

PAPER • OPEN ACCESS

## The Public Space Pattern research of Guangfu Traditional Villages Based on Spatial Syntax: A Case Study of Huangpu Village in Guangzhou City, China

To cite this article: Luhui Qi *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **267** 062033

View the [article online](#) for updates and enhancements.

# The Public Space Pattern research of Guangfu Traditional Villages Based on Spatial Syntax: A Case Study of Huangpu Village in Guangzhou City, China

Luhui Qi, Weiliang Liang, Mingbo Xi\*

School of Architecture, Guangzhou University, 510006, China

Email: 1798466763@qq.com, 1361959747@qq.com, ximingbo@163.com

TEL:13392659533

**Abstract:** Based on the space syntax technique and the field investigation of the famous Huangpu Village of Guangzhou city in China, this paper analyzes the current situation of the public space of Guangfu traditional villages and the evolution of historical context and sums up the characteristics of the traditional village public space pattern, which can bring lessons and inspiration to the current update model of public space organizations in Chinese villages.

## 1. Introduction

As a unique cultural area in southern China, the Guangfu district is a historical area in the south of China, a land flowing with milk and honey based on agricultural production and culture and a carrier of national culture and emotional memory. How to inherit the charm of history and culture has become an unavoidable problem in the transformation of modern villages. Located in the center of the Pearl River Delta, Guangzhou is a representative area of Guangfu culture. As one of the key protected villages in Guangzhou, Huangpu Village is facing the traditional rural lifestyle and the rhythm is gradually disintegrating. How to preserve the space memories and experiences of people in traditional villages is the goal of this research.

## 2. Huangpu Village introduction

Huangpu Village is located in Haizhu District of Guangzhou City. It is adjacent to Pazhou Island on the west and Zhujiang on the east. It is an important port in the history of Guangzhou. The village has a population of more than 7,600 people and more than 200 houses. In addition to the newly built houses, the entire ancient village is dominated by traditional Guangfu traditional villages. The village is mainly composed of retro commercial streets, traditional houses, modern houses and cultural museums. It uses natural water features to display the ancient villages of Guangfu, which has its own characteristics.

### (1) Village history

According to the "Guangzhou City Place Names", the Huangpu Village in the Tang Dynasty was the mudflat of the Pearl River. It was originally called "Fengpu". The meaning of Pu is the waterside or the position of entering the sea. It is said that the phoenix often comes for food and bathing, so the weather is smooth living and working in peace. During the Tang Dynasty, the superior geographical position of Huangpu Village made it a fishing port from Guangzhou to Huangpu Ancient Port, which is responsible for protecting the safety of Guangzhou and the



transactions between the surrounding oceans and Macao. In addition, it is a sacred place to worship the sea gods, and it is also a station for foreign sailors and ships. The Huangpu ancient port reflects the foreign trade situation of Guangzhou during the period of the ship. The early Huangpu Port was an important hub for the main road of the Pearl River.

The Huangpu Village was built in the Northern Song Dynasty. It is mainly composed of Liang, Feng, Hu, Luo and other surnames. It is a village with multiple surnames. Up to now, there are still 13 ancestral temples in the Huangpu Village. The protection of the ancestral temples varies. They are incompatible with the surrounding residential buildings. According to the introduction of the village, there were 99 ancestral temples in Huangpu Village during the heyday.

### (2) Development status

Today, Huangpu Village Tourist Area is located in the eastern part of Pazhou Island in Haizhu District. It integrates leisure, entertainment, tourism and accommodation functions. It enjoys convenient transportation, beautiful scenery and local characteristics. It not only has the advantages of historical and cultural tourism scenic spots, but also the source of the integration of Chinese and Western cultures on the Maritime Silk Road. It is located in the Golden Triangle District of Zhujiang New Town (CBD), Guangzhou International Financial City and Pazhou Internet Innovation Cluster (Figure 1). There are the most famous Chinese Commodity fair: The China Export Commodities Fair, the headquarters of Alibaba and Tencent. That makes Huangpu Village have a strong impulse to develop. Due to the historical villages, the villages under strict protection are still intact. However, most of the villagers in Huangpu Village have moved out. The existing old buildings are used for rent, and some taller buildings are built to destroy the original village mechanism. The government renovation plan has attracted The entry of some foreign painters and cultural businessmen which leading gradually lost the local culture.



