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Color Analysis of Porcelain Inlay Decoration in Traditional Buildings in Chaozhou

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Abstract

Chaozhou porcelain inlay (Qian ci) is a key decorative element in the traditional architecture of the Chaoshan region, deeply rooted in local cultural identity. The color schemes used in these decorations are not merely aesthetic choices but are rich in cultural and symbolic meanings. This study analyzes how the color system of Chaozhou porcelain inlay is shaped by the interplay between material properties, traditional craftsmanship, regional culture, and environmental factors. Through a combination of historical review and field investigation, the paper aims to provide a comprehensive understanding of how color choices reflect and communicate cultural significance within the architecture. Over the long term, this chromatic system has developed stable, highly distinctive regional characteristics. Focusing on porcelain inlay decoration in traditional buildings in Chaozhou, this study combines literature review with field investigation to examine color composition and pairing rules, and analyzes them from three perspectives: color characteristics, formation mechanisms, and cultural meaning. The results suggest that the colors of Chaozhou porcelain inlay are not merely aesthetic choices, but a visual-symbolic system constructed through high-saturation hues, warm–cool contrast, and hierarchical spatial allocation. From the perspectives of color symbolism and semiotics, this color system not only responds to the environmental and climatic conditions of the region, but also gradually constructs the cultural identity and local expression of traditional Chaozhou architecture through continuous processes of cultural encoding and spatial dissemination.

Keywords: Porcelain inlay (Qian ci), Decorative color, Traditional architecture, Art

Introduction

Located in the Chaoshan Plain of eastern Guangdong, bordering the South China Sea, Chaozhou' s unique geographical environment and cultural heritage have nurtured a traditional architectural system that combines practicality and artistry. Porcelain inlay, one of the three unique decorative arts of Chaoshan architecture, is an important medium for embellishing buildings and conveying culture. As a national intangible cultural heritage, porcelain inlay uses broken porcelain shards as raw materials. Through processes such as cutting, polishing, inlaying, and shaping, these shards are attached to the roof ridges, eaves, screen walls, and gate towers of traditional buildings, forming magnificent, durable decorative landscapes. Their colors remain vibrant even after weathering, becoming one of the most recognizable visual identifiers of traditional Chaozhou architecture.

Color is the soul of ceramic inlay decoration. Deeply rooted in Chaozhou's regional culture, craftsmanship, and folk beliefs, it not only conforms to the overall form of traditional architecture but also reflects the aesthetic pursuits of the Chaoshan people. Existing research largely focuses on the techniques, themes, and historical context of ceramic inlay. Still, it lacks a systematic analysis of its color system, especially in-depth research on the relationships between colors, the connection between traditional architectural context, and regional culture. This research gap is important because color in architectural decoration is not merely an optical or aesthetic

phenomenon. It can also function as a culturally situated visual resource. Previous studies have shown that color may carry social, emotional, and symbolic meanings, and that such meanings are strongly affected by cultural context, spatial setting, and viewers' interpretive experience (Elliot & Maier, 2014; Palmer & Schloss, 2010). In visual communication studies, color has also been discussed as a semiotic mode that participates in the culturally located making of signs through hue, saturation, brightness, purity, modulation, and contrast (Kress & van Leeuwen, 2002). Therefore, the color system of Chaozhou porcelain inlay deserves analysis not only as a decorative feature, but also as a structured visual language embedded in architectural space and regional cultural memory. Therefore, this paper focuses on the colors of ceramic inlay decoration in traditional Chaozhou architecture, outlining its color characteristics, analyzing its formation mechanism and cultural connotations, and providing theoretical support for the inheritance and innovation of color in traditional architectural decorative art.

To make the color analysis more verifiable, extracted colors were recorded not only through descriptive categories but also through digital color values. Representative colors were documented in RGB, HEX, HSV, and CIE L* a* b* formats. The CIE colorimetry framework provides a standardized basis for describing lightness, chromatic attributes, and color differences (Carter et al., 2018). Therefore, the recurring claim of "high saturation" is examined through measurable HSV saturation and CIE chroma values rather than through visual impression alone.

Research methods and theoretical framework

This study adopts a comprehensive research approach that integrates literature review, field investigation, and in-depth interviews to examine the color characteristics and cultural connotations of ceramic inlay decoration in traditional Chaozhou architecture.

First, a literature review was conducted to systematically examine the historical development, material sources, decorative themes, and existing color-related studies of Chaozhou ceramic inlay art. Particular attention was given to historical records of Chaozhou arts and crafts, archives of intangible cultural heritage, and scholarly literature on architectural decorative color, thereby establishing a historical and theoretical foundation for the research.

Second, field investigations were carried out in Chaozhou and its surrounding areas, focusing on well-preserved examples of traditional architecture, including ancestral halls, temples, and traditional residential buildings. Through on-site photography, color observation, and architectural component analysis, the study documented and summarized the color composition, spatial distribution, and organizational patterns of ceramic inlay decorations.

In addition, to further explore the cultural logic underlying color selection, semi-structured in-depth interviews were conducted with national- and provincial-level inheritors of ceramic inlay craftsmanship, practicing artisans, and local cultural researchers. The interviews focused on topics such as material selection, color preferences, symbolic meanings, and craft transmission, providing cultural insights that could not be fully revealed through literature review and field observation alone.

Theoretical framework

This study adopts Color Symbolism Theory and Semiotics as its primary analytical frameworks.

Color Symbolism Theory posits that color is not merely a visual phenomenon but also an important carrier of cultural meaning. Within different cultural contexts, colors are endowed with specific social values, emotional associations, and symbolic connotations, which gradually develop into stable forms of cultural identity through long-term social practices. In Chaozhou ceramic inlay decoration, colors such as red, yellow, cyan, and blue have acquired relatively fixed symbolic meanings through the combined influence of local beliefs, clan culture, and traditional aesthetic values.

