

Color Extraction and Replacement of Traditional Water Town Landscape Based on Visual Perception Theory—— Take Zhujia Village in Shijiu Lake, Lishui, Nanjing as an Example

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Abstract: Color is one of the important carriers in traditional village composition, which reflects the characteristic culture of village. It embodies the local attributes and characteristics of a village, carries the unique regional culture, and shapes the rural civilization. At the same time, the color of rural landscape also has strong regional characteristics, which is the external expression of rural landscape style, history and culture. This paper attempts to deeply interpret the color of rural landscape from the perspective of visual perception theory, focusing on the components of the color of traditional water towns. The thesis also extracts and designs the landscape colors of the traditional water village Zhujia Village, so as to build a traditional water village landscape integrating historical culture, fishing culture and multi-function. By analyzing the application of landscape colors in Zhujia Village, the thesis aims to create a beautiful and harmonious traditional water village habitat space.

Keywords: Visual perception; Traditional water town; Landscape color extraction; Jiuhuzhujia village; Zhujia Village in Shijiu Lake

1. Introduction

With the acceleration of rural revitalization, people are particularly picky about the display of characteristics in rural landscape construction. As an important link in the construction of rural landscape, color is indispensable to both the historical feelings brought by the inherent color of the village itself and the visual impact brought by the diverse local cultural colors, to jointly create a distinctive rural landscape. From the perspective of visual perception theory, it is necessary to explore the color activation process of rural landscape, which can not only improve the overall image of rural landscape, It is also an important manifestation of rural landscape design. After the full study of color narrative, this paper intervenes in the color research of rural landscape with its unique observation perspective, and through the methods of extraction and replacement, it makes active design research on the inherent rural landscape, telling the history, culture and future of the countryside with color.

2. Color cognition-water town landscape and color under the visual perception theory

2.1 Physiological visual cognition

The visual process is one of the most characteristic sensory ways used by everyone to understand the whole world, and it plays an irreplaceable role in the whole understanding process system. Generally speaking, the main components of the basic phenomena of physiological visual perception are composed of the first three visual elements: the eyes of an animal, the vision of other objects observed by it, and the external light perception. However, from the perspective of the evolution of human visual physiology, the whole physiological process of vision is to transmit the light perception of the world seen in the eyes to the human brain through the optic nerve, thus completing the whole physiological process of vision. Therefore, the specific evolution of visual activity is mainly related to the interaction of four special substances: human eyes, objects, light perception and the human brain. Visual physiology is a specialized physiological term that is fundamentally similar to the basic principles of how an optical camera works, with visual physiological outcomes generated and processes similar to the optical capture process of an optical camera. Light travels through the optic nerve to the

cerebral cortex, and presents an inverted shape on the retina through the principle of imaging, thus producing vision. From the optic nerve to the cerebral cortex, vision is produced.

2.2 psychological visual cognition

Gestalt psychology is an important school of psychology that emerged in Germany in the early 20th century. Gestalt psychology believes that one should recognize the overall characteristics of things and not concentrate on the local ones. The core idea of gestalt psychology is the integrity of behavior and psychology. Any “form” that appears in front of us has been visualized as a whole, forming a complete “form”. Therefore, Gestalt psychology, also known as “configuration psychology,” cannot be separated from the role of visual perception.[1]

The essential character of things in the objective external world as seen by man lies in the complex interplay between such objective external things and their own common features and transformations that exist with man and his actions as a human subject. However, seeing alone does not allow one to fully understand the nature of things. When this information is received by the retina, it is transmitted to the brain, thus producing complete cognition. Experiments show that a person who chooses a prominent sign on a relatively complex object may not be able to fully recognize the object, but the person can recall the complex object, thus obtaining complete images and memory.

2.3 Landscape features of traditional water Towns

2.3.1 Natural Landscape features

In the strict sense, “natural landscape” refers to a landscape that is mostly or completely undisturbed by human activity[2], such as landforms, climate, vegetation, rivers, lakes, etc. However, the landscape that we see now still has its basic structure from nature. To some extent, there are traces of human activities, and this landscape evolved from nature is called “natural landscape.” The natural landscape is characterized by a combination of four major factors: seasonal hydrology, terrain types and natural landforms, soil resources, and natural biodiversity. Its natural landscape features are relatively unique and prominent due to regional features, and the intertwined water systems constitute its unique natural geographical landscape. The natural landscape is the source of human landscape and the basic element of all natural landscape, which is unique and can not be reproduced.

