaposition of diverse motifs on a single vessel facilitates comparative analysis of immediate recognisability across different symbols.

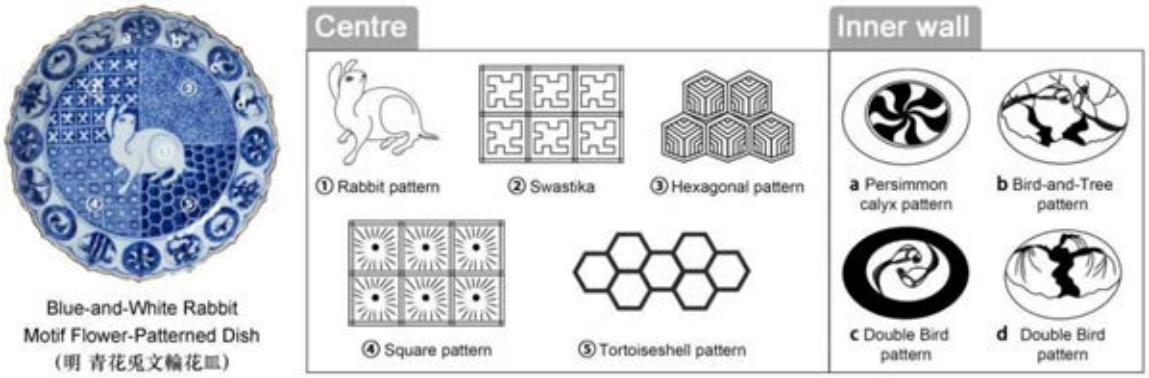

Figure 12 Symbolic Analysis of Patterns on Blue-and-White Rabbit-Motif Floral-Rimmed Dish

The first phase of the experiment involved guiding observers to autonomously identify patterns on the dish surface without prompting. The vessel was presented to seven observers without providing pattern names. The observer group required no specialist background but was instructed to answer solely based on intuitive perception: "Which patterns formed a clear impression at first glance?" Observational findings (**Table 6**) revealed that despite the coexistence of animal motifs, geometric patterns, and continuous border decorations, observers' attention was not evenly distributed across all elements. All seven observers clearly identified the rabbit motif, three actively described the persimmon calyx motif, and one prioritised the persimmon calyx motif as their primary recognition, demonstrating high consistency. In contrast, the geometric patterns serving as background elements, while perceived, were more frequently described using terms such as "filler" or "accent", and were less often acknowledged as distinct, independently recognisable symbols. Other patterns around the rim, such as bamboo and bird motifs, were scarcely singled out individually and did not enter the realm of explicit symbolic recognition.

Table 6 Symbolic Feature Translation Matrix for Four Thematic Categories

Observer Number	Primary Identified Pattern	Secondary Identified Motif	Observation Description Keywords
O1	Rabbit motif (①)	Tortoiseshell Pattern (⑤)	At first glance, one sees a rabbit, surrounded by decorative elements
O2	Rabbit Pattern (①)	Persimmon Peduncle Pattern (a)	First the rabbit catches the eye, then one discerns the flower-like ornamentation
O3	Swastika Pattern (②)	Rabbit motif (①)	The central geometric pattern is quite distinct, then notice the rabbit
O4	Persimmon calyx pattern (a)	Rabbit motif (①)	The pattern directly above is rather interesting; it catches the eye immediately.
O5	Rabbit motif (①)	Other unidentified	Primarily notice the rabbit in the centre; the rest are not readily discernible.
O6	Rabbit motif (①)	Square Pattern (④)	The rabbit is particularly distinct, with the background geometric patterns clearly delineated
O7	Persimmon calyx pattern (a)	Rabbit motif (①)	The persimmon calyx pattern is clearly defined, with the rabbit motif only discernible at its centre

Based on observational experimental findings, the rabbit motif and persimmon calyx motif were selected as core symbolic objects for subsequent design experiments. All subsequent design experiments and validations centred on these two ornamental categories, prioritising symbols already effectively recognised and consensus-formed at the perceptual level. By adjusting their combinations and visual conditions, we further examined how

their interpretative elements varied under different conditions.