In addition, this study draws upon the semiotic perspective of the French theorist Roland Barthes, viewing the colors employed in ceramic inlay decoration as a visual sign system. Within this framework, color functions as the signifier, while the associated cultural meanings—such as auspiciousness, prosperity, sacredness, and social order—constitute the signified. Through their repeated appearance in ancestral halls, temples, and traditional dwellings, these color signs gradually evolve into a cultural symbolic

system that embodies regional identity and collective cultural memory.

Field survey and color extraction

To enhance the objectivity and reproducibility of the color analysis, this study employs a digital image analysis approach to extract, classify, and statistically analyze the colors used in ceramic inlay decorations of traditional Chaozhou architecture. The overall research procedure is illustrated in Figure 2.

First, during the field investigation, photographic documentation was conducted on ceramic inlay decorations found in representative ancestral halls, temples, and traditional residential buildings in the Chaozhou region. To minimize the influence of lighting variations on color identification, all photographs were captured under natural daylight conditions, and the original image files were retained for subsequent analysis.

Second, the dominant colors within the collected images were extracted using Adobe Color, from which representative color samples were selected. Adobe Color is capable of automatically identifying the principal color combinations within an image, thereby reducing the subjective bias associated with manual color selection.

Subsequently, the extracted colors were recorded as RGB (Red–Green–Blue) values and compiled into a color database. RGB data not only provide an accurate representation of color characteristics but also serve as the basis for subsequent quantitative analysis. The extracted colors were further classified and coded according to the Natural Color System (NCS). As a color description system based on human visual perception, NCS is widely applied in architectural color research and environmental design studies. In this study, ceramic inlay colors were identified and categorized primarily according to three dimensions: hue, chromaticness, and blackness.



Figure 1 Fieldwork interviews: A semi-structured interview with a local cultural researcher

Following NCS coding, statistical analyses were conducted to examine the frequency, proportional distribution, and saturation characteristics of different color categories, with the aim of identifying the overall patterns of the Chaozhou ceramic inlay color system. By comparing the chromaticness levels of different colors,

the study further verified the high- saturation characteristics of the dominant color palette.

Finally, the statistical results were interpreted through the theoretical lenses of Semiotics and Color Symbolism Theory, exploring how colors gradually transcend their material attributes to become cultural symbols and participate in the construction of regional cultural identity.

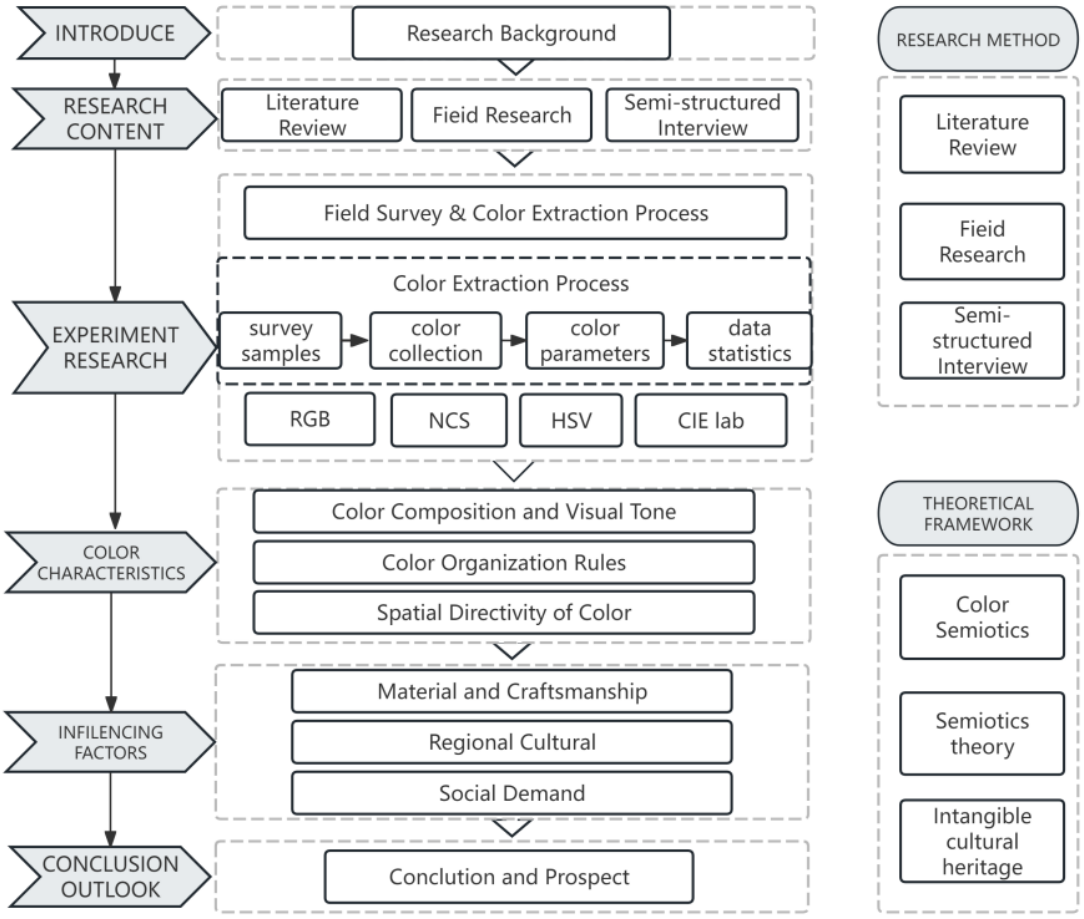


Figure 2 Research analysis process and research objectives



Figure 3 Statistics of survey cases and color samples

To ensure the representativeness of the sample, this study selected typical examples of ancestral halls, temples, and traditional residential buildings in the Chaozhou region as investigation sites. Through on-site photographic documentation, a total of 200 images of architectural decorations were collected, from which

200 valid color samples were extracted for subsequent RGB recording, NCS coding, and saturation analysis. The selected cases encompass different architectural typologies and are therefore capable of providing a comprehensive representation of the color characteristics of ceramic inlay decoration in traditional Chaozhou architecture.