Figure 1. Huangpu Village Location

## 3. Research method

### (1) Introduction to spatial syntax

By quantifying the structure and elements of buildings, cities, settlements, landscapes, etc., The spatial syntax can study the spatial composition theory of spatial organization structure for understanding human cognitive intention relationship. From the 1960s and 1970s, Professor Bill Hillier and Julian Hansen of the University of London jointly proposed space syntactic theory. At present, spatial syntax has achieved remarkable results in architectural design, urban planning theory and design practice.

### (2) The Application of Space Syntax in the Study of Historical Villages

The basic principle of spatial syntax is the division of space, that is, the collection of small spaces to express the entire space system. Spatial segmentation includes three methods: axis, convex, and viewport. The axis is the farthest distance that can be seen from a point in space. Each axis represents a one-dimensional small-scale space. The axis not only represents the line of sight, but also moves in space, along with travel, transfer, and motion. By connecting the entire space with the smallest and longest axis, forming a linear system with multiple nodes, we can get the possibility of the path. The straight space is used to summarize the convex space in the village, so we can get a linear axis model similar to the shape of the human settlement is formed. Through using the Depthmap software, we can find a more intuitive spatial form and structure of the village.

#### 4. Research on the Public Space Pattern of Huangpu Village

##### 4.1 Spatial pattern characteristics of Huangpu Village

From the perspective of traditional form layout, Huangpu Village is a typical village form of the flat-shaped layout of Guangfu Water Village. Although Huangpu Village is in the peninsula, there are surrounding water pools on the periphery of the village (now partially landfilled), and the open water space on the outside. There are also a lot of water bodies in the village. The Fengshui Pond is the typical Guangfu Water Town. Features. In the spatial structure of Huangpu Village, the water body is like a continuous streamline connecting the different landscape nodes and the living paths of the villagers, highlighting the characteristics of the people in Huangpu Village.

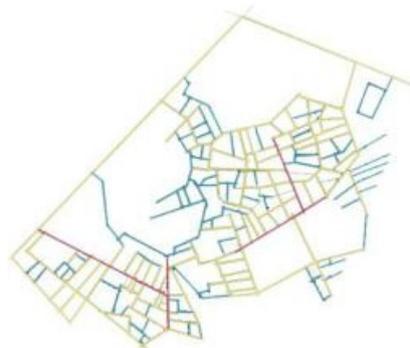


Figure 2. Local integration of Huangpu Village (R=200)

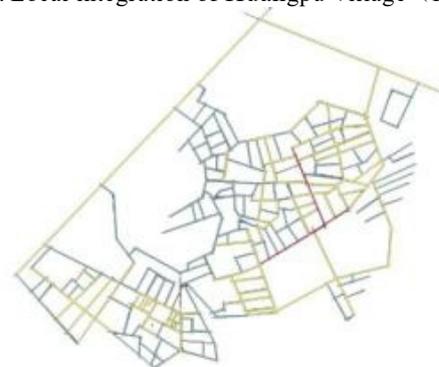


Figure 3. Global integration of Huangpu Village (R=N)

The interior of Huangpu Village is a small-scale traditional residential form. The buildings are narrow along the street, densely laid out, and distributed. The layout of “three rooms, two corridors and one patio” is adopted, reflecting the traditional residences of Guangzhou based on pragmatism. Architectural style. All the dwellings are centered on their respective clan ancestral halls, separated by lanes and concentrated in blocks, reflecting the traditional clan culture thoughts of the blood clan. At the same time, these dwellings mostly use blue brick walls, red sandstone wall feet, colored gray plastic or stone carving decoration. The overall tone color of the building in the village is the main color of green ash, and green is its auxiliary color. The public pavement is paved with gray ramie stones, and the doorway entrance and exit partially retains the door.

#### *4.2 Syntactic Analysis of Public Space Form*

##### *4.2.1 Analysis of the Independent Space System of Huangpu Village*

The Huangpu Village was selected as an independent system, and the model of the boundary of the street space was extracted. Considering the daily travel of Huangpu Village and the radius of the ancient village, 200m was selected to establish a buffer zone, and three morphological variables including integration degree, selectivity and intelligence were selected to analyze the spatial form of Huangpu Village.