4.2 Regeneration: From Symbol Recognition to Combination Translation

When the persimmon calyx-like pattern and the central rabbit motif enter into a combinatorial relationship, a disparity exists in their symbolic hierarchies. The archetypal persimmon calyx pattern radiates outward from its central point, exhibiting a symmetrical, radial structural characteristic. The peripheral persimmon calyx-like elements establish an indirect similarity to natural forms by extracting the growth nodes of the fruit, while the outward-projecting angular units suggest growth, continuity, and fruition. As an animal motif, the rabbit pattern possesses explicit referential meaning. In contrast, the persimmon calyx-like pattern contributes to meaning formation through its spatial positioning. Extracted rabbit and persimmon calyx patterns serve as fundamental units for design translation. While preserving the recognisability of core elements, experiments with four-directional continuous planar arrangements generate new pattern compositions. This process observes whether recognisability and semantic directionality remain stable.

4.2.1 Step 01: Symbolic Generation Experiment with Single Patterns.

The rabbit motif, the most recognisable core pattern on the plate surface, demonstrated highly consistent identification results in observational experiments. Using the rabbit motif as the template, its form was deconstructed while preserving symbolic integrity. Key features—such as the direction of the head, the curvature of limbs, and the overall dynamic posture—were extracted and symbolically rendered (**Figure 13)**. The persimmon calyx motif recurs as a rim decoration. Its fundamental composition was analysed, with emphasis on extracting pattern details under varying scales to form a stable, balanced decorative structure on the plane (**Figure 14**).

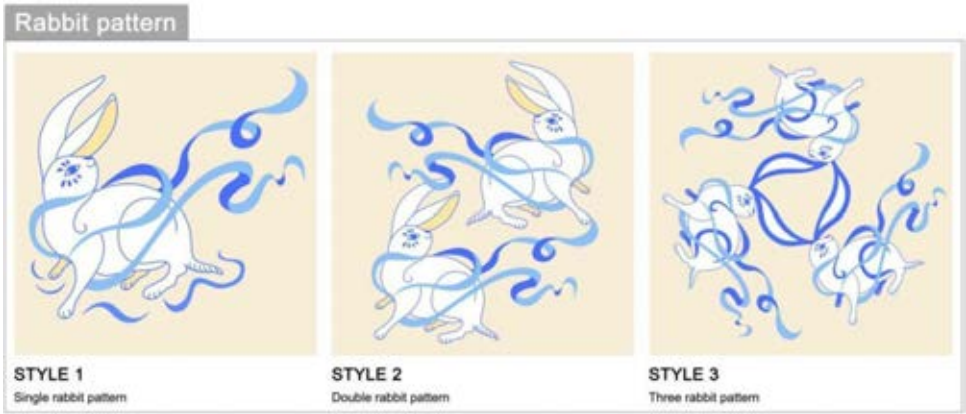

Figure 13 Schematic of rabbit motif symbol design

Figure 14 Persimmon calyx motif symbolic design schematic

4.2.2 Step 02: Experimental generation of composite symbols.

Building upon the continuous units derived from prior experiments, this phase reorganises the rabbit and persimmon calyx motifs within a unified visual system **(Figure 15**). Each motif group employs a consistent 1:1

square composition as its canvas, ensuring comparability among derived symbol outcomes. Three arrangement strategies were devised: First, synchronous arrangement. Rabbit and persimmon peduncle motifs repeat at equal intervals horizontally or vertically, maintaining consistent orientation. Observe whether merged symbols retain recognisability. Second, composite arrangement. Motifs combine into a single symbol, which is then repeated. Observe whether the new composition elicits emotional responses akin to the original symbols. Third, central arrangement. Positioning the rabbit pattern as the core element at the centre, with persimmon calyx patterns radiating around it to form a radial layout. Observing the interpretative hierarchy of symbols after spatial weight adjustments. All three arrangement experiments are presented devoid of narrative context, ensuring the symbols' form and arrangement itself become the primary identification cues. By adjusting symbol styles, rotation angles, spacing, and repetition counts, multiple comparable design proposals are generated, providing clear foundations for subsequent experimental validation.

Figure 15 Schematic of combined symbol design

4.3 Results: From Combined Translation to Valid Verification

In Peircean semiotics, interpretants unfold as theoretical premises during use. Consequently, the design feedback process was structured as an iterative adjustment of symbolic conditions, documenting shifts in interpretive responses.