2.3.2 Agricultural landscape features

Agricultural landscapes is a long-term social and economic activities that human beings transform nature to adapt to survival.[3] With the passage of time, the demand of human beings for land productivity is increasing. Human beings strive to improve the productivity of once developed land and the sustainable development of undeveloped areas and river basins. Different periods of agricultural development and different modes of agricultural production lead to different agricultural landscapes. Similarly, human beings can maintain themselves, develop and organize their own societies, and thus start the evolution of society again. The basic starting point of the idea is people’s idea of getting natural food. It is in the complex process of “adapting” to the ecological environment in which they live and “coping” with social changes that people of different regions and ethnic groups have gradually developed their own unique ways of thinking about access to natural food. The land use pattern is influenced by the productivity level in different historical periods, which formed the agricultural landscape characteristics in different periods.[4]

2.3.3 Human landscape features

Landscape features reflect the long-term interaction between man and nature. In the studies of geography, the characteristics of human landscape can be divided into two aspects: material and non-material aspects. The characteristics of material elements are often intuitively perceived by people, such as settlement patterns, the texture of streets and alleys, and the symbolic expression of decoration. While immaterial elements are expressed by clan culture, folk sentiment, social activities, and humanistic spirit. Humanistic landscape is a product of the combination of sociology and anthropology, which focuses on socio-economic and cultural activities and internal structures and relationships. Therefore, it involves a multi-level comprehensive system of natural resources, history, economic development, social culture and so on.

3. Color interpretation-the system and elements of water town color

3.1 Analysis of landscape color system

Generally speaking, the color of rural landscape is a combination of the colors displayed and perceived in the village space. The main manifestations of rural landscape color can be roughly divided into pure artificial natural landscape color and semi-artificial natural color. Natural color mainly refers to the use of natural materials to represent a color, including various types of natural entities such as mountains, water, fields, lakes, rocks, trees and plants, the sky and earth. Artificial color mainly refers to the landscape color artificially constructed or designed by means of technology or modern art, including the artificially created colors such as architecture, landscape street furniture, road paving, etc. In addition, the historical humanistic color is also the inevitable result of the way of social and cultural activities and folklore ideas carried out by the local village people, as well as their gradual evolution under the influence of historical religious and cultural ideas. It includes Chinese traditional etiquette culture, traditional religious festivals and customs, as well as various cultural activities with great commemorative significance and important places showing the color of national spirit. The humanistic colors is the intuitive embodiment of the unique characteristics of each ethnic village in China, and the direct reflection of the excellent cultural traditions and advanced aesthetic life concepts of the village residents in China.

3.2 Interpretation of the color elements of traditional water town landscape

China's southern region is extremely vast, and there are obvious climatic differences in the natural landscapes formed by different types of regions. Therefore, different villages have different rich natural colors. The unique landscape natural colors of Chinese traditional water towns is also reflected in the natural native vegetation of the mountains, the agricultural production environment landscape and the typical rural landscape. The focus of the natural vegetation as well as the farming production environment landscape is on plants. Plant elements have dynamic variability. For example, plants sprout in the spring, grow in the summer, bloom in the spring and bear fruit in the fall[6] with the change of seasons, which always affects the color of the water village. Natural landscape colors mainly include square greening, street greening, etc. Although the green occupies the main position in the natural landscape, the flowers and fruits of plants will show different colors according to the seasonal change, such as red rose, golden rape, pale pink cherry blossoms, etc. Agricultural production landscape mainly lies in the results of local farmers' cultivation, which is reflected in the crops planted in different seasons, resulting in the color changing with natural growth.