###### *(1) Integration*

As shown in Figures 2 and 3, the analysis of local integration and global integration shows that from Figure 2 we can see that there are two local integration cores in the red path of Huangpu Village, one close to the seaport and the other close to the interior of the village. There is only one core of integration within the village. It can be concluded that Huangpu Village is an ancient village developed close to the harbor. Therefore, in addition to the interior of the village in the local space, the area close to the harbor is also a densely populated area, and its roads are transformed from the core of integration.

In terms of local integration, the integration degree of Panshi Street, Xiayang Street, Shunyi Square and Shiji Road is the highest, and the roadway connected with it has moderate integration, indicating that the Panshi Street, Xiayang Street, Shunyi Square and Shiji Road are very attractive to the internal flow of Huangpu Village, which should be the image street created by the tourism development in the ancient village. Meanwhile, the integration of a large number of roadways in the ancient village is not high, because there are a large number of ancient villages with wide and narrow roadways, profound twists and turns, multiple broken roads, and unclear classification. This is the charm of Huangpu Village and we should spare no effort to protect the traditional space texture from damage, and actively take optimization measures to repair the local space of the broken and split.

###### *(2) Choice*

The global selection degree can not only simulate the choice of people flow to the street, but also reflect the accessibility of the street, so the two can comprehensively reflect the comprehensive potential value of the street. As shown in Figure 4 and Figure 5, the global selection analysis shows that Panshi Street and Xiayang Street are the axes with the highest global selection and are also the axis with the highest degree of integration, indicating the development potential of strong gathering and attracting people. As shown in Figure 4, from the local selection degree, the selection of Xiyi Street, Cross Street, Ancient Street and Hengjie Street is the highest, and the center of gravity is moved northward to the Zongyi Open Area, indicating that this is the main gathering and rest place for the internal villagers. Enhancing the service and experience quality of the open area of the Ancestral Hall will help to activate and enhance the internal vitality of the Huangpu Village. Panshi Street and Xiayang Street are the only two long streets that run through the ancient villages, and the streets and corridors that are connected vertically with them cross the two sides of the block, so the selection is higher. The

Huangpu Village, which is mainly based on pedestrian traffic, has a good selection of streets and lanes under local spatial scales due to the development of its street and road network.

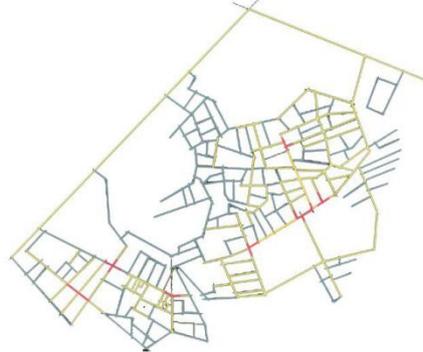


Figure 4. Local selection(R=200)

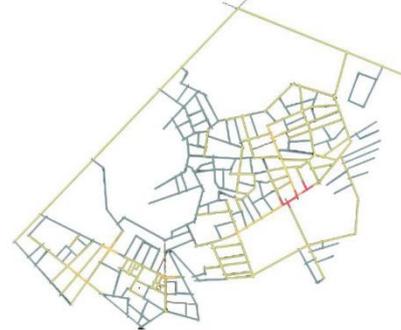


Figure 5. Global selection (R=N)

As shown in Figure 6, the intelligence of Huangpu Village is  $R^2=0.525712$ , which indicates the overall and local fitting of the ancient village, and the spatial comprehensibility is good. It shows that when the people flow in the ancient village, it is easy to infer the spatial structure and the space intentions of the whole ancient village through the perception of local space. Select the high-intelligence area and the red highlight in Figure 6. corresponds to the axis of the yellow highlight in Figure 4 and 5, including Hengjie, Yingcun Road, Cross Street, and Xiyi Street. These streets are partially integrated higher and better understanding and people are more likely to perceive the intention of the entire Huangpu Village from these streets, therefore these streets should be regarded as a key transformation target.