First, without providing any contextual explanation, three sets of pattern samples with different arrangement forms were presented to seven observers in random order. Their initial reactions and interpretative tendencies were recorded. The experiment documented three categories of response information, corresponding to different levels of interpretative items in Peirce's semiotics:

a. Logical Explanation Item: Whether the observer could rapidly identify the object category signified by the image.

b. Emotional Explanation Item: Whether the observer generates associations or emotional responses without prompting.

c. Active Interpretation Item: Whether the observer spontaneously provided a relatively stable judgement of meaning.

The key observation and comparison focused on how adjustments to different variables influenced the pathways of explanation item generation. The validation process employed a longitudinal comparison approach, starting from the same symbolic prototype to observe changes in interpretative responses under varying design conditions (**Figure 16**).

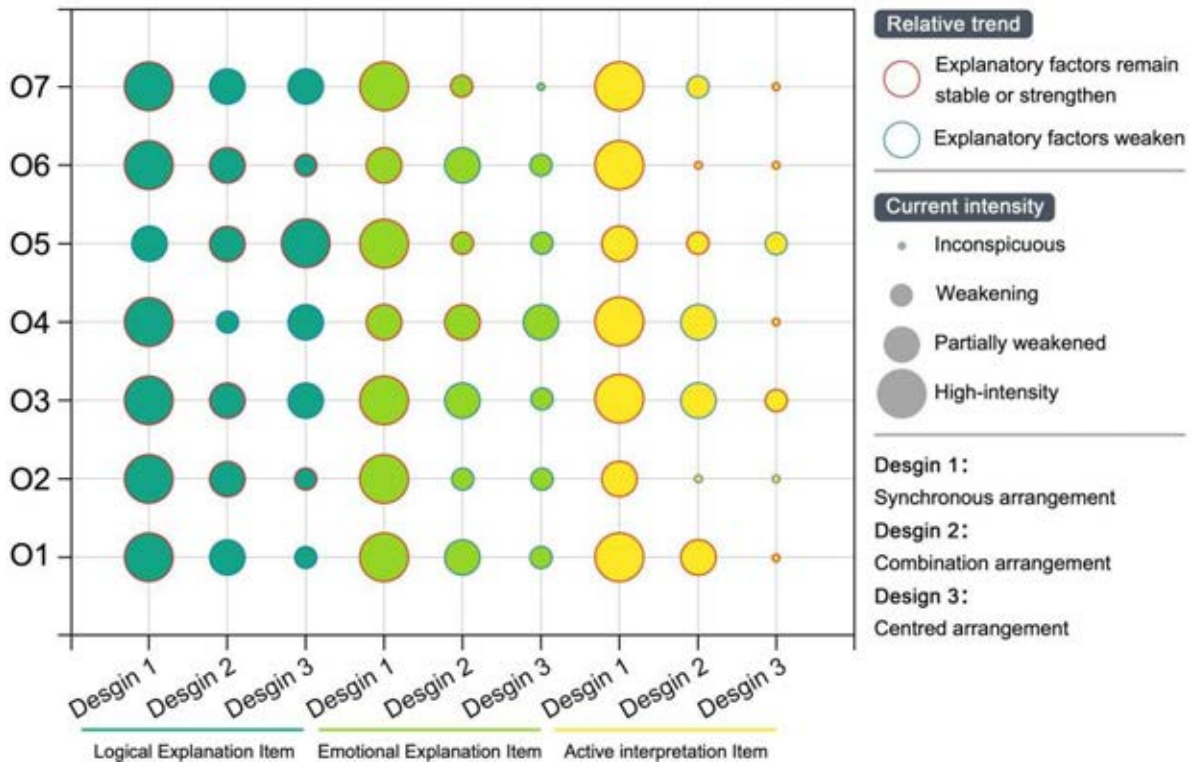

Figure 16 Relative states and changes of explanation items under different arrangement patterns