Table 1 Statistics of survey cases and color samples

Survey object	Building type	Survey date	Number of color samples
Jilue Huang Ancestral Hall	Ancestral Hall	2025.04	50
Congxi Ancestral Hall	Ancestral Hall	2025.04	40
Longhu Ancient Village	Residential Complex	2025.04	60
Kaiyuan Temple	Temple	2025.04	50
Total	—	—	**200**

Table 2 Statistics of main colors in Chaozhou porcelain inlay

Color category	RGB	NCS coding	Chromaticness	Blackness	Hue	Color saturation
Red	210,45,38	S0580-Y90R	80	5	Y90R	82%
Yellow	232,184,35	S0570-Y	70	5	Y	79%
Cyan	56,128,120	S3050-B70G	60	30	B70G	68%
Blue	43,88,176	S3060-R80B	50	30	R80B	71%
White	245,245,240	S0500-N	0	5	Neutral	0
Black	35,35,35	S9000-N	0	90	Neutral	0

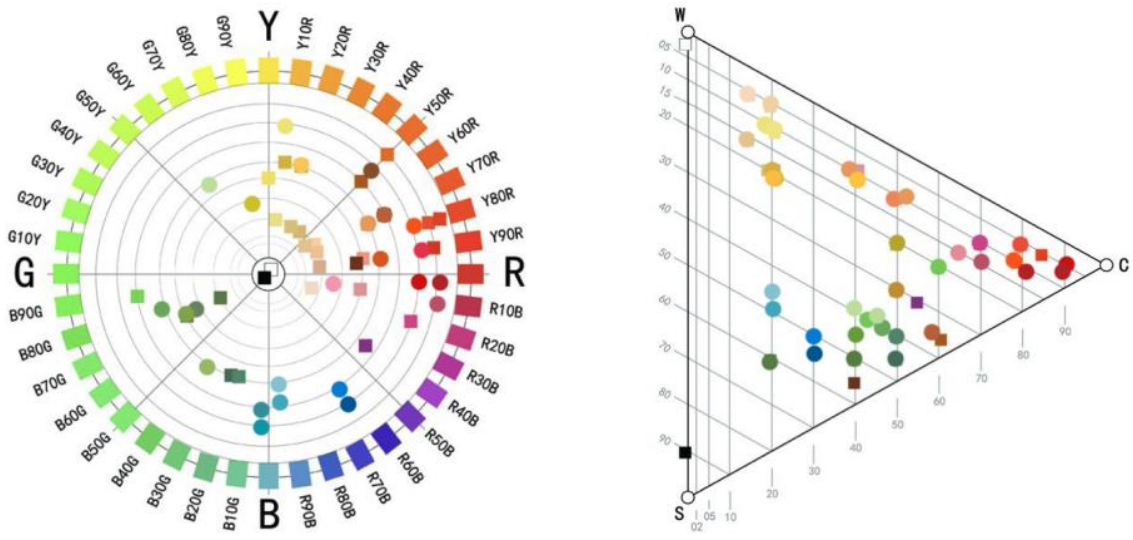


Figure 4 The position of colors in the NCS system

The average saturation value of the extracted ceramic-inlay colors was 75.3%, significantly higher than the average saturation level of conventional architectural façade colors. Based on NCS classification, the dominant colors of Chaozhou ceramic inlay decoration can be categorized into six major groups: red, yellow, cyan, blue, white and black. Among them, red and yellow exhibit the highest chromaticness values and constitute the primary visual tones of the decoration system.

Color characteristics of Chaozhou porcelain-inlay decoration

Based on the RGB extraction and NCS classification results obtained through the methodology described in Section 2.3, six dominant color categories were identified in Chaozhou ceramic inlay decoration. The color system of Chaozhou inlaid porcelain decoration is a stable visual system that gradually formed under specific historical, material, and regional cultural conditions. Compared with traditional architectural decorations in other regions, its colors exhibit high saturation, strong contrast, and a high degree of order. This color system is not simply the result of aesthetic choices, but rather serves the symbolic expression and spatial identification function of architectural decoration through the synergistic effect of color composition, organization, and spatial distribution. Specifically, its color characteristics can be analyzed from the following three levels:

Color composition and visual tone: The material basis of high-saturation colors

According to the statistical results of the 200 color samples, red and yellow account for 55.3% of the total, forming the dominant color palette of Chaozhou ceramic inlay decoration. Blue and cyan constitute 33.2% of the samples, serving as important auxiliary colors that contribute to visual balance and chromatic contrast within the overall decorative composition. From a color composition perspective, Chaozhou inlaid porcelain decoration primarily uses fragments of Ming and Qing dynasty polychrome, famille rose, and blue-and-white porcelain as raw materials. Its color system is composed of several dominant colors, including red, yellow, cyan, blue, white, and black. Red and yellow form the core hues in the overall visual effect, while cyan and blue-and-white serve as important superb color complements. White and black play auxiliary roles in transition, outlining, and structural reinforcement.

The most significant characteristic of this color composition is its generally high saturation. This high saturation stems from the physical properties of the porcelain glaze itself— the glaze layer, after high-temperature firing, has a stable color, high brightness, and is not prone to fading. It is also closely related to the technique of inlaying porcelain using fragmented porcelain pieces. The process of cutting and reassembling these fragments strengthens the contrast between color blocks, presenting colors on the building surface in a more direct and intense way.