The rural landforms in traditional water towns mainly include mountains, waters, soils, and stones. The background of traditional water towns is usually mountains, and the color will be different according to the vegetation planted on the mountains. As one of the characteristics of traditional water towns, water will show different colors due to the influence of external materials, mainly grey-blue and sometimes blue or grey-green; The color of the soil is mainly different according to different regions. The soils in the south is usually red, while that in the north is mostly black and brown. The color of traditional water town landscape architecture is mainly determined by the regional environment, national traditions, history and culture. Take the traditional water town in the south of the Yangtze River as an example. The temperature in the south of the Yangtze River is high, and most of the buildings are white walls and black tiles. Referring to the traditional architecture in the south of the Yangtze River, most of the black, white and grey tones are elegant and beautiful; Contrary to the cold temperature in the north, the north is mostly made of grey brick and black tile, which is more magnificent. In the process of historical changes, traditional water town has also bred its unique historical and cultural landscapes, such as folk ceremonies and traditional costumes. Based on its unique folk traditions, traditional water towns form their own folk colors and express daily public life. Over time, they have become the psychological needs of local residents, evolving into spiritual beliefs, and have been handed down to the present. So different villages will form different folk customs. For example, in folk ceremonies, most of the colors are red elements to express blessing or yellow elements to symbolize noble status.

3.3 Color design features of traditional water towns

The traditional water town culture bears unique national memory and is a kind of non-renewable cultural heritage. As a traditional village, its traditional culture is an indispensable part of the design.

The traditional culture of a village has a place in the color extraction. From the traditional culture lineage, we can see the history of changes in the village and the unique historical and humanistic heritage formed in the process of development, so that we can extract the corresponding color palette. As a typical land of fish and rice in China, water towns in the south of the Yangtze River have formed their own unique features. First of all, in terms of the architectural style of water towns, most of them adopt elegant and simple practical white walls and black tiles, and the building wood used is mainly light brown-red logs; Secondly, the geographical environment of the water towns is mostly rivers and pond, and there are many modern water town architectural street furniture with regional characteristics, such as docks, water lanes and stone trestles, which are mostly paved with blue bricks; Finally, as a major feature of traditional water towns, fishing culture has nurtured generations of water town people and formed a unique cultural industry. The formation and evolution of rural spatial forms is the result of internal and external factors.[5] The most important feature of China's traditional pattern of water towns is the water system. Areas near water towns rich in natural water resources can often form large-scale residential areas first. The second, traffic affects residents' daily lives. Generally speaking, the distance of roads also affects the spatial patterns. Finally, it's the culture. Traditional villages mostly follow the geomantic omen and have unique village landscapes. Generally speaking, traditional village space is also influenced by clan factors, resulting in clan-driven village space creation.

4. Color extraction - the composition factor of traditional water town color

4.1 Color extraction of natural landscapes

The color of the traditional natural landscape of water towns is an intuitive feeling under visual perception. Through the full study of the natural colors of traditional water towns and the color extraction and implantation, the color extraction strategy of traditional water towns landscape is established, which integrates the human settlements landscape and the natural environment. At the same time, CMYK mode is used to extract and analyze the color of the traditional water town landscape, and the colors is applied to the roofs, streets, walls and other blocks of the water town. The architectural color of traditional folk houses in water towns is mainly shown in the form of sloping roofs, which naturally change with the ups and downs of the surrounding mountain terrain. The grey glazed tile roof and the black tile and white walls naturally form a space like undulating mountains. Another feature of the traditional water town architecture is the contrast between the white Ma Tau wall painted with white lime and the outer wall of black brick. This contrast complements turquoise and clear valley river, which makes people feel that the whole building can form a harmonious and unified architectural color with human beings and natural space at the same time, presenting another kind of more peaceful and natural architectural environment. Take the Nanjing Zhujia Village residential complex as an example, the layers of houses are staggered and overlapping on the buildings and roof tiles. The beauty of scattered rural buildings symbolizes the undulating heights of the mountains. Below the mountains, the turquoise water of the lake flows quietly. The reflection of the mountains and the water is another natural beauty in which people live in harmony with nature.