4.3.1 a. Logical Interpretation Items

Across all arrangements, the core rabbit motif maintains highly stable recognisability. In the synchronous arrangement, six out of seven observers swiftly identified the rabbit motif prototype as "rabbit" and the persimmon calyx motif prototype as "persimmon". The sole hesitant observer indicates that when repetitive units become excessive and visual density increases, logical interpretation items are slightly affected. In the combination arrangement, 5 out of 7 observers recognised the rabbit motif, while 4 recognised the persimmon calyx motif. When the rabbit and persimmon calyx motifs combined to form a new symbol, the core shape of the rabbit motif retained dominance. The persimmon calyx motif, positioned peripherally in a supporting role, exhibited weaker logical recognition. In the centred arrangement, all seven observers recognised the central rabbit motif, demonstrating highly stable logical recognition of the core symbol. Most observers identified the peripheral persimmon-stem motif, though two regarded it as supplementary decoration rather than an independent symbol.

4.3.2 b. Emotional Interpretation Component

Emotional responses exhibited heightened sensitivity to symbol variations. In the synchronous arrangement, all observers retained associations of "lively," "gentle," and "auspicious" emotions even after removing contextual narratives, indicating the rabbit motif's emotive flexibility persists through rhythmic transformations. In the combined arrangement, all observers similarly triggered "lively" and "gentle" emotional responses to the rabbit motif, while the persimmon calyx pattern elicited "abundant" and "auspicious" emotions, albeit with relatively weaker intensity. This indicates that the emotional interpretation of the persimmon calyx pattern is influenced by its position and combination method. In the central arrangement, observers generally responded to the central rabbit motif with "gentleness," while emotional responses to the surrounding persimmon calyx motifs were markedly lower than those to the rabbit motif. Nevertheless, the overall association with "blessing" was maintained.

4.3.3 c. Active interpretive items

Active interpretive items exhibited marked variation across symbol arrangements. In synchronous arrangements, five observers spontaneously interpreted symbols as conveying social meanings of "auspiciousness"

and "blessing," while two remained primarily at the emotional level. In the combined arrangement, three observers interpreted the composite pattern as conveying an overall "auspicious" meaning, while four remained anchored to emotional associations with individual symbols. This indicates reduced stability in active interpretation when symbols combine to form novel configurations. In the central arrangement, all five observers assessed the social meaning of the entire composite symbol, though two primarily focused on the emotional dimension of the rabbit motif, failing to fully integrate the persimmon calyx motif into their social interpretation.

The arrangement of three categories reveals distinct interpretative dynamics. Logical interpretations remain highly stable on rabbit-patterned items, while peripheral persimmon-stalk patterns show slight declines influenced by arrangement and positioning. Emotional interpretations consistently remain strong on rabbit-patterned items, with auxiliary symbols triggering slightly reduced responses. Agency interpretations prove most susceptible to variations in arrangement and combination; when symbols depart from their original context or form new combinations, the formation of social meaning tends to diverge. The meaning of symbols is not immediately conferred upon completion of the design, but is continually generated, confirmed, or diminished within specific symbolic contexts. Preserving the key form of the core pictogram is the prerequisite for ensuring the stability of logical and emotional interpretation. Any formal changes must be made without compromising this core form. Auxiliary symbols may undergo minor visual positioning adjustments, but their supporting role to the core symbol must be considered. They are primarily employed to enhance design expressiveness, while the core pictogram remains the primary bearer of meaning.

5. Discussion

Within contemporary design discourse, the semiotic significance of Ming blue-and-white patterns extends beyond visual interpretation and can be rearticulated as a set of generative mechanisms. Drawing on Peirce's triadic framework, this study reorganizes its findings into three interrelated pathways that inform design practice at different levels.

At the iconic level, the internal structural logic of blue-and-white ornament—exemplified by the rhythmic continuity of scroll motifs and the radial organisation of medallion patterns—provides a basis for morphological abstraction. Rather than remaining confined to surface decoration, these elements may be reconfigured as modular units and incorporated into contemporary ceramic design through geometric or parametric strategies. In this process, the pattern no longer merely embellishes the object but actively participates in shaping it, influencing vessel contours, opening proportions, and modes of assembly. What emerges is a shift from two-dimensional ornamentation to three-dimensional form generation.