In terms of overall visual effect, high-saturation colors establish a distinct and focused visual tone for Chaozhou inlaid porcelain decoration. This fundamental tone not only makes inlaid porcelain highly recognizable within traditional architectural complexes but also provides a clear prerequisite for subsequent color organization and spatial configuration.

Generally speaking, Chaozhou inlaid porcelain decoration typically employs highly saturated glaze colors. This stems from the high purity and stability of the porcelain glaze, and also aligns with the passionate and unrestrained aesthetic preferences of the Chaoshan people. This distinguishes the color style of Chaozhou inlaid porcelain from architectural decorations in other regions, making it a unique color identifier.

From the perspective of Color Symbolism Theory, highly saturated colors not only produce strong visual stimulation but also serve as important vehicles for the expression of cultural meaning. Through long-term and repeated use, red and yellow have gradually acquired symbolic associations with auspiciousness, prosperity, and authority. As a result, these colors transcend their physical and material properties and become visual symbols endowed with functions of cultural encoding and cultural communication.

Color organization: Formal principles of warm and cold colors, solid-void relationship and symmetry

The color scheme of Chaozhou porcelain inlay decoration strictly follows the principles of symmetrical balance and solid-void correspondence, which conforms to the symmetrical layout of traditional architecture as well as the harmonious ideal of Chinese aesthetics, and is mainly reflected in two aspects.

First, symmetrical color arrangement in the overall layout. Traditional Chaozhou architecture mostly adopts an axially symmetrical layout. As an extension of the architecture, the color matching of porcelain inlay also abides by this rule: the colors of porcelain inlays on both sides of the roof ridge and at the ends of eave corners remain symmetrical. For instance, if red is used as the dominant hue on the left, red is correspondingly adopted on the right to ensure visual balance of the whole

building. Such symmetrical coloring not only strengthens the solemnity of the architecture but also implies the Chaoshan people's values of moderation and harmony.



Figure 5 Porcelain inlay decoration of Tianhou Temple on Phoenix Islet, Chaozhou

Second, porcelain inlay decoration usually takes warm colors such as red and yellow as the dominant hues to highlight core symbolic images including figures and auspicious beasts. Bright and saturated red, mostly taken from solid-red ceramic shards, is commonly applied to key parts such as figures' costumes, flower petals and auspicious beasts' scales, occupying the visual focus. Bright and noble yellow, mostly selected from lemon yellow and orange yellow ceramic shards, is often used for pattern borders, auspicious beasts' bodies and pattern backgrounds, enhancing the luxurious sense of decoration.



Figure 6 Mythological figures, lions、flower

Among cold colors, cyan and blue-and-white blue are used to balance the intensity of warm colors and also appear in the decoration of winged auspicious beasts such as dragons and peacocks, as well as in landscape patterns, cloud motifs and figures' clothing lines, adding an elegant and refined quality. White mostly serves as a blank-leaving or transitional color for outlining contours and filling gaps, improving color layers. Black is mainly used for line drawing to strengthen modeling contours and enhance the distinguishability of colors and forms, balancing the intense stimulation of warm colors by lowering the visual temperature. Such a complementary arrangement of warm and cold colors keeps the overall composition moderate in passion and unified in contrast.



Figure 7 Phoenix and dragon

Third, in the treatment of the relationship between the real and the void, the colors of porcelain inlay display a clear hierarchical structure. Highly saturated warm colors are mostly used for the " real image" elements, namely the primary objects on which the viewer's gaze is focused, whereas cool or neutral colors serve as the "void image," being applied to background rendering or spatial transitions. In this way, primary and secondary relationships can be clearly distinguished within a limited decorative space. This differentiation between the real and the void not only enhances the visual layering of the image, but also effectively guides the viewer's sequence of observation.

In addition, traditional Chaozhou architecture generally adopts an axially symmetrical spatial form, and the color arrangement of porcelain inlay decoration also closely conforms to this structure. Symmetrical architectural components, such as roof ridges and eave corners, maintain consistency in hue selection and color proportion, making color an extension of architectural order rather than an independently existing decorative element. Through the combined operation of multiple principles— including warm versus cool tones, the differentiation of the real and the void, and symmetry— Chaozhou porcelain inlay decoration has developed a chromatic formal system that preserves a strong sense of order even amid vivid contrasts.

Chaozhou porcelain inlay decoration features a clearly layered and sharply contrasting color system, dominated by highly saturated warm colors (red and yellow), harmonized by cold colors (cyan and blue) and neutral colors (white and black). These principal colors complement each other, presenting a color scheme akin to the "Five Elements and Five Colors" in traditional Chinese culture. Its characteristics of harmonious contrast and balanced warmth and coldness highlight the Chaoshan people's aesthetic interest of "celebrating joy and vitality while pursuing moderation and harmony".

According to Semiotic Theory, the contrast between warm and cool colors, the interplay of solid and void elements, and the symmetrical arrangement of colors not only constitute visual forms but also serve as mechanisms for communicating cultural order. Through the repeated application of specific color structures, viewers are able to recognize hierarchical relationships and ritualized spatial order within architectural spaces, thereby facilitating the effective transmission of symbolic meanings embedded in the color system.

Spatial directivity of color: Adaptation to regional environment and enhanced spatial identification

In traditional Chinese culture, color is not merely an objective optical and visual effect, but has been endowed with abundant subjective humanistic and emotional implications, endowing it with a strong and far-reaching symbolic attribute (Wang, 2018). The color selection and collocation of Chaozhou porcelain inlay decorations possess distinct regional adaptability. They not only satisfy the requirement for decorative durability under the climatic conditions of eastern Guangdong, but also realize the visual identification function of architecture in the regional environment, representing

the integration of practical rationality and aesthetic pursuit.