4.2 Color extraction of human landscape

The cultural landscape features of Chinese traditional water towns are mainly embodied in two important aspects. First, it reflects the color of Chinese traditional water town street. Under the social development environment of Chinese traditional water town culture, stretch and narrowness are the biggest landscape feature running through the streets of traditional water towns. The two sides of the street pavement are more of the whole natural stone pavement directly paved (Figure 1, Figure 2), maintaining the overall harmony between the original Chinese traditional folk alley architecture and the harmony between nature and simplicity. Each of the traditional water town's alleys and streets has undergone natural weathering and wear and tear over the years, leaving behind a variety of mottled historical traces. This is a traditional water town street that symbolizes a long history and development, and it is also a mark left by the passage of time as a city. The second one is the ancient bridge in the traditional folk houses in water towns. Under the precipitation of history, the ancient bridge has formed a certain unique traditional historical and cultural imprint in the humanistic and historical significance of the water town. The materials are mainly granite, slate and so on. In the method of selecting the color of the stone, most of them use a natural color of the color material that has been inherited from the local history. Some colors are greenish-white tones or yellowish tones, brownish tones, etc. (Figure 3, Figure 4).



Figure 1. Tongli Ancient Street



Figure 2. Zhouzhuang Ancient Street



Figure 3. Tongli Ancient Bridge



Figure 4. Zhouzhuang Ancient Bridge

5. Color Replacement - color interpretation of Zhujia Village landscape under visual perception theory

5.1 Architectural landscape color design

The architectural landscape is dominated by ancient residential structures, such as the dwellings in Zhujia Village, which are still dominated by the gray and white walls of wooden brick buildings. Traditional residential building forms are still dominated by traditional wooden structure houses. As a traditional southern water village in China, the colors of the three main materials used in the traditional architectural landscape of Zhujia Village mainly refer to the gray tiles used on the exterior walls and roofs of traditional buildings and the lime paving on the walls of the courtyards of residential buildings where the residents of the water village are accustomed to using lime. The color of the building facades is mostly light grey, with green grey or warm grey masonry. Chinese traditional ancestral buildings are mostly restored with stone and wood structures, showing a reddish-gray color.

5.2 Street landscape color design

The traditional country road landscape color design full of water township style is hoped to fully reflect the deep and long history of the traditional water township village, which is one of the key aspects of this landscape color design show. The color design is based on a comprehensive mix of indigenous natural and unpolluted granite strips, crushed slate material, pebble-lime brick material and red masonry selection. Stone, crushed slate, red pebble and other raw materials are mostly directly taken from natural rocks. After a lot of manual grinding and polishing, the color scheme is generally cold grey; The main material color of the lime tile should also generally be neutral and advanced cool gray stone, while the color of the red tile should be relatively warm in the middle. The color scheme of the road itself is also like the lineage of a village building. If properly matched, it can bring another infinite charm to this rural architecture.

5.3 Square color design

As the main recreational place of villagers, the design of the interior landscape environment of the village cultural square is very important. As another major design feature of rural landscape architecture, elements are bound to be combined and rationally matched by color design. Some basic impressions of traditional water color environment have been well controlled, that is, natural colors visible to the naked eye and some natural colors formed by rural historical and cultural elements. For the overall architectural color of the Chinese traditional water town square building facade, light red gray and light gray tones are selected as the overall main color of the facade. Wood gray and high-grade gray are used as local collocation tones, and plant green and flower red-pink-blue are used

as local emphasis main colors of the facade.

5.4 Color design for cultural spaces

Zhujia Village has the cultural imprint of an ancient fishing village that “flourished because of fishing” and has formed unique fishing cultural relics, with colorful folk art and folk culture - fishing ceremony, fishing festival, temple fair, martial arts skills of performing water marsh characters, dancing horse lantern(local folklore entertainment), etc. In order to make better use of public space, part of the village is designed as a cultural color space, creating an air corridor connecting residential buildings (Figure 5). At the same time, a detachable scaffold form is constructed, which can be reconfigured according to the needs to create different space states. The spatial corridor echoes the cultural street, and a watchtower (Figure 6) is placed to overlook the distant waterfront landscape to create the best landscape view. In the design process, the red and yellow elements which are indispensable for the rituals are extracted and combined to present a reddish-brown architecture to bring out the atmosphere of the festival; The design of the paving material is to consider the use of three main stone, namely, strip limestone surface materials, white ash tile and red brick. The three are interlaced with each other, and the color is matched with white and gray brick (Figure 9), which is simple, bright and dignified, but natural and generous.