At the indexical level, the cultural and historical contexts embedded in such patterns—ranging from literati aesthetics to maritime imaginaries—operate as latent references that can be activated through design. Instead of direct visual quotation, these associations are mediated through use scenarios, narrative frameworks, or interaction logics. For instance, in interactive product design, carefully structured user pathways and situational cues allow cultural meanings to surface gradually within the experience, fostering a perceptual link between past contexts and present engagement.

At the symbolic level, the established meanings carried by traditional motifs — such as auspiciousness, harmony, and cyclical order—undergo selective reinterpretation. Detached from fixed historical readings, these symbolic values can be recoded within contemporary communication systems. In branding and information design, such transformations enable traditional signification to evolve into a visual language aligned with current cultural narratives, while retaining its conceptual depth.

Building on these layers, the study further explores the adaptability of this semiotic framework across media. In ceramic practice, pattern logic informs both form generation and glaze articulation; in digital interfaces, it

translates into iconographic systems and dynamic visual structures; and in interaction design, it contributes to the construction of user engagement and cultural cognition. Through these applications, blue-and-white patterns shift from passive decorative resources to active semiotic infrastructures, capable of generating meaning across diverse design contexts.

6. Conclusion

Centred on Peirce's semiotic theory and analysing Ming Dynasty blue-and-white patterns to explore design innovation, this study attempts to address a long-assumed yet rarely verified question: where does the stability of traditional patterns originate, and can it be systematically preserved or regenerated in contemporary expression? Through hierarchical analysis of pattern symbol structures, symbolic translation of design operations, and experimental validation of interpretant generation processes, this study endeavours to transform the question from empirical judgement into a methodological issue amenable to analysis and verification.

First, we move beyond static approaches that treat pattern meaning as symbolic outcomes or collections of cultural allusions. By introducing Peircean semiotics—specifically the framework of indexical signs, indexical relations, and interpretants—we deconstruct and reanalyse Ming Dynasty blue-and-white patterns. The findings reveal that the symbolic efficacy of patterns rests upon multiple relational layers: the signifier level underpins intuitive object recognition; the relationship between sign and object is continually activated through context; and the ultimate stabilisation of meaning depends upon the accumulation and consolidation of interpretive items through prolonged, repeated usage. Through reverse comparative analysis of extensive samples, this study confirms the highly structured characteristics exhibited by four thematic categories—landscapes, figures, plants, and animals—within Ming Dynasty blue-and-white patterns. These four themes exhibit distinct yet comparable levels of symbolic stability across the representational, relational, and interpretative dimensions, thereby avoiding the pitfall of substituting thematic categorisation for theoretical analysis.

By establishing historically validated stable symbolic relationships as the starting point, this research introduces design innovation into semiotic studies, transforming it into an experimental basis for verifying theoretical judgements. The design process is defined as the deconstruction and reconstruction of symbolic conditions, centred on critical variables such as whether symbols remain recognisable, whether semantic orientation shifts occur, and whether interpretative outcomes diverge. This approach positions design as a means to observe how symbols develop stably. Experimental validation further demonstrates that object recognition does not equate to meaning establishment. Within experimental samples, even when iconic-symbolic recognition remains stable, interpretative elements may weaken or fragment due to shifts in symbolic weighting, visual hierarchy, or compositional relationships. The allegorical meanings taken for granted in traditional patterns rely on repeated confirmation through long-term use under specific symbolic conditions, exhibiting characteristics of intergenerational accumulation and open extension. Interpretative elements represent phased stable outcomes whose stability depends on historical usage, yet may be readjusted under new symbolic contexts.

Future research may broaden its scope to encompass additional subjects and samples, conducting cross-object and cross-period comparisons to explore the recognisability and semantic orientation of diverse semiotic symbols. Participation from varied audiences — including cross-cultural observers of differing ages and professional backgrounds — will enhance understanding of symbolic diversity. Furthermore, more complex symbolic combinations could be employed to observe interactions within multifaceted visual relationships, thereby enriching the expressive forms of symbolic regeneration. The integration of Peircean semiotics with design innovation proposes a research methodology for understanding how traditional patterns generate meaning, achieve stability, and undergo regeneration. This approach avoids the distortion of meaning inherent in experiential or stylistic translation. It also offers methodological insights for translating broader traditional visual symbols within

contemporary contexts.

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