The highly saturated hues used in porcelain inlay are mostly glazed with highly stable metal oxides. These components hardly undergo chemical reactions in the natural environment and can retain their bright luster even after decades or even centuries of weathering. This thoroughly solves the pain point of traditional decorative materials— "easy to damage, difficult to last" — and ensures the long- term ornamental and practical values of architectural decoration, reflecting the craftsmen's optimal choice of materials and colors based on regional climatic features.

Meanwhile, the collocation of highly saturated hues creates a strong visual contrast against the dense Lingnan vegetation, improving the identifiability of the architecture. Traditional Chaozhou dwellings are mostly located in villages, and the bright colors of roof porcelain inlays enable buildings to stand out in the settlement. This not only manifests the family's status and strength, but also forms a unique village landscape, becoming a visual symbol of regional architectural culture. It thoroughly solves the problem of insufficient weather resistance of traditional architectural decorations.

The color selection of Chaozhou porcelain inlay fully takes into account the Lingnan climate and environment. Bright and durable glazes are adopted to tackle the poor weather resistance of traditional architectural decorations. Highly saturated hues form a sharp contrast against the lush southern green plants, making porcelain inlay buildings recognizable from a distance and serving as a visual symbol of local landscapes. The distribution of colors in architectural components has a clear functional division: warm tones are mostly used for animals and plants above the ground, such as lions and flowers, while cold tones are mainly applied to flying creatures such as dragons and phoenixes. Generally, striking warm colors including red and yellow are mostly used for roof ridges, cornices and other upper architectural parts, as well as for auspicious mascot motifs. Cold colors such as cyan, green and blue- and- white blue are employed as backgrounds or secondary details for filling. This color scheme inherits the traditional Chaoshan aesthetic features of strong contrast and grandeur on the one hand, and defines the architectural hierarchy in practical function on the other, making the main images more prominent. Overall, the regional adaptation of Chaozhou porcelain inlay colors not only guarantees long-lasting brightness, but also strengthens the identifiability and cultural connotation of architecture through rational spatial distribution.

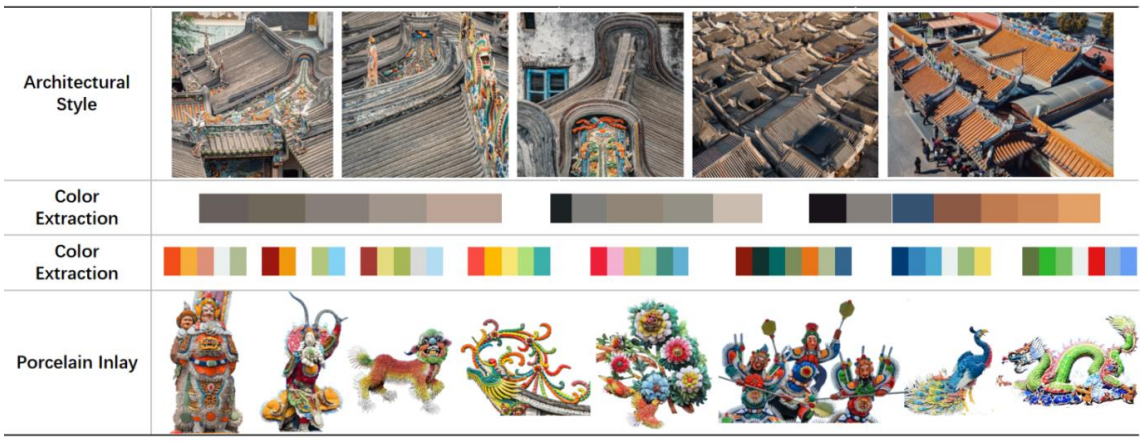


Figure 8 Extracted comparison between architectural appearance colors and Chaozhou porcelain-inlay colors

Furthermore, the color distribution of Chaozhou porcelain inlay features obvious component zoning and spatial stratification, reflecting the corresponding relationship of position–rank–theme. High and more symbolic parts such as roof ridges, eave corners and cornices usually adopt more striking warm colors to highlight the visual center, while secondary components or background areas mostly use cold and neutral colors

for foiling and transition, thus forming a hierarchical organization of high solid and low void (Chaozhou Arts and Crafts Research Institute, 2019). At the thematic level, warm colors are often applied to animal and plant images such as lions and flowers to strengthen their subjectivity, whereas cold colors are mostly used for the background and balancing of flying auspicious beasts and cloud patterns, thereby establishing a consistent visual order between theme emphasis– hierarchical organization–viewing guidance. This multi-level color structure not only embodies the artistic idea of complementation between warm and cold colors and combination of light and shade (Li, 2021), but also adapts to the climate of the Chaoshan region featuring "long sunshine, high temperature and heavy rainfall": the highly saturated glazes contain stable metal oxides, which resist wind, rain and sun exposure and maintain bright luster over a long period.

In summary, the regional adaptation of colors in Chaozhou porcelain inlay is not limited to material selection for weather resistance, but further represents an expressive strategy of organizing spatial order through colors. By means of the contrast and hierarchical distribution of highly saturated colors, porcelain inlay enhances architectural identifiability while achieving the visual presentation of spatial structure. Through long-term repeated application, it has been solidified into an important visual representation of local cultural identity. From the perspective of heritage landscape studies, color not only shapes the visual appearance of architecture but also constitutes an important component of local landscape memory. Through long-term and repeated application, the highly saturated colors of ceramic inlay decoration have gradually become one of the most distinctive visual identifiers of traditional Chaozhou settlements, contributing to the construction and reinforcement of local cultural identity.

Factors shaping the color system of Chaozhou porcelain-inlay decoration

The formation of the color system for Chaozhou porcelain inlay decoration is the result of the combined effects of material properties, craftsmanship inheritance, regional culture and social demands. Behind its color selection and collocation lie profound historical deposits and humanistic logic. Specifically, the development of porcelain inlay colors is influenced by the following three aspects.