Figure 5: Air Corridor

Figure 6: Watchtower

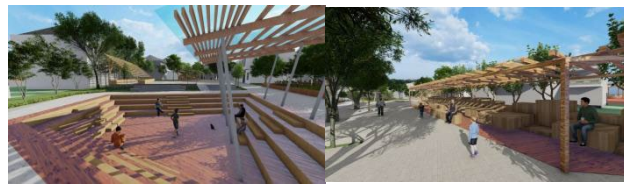


Figure 7: Meditation Space

Figure 8: Platform





Landscape space	Applicable chromatography in Zhujia Village	
	Dominant color	Embellishment color
Cultural color space	 	 
Color parameters	C:47 M:65 Y:87 K:0	C:47 M:82 Y:83 K:13
	C:17 M:20 Y:21 K:0	C:0 M:49 Y:54 K:0
	C:5 M:22 Y:51 K:0	C:6 M:13 Y:13 K:0

Figure 9: Color space applicable color spectrum of Zhujia Village culture





Landscape space	Applicable chromatography in Zhujia Village	
	Dominant color	Embellishment color
Historical color space	 	 
Color parameters	C:52 M:68 Y:99 K:15	C:49 M:31 Y:25 K:0
	C:40 M:51 Y:63 K:0	C:73 M:33 Y:83 K:0
	C:15 M:18 Y:30 K:0	C:18 M:6 Y:14 K:0

Figure 10: Color space applicable color spectrum of Zhujia Village history

5.5 Historical space color interpretation

The unique cultural background of Zhujia “champion village” can be traced back to the Five Dynasties and Ten Kingdoms period. Under the continuous development and changes of the times, its political significance gradually disappeared, but the cultural spirit is passed on forever with the traces of the times. During the long-term development process, many excellent cultural traditions have been

bred, which reflects the historical and humanistic foundation of the ancient village. Therefore, in the subsequent design, we should fully respect its historical and cultural space, and on this basis, try to design a historical square next to the ancestral temple. As far as its historical and cultural colors is concerned, the square is dominated by high-grade grey tones. Warm gray tones are used as the main color, and gray-red or gray-yellow tones of low purity are chosen to highlight the rustic tone of Zhujia Village (Figure 10). The highlight of the design of the historical plaza is that it is not a flat space, but a sunken meditation space (Figure 7), which allows local fishermen and visitors to recall the history of the Zhu family, and a raised platform (Figure 8), which provides a clear view of the spatial texture of the ancestral shrine of the Zhu family and the traditional water village "built towards the shrine".

5.6 Waterfront space color interpretation

In order to restore the prosperity of the fishing village in the past and to inherit the traditional fishing culture, the waterfront space of Zhujia Village was regenerated in the design to enhance the experience of the place. Through the design, the designer's understanding of the fishing culture of Zhujia Village is conveyed to every visitor to Zhujia Village. The simple color of wood is extracted. The main color of light-colored wood echoes the waterfront, while the dark brown is used to break the monotonous color of the site, and festive color is used as a secondary color, breaking the brown system and adding bright spots. On the basis of satisfying the residents' functional use, the flourishing scene of the fish market in the past can be reproduced by rebuilding the wharf and building a water market. By setting up the water platform and a water gallery, people can better show the beauty of Shijiu Lake in Zhujia Village, and people can't help recalling the life of the water town through Shijiu Lake, thus awakening the memory of the traditional water town and feel the unique flavor of the traditional water town.

6. Conclusion.

As a typical fishing village of traditional water town, Zhujia Village in Shijiu Lake, Lishui, Nanjing, not only carries the culture of the past water town, but also carries the inheritance and development of the future traditional water town. From the perspective of visual perception theory, this paper takes Zhujia Village as the object to extract its unique colors of water nature and folklore under the interpretation of the colors of traditional water village. Through the creation of colors and the scenes constructed by its unique culture, the single site of Zhujia Village is transformed into a multifunctional multi-dimensional space of the traditional water village. Through the experience of different functional spaces, local residents or tourists can feel its history, culture and place spirit, which will guide people to pay more attention to the protection and development of traditional water towns and explore the design of traditional water towns in the future.

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