Material and craftsmanship factors

The Chaoshan region features a typical south subtropical monsoon climate, with an annual average temperature of 21℃-23℃, annual precipitation as high as 1,600-2,000 mm, and lies in the Pacific typhoon belt, suffering 3-5 typhoon landfalls or influences every year. The climate of high temperature, high humidity, heavy rainfall and strong wind imposes stringent requirements on the durability of architectural decorations (Wan, et al.,2025).

Painted decorations in traditional architecture mostly adopt plant pigments or mineral pigments with low weather resistance, which are prone to oxidation and mildew in high- temperature and humid environments, and usually fade and become mottled within 3-5 years. Clay sculptures, due to the strong water absorption of clay materials, tend to soften, crack or even fall off after long-term rain erosion, making it difficult to maintain long-term decorative effects.

The concrete presentation of porcelain inlay decorative colors is deeply restricted by the properties of raw materials and production techniques, which constitutes the core material premise for the formation of its color system. The raw materials of Chaozhou porcelain inlay mainly come from broken ceramic shards produced since the Ming and Qing dynasties, including wucai porcelain, famille rose porcelain, blue-and-white porcelain and other porcelains from official or private kilns. From the perspective of material culture, porcelain fragments should not be regarded as passive decorative materials. Their glaze, surface gloss, hardness, texture, and reflective quality actively shape the visual effect and cultural meaning of the final decoration. Material culture studies emphasize that objects and materials participate in the production of social meanings rather than merely carrying meanings imposed from outside (Miller, 2005). In the case of Chaozhou porcelain inlay, the material properties of glazed porcelain provide not only durability and brightness, but also the technical basis through which color becomes visible, repeatable, and symbolically stable. The types and textures of the glaze colors of these shards directly determine the color range available for porcelain inlay.

The Chaozhou ceramic industry prospered in the Ming and Qing dynasties. Numerous kilns produced ceramic shards with bright colors and full glazes, providing a rich variety of color materials for porcelain inlay. The easy cutting and pasting of ceramic shards also enabled craftsmen to flexibly select shards of desired colors and accurately match pattern colorways that met aesthetic requirements.

From a technological perspective, processes such as ceramic cutting, inlaying and mortar shaping of porcelain inlay have a crucial impact on color effects. The craft process also shows that color formation is inseparable from making. Ingold (2013) argues that making is a process through which practitioners think through materials rather than simply impose a pre-existing form on passive matter. Similarly, porcelain-inlay craftsmen select, cut, combine, and position ceramic shards according to motif structure, surface curvature, light reflection, visual hierarchy, and architectural placement. As a result, the color effect of Chaozhou porcelain inlay is produced through the interaction of material properties, craft judgment, bodily skill, and spatial context. Craftsmen need to cut and combine ceramic shards according to the design, and create three- dimensional shapes through layered inlaying. The overlapping and matching of colors must take into account both the three-dimensional sense of the shape and visual aesthetics, which endows porcelain inlay colors with distinct layers and coordinated contrasts.



Figure 9 Colors and shapes of porcelain fragments

Regional cultural factors

Chaoshan regional culture is the core driving force behind the color selection of porcelain inlay decoration. Its color scheme is deeply integrated with the folk beliefs, ethical values and aesthetic pursuits of the Chaoshan people, presenting distinct ritualistic characteristics. The Chaoshan people uphold a life ideal that values auspiciousness and joy, and the wide use of warm colors such as red and yellow is a direct expression of this wish-fulfilling psychology. Red symbolizes festivity, loyalty and family prosperity; yellow stands for nobility, good fortune and peace. Their combination not only satisfies the spiritual need for folk blessing, but also reflects the passionate and open-minded life attitude of the Chaoshan people. As an important color supporting warm tones, green symbolizes vitality and auspiciousness. It is mostly applied to flower leaves, ornaments of auspicious beasts and other parts, implying the Chaoshan people' s reverence for nature and cherishment of life.

The integration of Central Plains culture and local culture also shapes the color choice of porcelain inlay. As a major settlement for Han people migrating south from the Central Plains, Chaoshan inherits the hierarchical and aesthetic concepts of Central Plains culture through colors. The noble implication of yellow derives from the imperial culture of the Central Plains, which, after local adaptation, has become a decorative hue for ordinary residences and ancestral halls, reflecting the fusion and evolution of culture. Meanwhile, the Chaoshan people integrate the cultures of Confucianism, Buddhism and Taoism. The application of cold colors such as cyan and white embodies the Taoist thought of "pure tranquility and non-action" and the Confucian "Doctrine of the Mean", forming a unique color aesthetic.

Color	Example	Picture	Application Locations	Functional Positioning
RED			• Figure Costumes, • Flower Petals, • Scales of Auspicious Beasts	Visual Focus; symbolizes celebration, loyalty and righteousness, and family prosperity
YELLOW			• Pattern Borders, • Bodies of Auspicious Beasts, • Pattern Backgrounds	Enhances magnificence; symbolizes dignity, auspiciousness, and peace and smoothness
GREEN			• Flying Auspicious Beasts (Dragons, Peacocks), • Landscape Patterns	Balances the intensity of warm tones; adds an elegant and refined texture
BULE			• Cloud Patterns, • Clothing Folds of Figures, • Decorative Borders	Harmonizes color rhythm; aligns with the elegant philosophy of Confucianism and Taoism
WHITE			• Contour Outlining, • Gap Filling, • Color Transition	Enhances layering; achieves natural color connection
BLACK			• Line Outlining, • Shape Enhancement	Improves contour recognition; stabilizes the visual effect of colors

Figure 10 Application locations of colors and functional positioning

Social demand factors

Changes in social structure and living demands have driven the evolution and improvement of colors in porcelain inlay decoration, endowing it with distinct identity characteristics. During the Ming and Qing dynasties, the clan system flourished in Chaoshan. As the core venue for clan sacrifices and meetings, ancestral halls became the main carrier of porcelain inlay decoration. In this period, the color scheme of porcelain inlay was more solemn and magnificent, mainly using red and yellow as the dominant hues, matched with auxiliary colors such as blue-and-white blue and cyan. The splendor of colors highlighted the status and glory of the clan and strengthened clan cohesion. By contrast, porcelain inlay decorations on ordinary residences were relatively simple, with practical and festive color schemes, mostly adopting a single highly saturated dominant hue to avoid excessive luxury, which reflected the social structure of "hierarchical order" (Wang, 2020).

Since modern times, with the constant iteration of social aesthetic concepts, the colors of porcelain inlay decoration have gradually become diversified. In addition to traditional mainstream colors, craftsmen have begun to introduce light-toned ceramic shards, making the color scheme fresher and more elegant to adapt to modern aesthetic needs. Meanwhile, the application scenarios of porcelain inlay decoration have been continuously expanded, from traditional architecture to cultural and creative products and public spaces. The color matching has also become more flexible, retaining traditional color genes while integrating modern design concepts, thus realizing the integration of tradition and modernity.

From the perspective of heritage studies, cultural heritage encompasses not only tangible entities but also the symbolic meanings collectively recognized and constructed by social groups. Through long-term visual dissemination and repeated cultural reproduction, the colors of Chaozhou ceramic inlay decoration have contributed to the formation of collective memory and have become an important component of local cultural identity. Consequently, they possess significant heritage value and play a vital role in fostering cultural identification and community cohesion.

Cultural mechanism construction of Chaozhou porcelain inlay decoration

Transformation mechanism from decorative colors to cultural symbols

According to Barthes (1977), a visual symbol consists of a signifier and a signified. In Chaozhou ceramic inlay decoration, color functions as the signifier, while concepts such as auspiciousness, prosperity and sacredness constitute the signified. Through repeated use in architectural decoration, these color signs gradually become stable cultural symbols.

Chaozhou porcelain inlay colors are deeply symbolic, carrying meanings that transcend mere decoration. For example, red and yellow are commonly used to symbolize festivity, wealth, and good fortune, while cooler tones like cyan and blue are used to suggest tranquility and auspiciousness. These colors align with the Chaoshan people's values and belief systems, which are influenced by Confucianism, Buddhism, and Taoism. The use of specific colors in specific architectural elements, such as the prominent use of warm colors on roof ridges or auspicious beasts, serves to reinforce cultural narratives and spatial hierarchies within the architectural layout. The spread of Chaozhou porcelain inlay colors is first reflected within the regional culture: in ancestral halls, temples, dwellings and other places across Chaoshan, the generations-old sacrificial and folk activities have tightly bound colors such as red, yellow, blue and green to the implications of festivity, wealth, honor and good fortune, strengthening ethnic identity and local spirit.

The symbolic interpretation of porcelain- inlay colors can be strengthened through visual semiotics. Kress and van Leeuwen (2002) argue that color can function as a semiotic resource when it is used in culturally patterned ways. In Chaozhou porcelain inlay, red, yellow, green/ cyan, blue, white, and black may therefore be understood as visual signifiers. Their meanings are not determined by hue alone, but by their repeated association with specific motifs, architectural components, ritual practices, and local cultural memory.

From the analysis of the color characteristics and forming factors of Chaozhou porcelain inlay decoration, it can be found that porcelain inlay colors have gone beyond the simple material attributes and aesthetic category, and gradually evolved into a stable and identifiable cultural symbol system. The dominant colors such as red, yellow, cyan and blue-and-white blue have been endowed with clear and fixed symbolic meanings through long-term repeated use, and have been strengthened and solidified through architectural decoration as a public visual medium.

Color meaning should not be treated as universal or fixed. Psychological and perceptual studies suggest that color preferences and color meanings are shaped by experience, affect, ecological association, and context (Elliot & Maier, 2014; Palmer & Schloss, 2010). Therefore, the meanings of porcelain-inlay colors should be interpreted in relation to Chaoshan folk beliefs, temple worship, ancestral rituals, architectural hierarchy, and regional aesthetic traditions. In this sense, red and yellow do not simply appear as bright colors; they become culturally meaningful through repeated use in festive, ritual, and auspicious visual contexts.

Among them, red and yellow have visual advantages not only because of their high saturation, but also because they symbolize festivity, nobility and blessing in folk beliefs, making them the most representative symbolic colors in Chaozhou porcelain inlay. The repeated appearance of cold colors such as cyan and blue-and-white blue on auspicious beasts, cloud patterns and high-altitude components has gradually associated them with imagery such as "ascension", "transcendence" and "sanctity". This stable correspondence between colors and meanings enables porcelain inlay decoration to convey cultural information without relying on written explanations.

From the perspective of visual grammar, images communicate meaning through the interaction of composition, salience, framing, modality, and spatial organization (Kress & van Leeuwen, 2021). This is particularly relevant to Chaozhou porcelain inlay because its color meanings are produced not only by individual hues, but also by color contrast, saturation, material surface, motif arrangement, and architectural location. Therefore, the transformation from decorative color to cultural symbol depends on the combined operation of hue, material, craft, motif, space, and ritual context.

Spatial order and symbolic communication of color

Color symbols of porcelain inlay are not randomly distributed, but are systematically presented based on the spatial structure of traditional architecture. The concentrated application of porcelain inlay colors on key components such as roof ridges, cornices and screen walls makes them an important part of the spatial order of architecture.

In this process, colors undertake a function similar to "spatial markers": highly saturated warm colors mark the core and symbolic parts of architecture, while cold and neutral colors form visual buffers and spatial transitions. Colors thus participate in the construction of architectural hierarchy, functional differentiation and

viewing paths, allowing viewers to unconsciously recognize the spatial structure and cultural significance of the building.

This spatial expression mode with colors as the medium makes Chaozhou porcelain inlay decoration not only decorate the surface of buildings, but also deeply intervene in the generation process of architectural spatial meaning.

The construction of local cultural identity

When porcelain inlay color symbols are used continuously and extensively in a specific region, their significance is no longer limited to a single building, but gradually expands into the common visual memory of the regional space. The densely distributed ancestral halls, temples and traditional dwellings in Chaozhou make highly saturated porcelain inlay colors one of the most identifiable visual elements in village landscapes.

In long-term daily life and ritual activities, residents constantly watch, use and identify these color symbols, and internalize them into emotional cognition of local culture and spatial environment. Therefore, porcelain inlay colors not only constitute the architectural decorative language, but also become an important medium connecting individual memory, ethnic culture and regional space, ultimately contributing to the unique spatial identity structure of Chaozhou traditional architecture.

Heritage safeguarding and cultural authenticity of porcelain-inlay colors

The heritage value of Chaozhou porcelain-inlay colors should not be understood only as the preservation of physical ceramic fragments or architectural surfaces. It also involves the safeguarding of craft knowledge, material selection, color-matching experience, ritual use, and cultural space. Studies of intangible heritage emphasize that heritage is not a fixed object from the past, but a dynamic process shaped by communities, practices, institutions, and cultural interpretation (Akagawa & Smith, 2018; Smith, 2006). From this perspective, the protection of porcelain-inlay colors should include both tangible architectural remains and the intangible knowledge systems that sustain their production, transmission, and cultural meaning.

At the same time, contemporary innovation in porcelain-inlay color design should be guided by the principle of cultural authenticity. Authenticity in heritage conservation is not limited to the physical originality of materials, but also involves cultural context, values, traditions, practices, and social meanings (Boccardi, 2019). Accordingly, future applications of Chaozhou porcelain-inlay colors should not simply reproduce traditional color forms mechanically. Instead, they should respect the relationship among material authenticity, craft practice, architectural order, and regional cultural identity. Only in this way can the color system of Chaozhou porcelain inlay maintain its cultural continuity while gaining new relevance in contemporary design and heritage practice.

Conclusion and prospect

In conclusion, Chaozhou porcelain inlay decoration has developed a distinct color system that combines the high-saturation tones of red, yellow, cyan, and blue to create a balanced, harmonious visual effect. This color system is not only aesthetically pleasing but also deeply symbolic, embodying the cultural identity of the Chaoshan region. The formation of this system is the result of a unique combination of material properties, craftsmanship, and regional culture. While this tradition has faced challenges in terms of inheritance and preservation, it continues to play a key role in expressing the cultural values of the Chaoshan people. In the future, efforts should be made to preserve and innovate this color system, ensuring that it remains relevant in contemporary architecture and design. Its color composition conforms to material properties and regional climate, its matching rules follow Chinese aesthetics and architectural forms, and its color selection embodies profound regional culture and folk beliefs, representing the unity of practicality, artistry and culture. As a decorative element of architecture, the colors of porcelain inlay are also visual symbols of Chaoshan regional culture, which record the aesthetic pursuit, ethical values and cultural changes of the Chaoshan people, and possess important academic research value and inheritance significance.

Based on literature research, field investigation and inductive analysis, this paper systematically reveals the color characteristics, formation mechanism and cultural value of Chaozhou porcelain inlay decoration, and draws the following core conclusions:

(1) Chaozhou porcelain inlay decoration has formed a color system featured by dominance of highly saturated warm colors, coordinated warm-cold contrast, symmetrical balance and regional adaptation. Its mainstream colors can be summarized into six categories: red, yellow, cyan, blue-and-white blue, white and black, which jointly constitute a color pattern of "unity of practicality and aesthetics".

(2) The formation of the porcelain inlay color system is the result of the dynamic interaction of material properties, regional culture and social demand: ceramic shard materials and production techniques form the material basis for color formation; regional culture and folk beliefs shape the spiritual core of colors; social structure and living demands dominate the functional orientation of colors. The deep coupling of the three contributes to the uniqueness of porcelain inlay colors.

(3) The colors of porcelain inlay decoration integrate aesthetic, cultural and academic values, serving as an important carrier and visual symbol of Chaoshan regional culture. However, it is currently confronted with inheritance dilemmas such as the shortage of traditional ceramic shard resources, the fault of inheritance subjects and inadequate protection mechanisms, so systematic measures are urgently needed to promote its living inheritance.

In response to the dilemmas in the inheritance of porcelain inlay colors, three aspects of work should be strengthened in the future:

First, strengthen the protection and sorting of traditional ceramic shard resources, and develop imitation ceramic shards with traditional textures to guarantee the material basis for color inheritance.

Second, intensify the training of inheritors, integrate color aesthetics and regional culture into inheritance education, improve the aesthetic ability and cultural literacy of young inheritors, and promote the innovative development of color matching.

Third, enhance the protection of traditional architecture and porcelain inlay decoration, record the color characteristics of porcelain inlay through digital technology, and promote the cross-border integration of porcelain inlay colors with modern design, so that traditional colors can be revitalized in contemporary society.

Declaration of generative AI in scientific writing

During the preparation of this manuscript, the authors used ChatGPT to assist with language editing, translation, grammar correction, and improvement of academic writing. The authors carefully reviewed and revised all AI- assisted outputs and accept full responsibility for the final content of the manuscript. Generative AI was not used to generate research data, conduct statistical analyses, interpret research findings, or develop the scientific conclusions presented in this study.

CRediT author statement

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