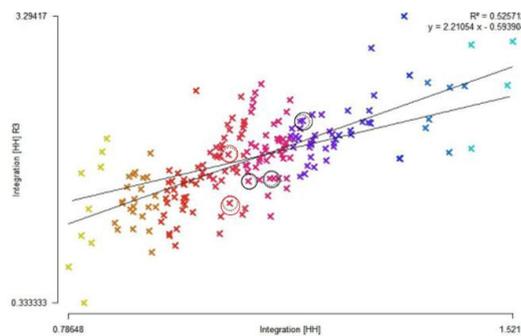


Figure 6. Huangpu Village Intelligence

#### 4.2.2 Correlation analysis of street space and function

##### (1) The business formats

By comparing the integration of Huangpu Village and the function of land use along the street (Figure 7.), it is easy to find that commercial facilities occupy the streets with the highest integration and the best accessibility, such as Panshi Street, Xiayang Street, Shunyi Square, and village entrance area, which can make full use of convenient transportation advantages to attract people. These highly integrated streets constitute a square-shaped street pattern. Due to its high understanding and strong accessibility, the integration core bears most of the flow of people in Huangpu Village.

Considering that Huangpu Village is in tourism development, this paper will continue to subdivide business into non-touristic retail business and tourism catering and accommodation. It can be found that there are few commercial outlets for tourism, and most of them are mixed with retail businesses. A large number of restaurants and hotels are set up at the entrance of the ancient village and the main road intersection of Panshi Street.

##### (2) Historic buildings

As shown in Figure 7, the historical buildings are mainly distributed in the ancient port side and inside the street. It can be intuitively found that most of the historical buildings are basically distributed on both sides of the blue axis. Only a few historical buildings and core scenic spots are located on the main street, but are distributed on the axis of medium and high integration, such as the beautiful stone Fenggong, the Xuan Xuanjia, and the former residence of Liang Lanfang. Most of the ancient villages have low integration of historical streets and lanes, because the historical streets and lanes are far-reaching, linear and twisted, and the roads are endless, and the accessibility is poor, but it can stimulate the interest of tourists. The reason for the low integration of the streets in Xincun is that the density of the road network is small and the connectivity with the main streets is not enough. When space optimization is done, the number of east-west streets and lanes can be appropriately increased to form a square grid street structure, and barriers with low connectivity can be opened.

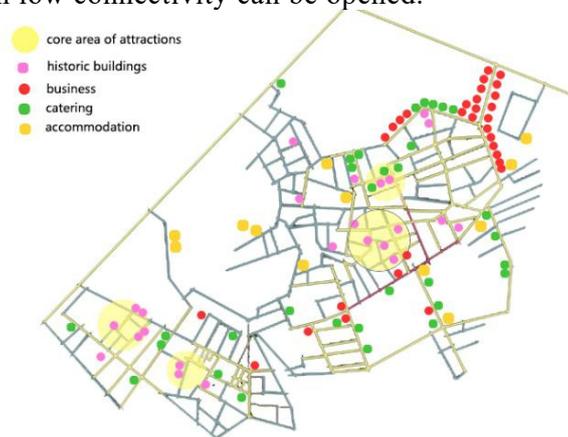


Figure 7. Land use attribute and overall relevance map

##### (3) Ancestral Cultural Space

In the village of Guangfu, Ancestral temple is the highest-ranking core position in the whole village, which is often the core part of the public space of the entire village and surrounded by related elements such as ponds, banyan trees and mountains. And they reflect the concentration of natural, economic and social customs in the village. The same is true of the surrounding space of many ancestral temples in Huangpu Village. The "square" in the traditional public space of the Guangfu Village is different from the various city squares. On the one hand, although it is

vast in area, it is mainly relative to other public spaces with hard paved land in the village; on the other hand, it appears in the form of ancillary space of the Ancestral Hall. And without the Ancestral Hall, there will be no such square.

Public gathering is the "secondary function" of the Ancestral Hall (the clan sacrifice is the "native function" of the Ancestral Temple) [5]. Since the internal space of the Ancestral Hall cannot accommodate all the members of the clan at the same time, the Ancestral Hall needs a wider external space to provide Public aggregation function. The clan meaning of Ancestral temple led to the gathering, and the gathering activity reinforces itself ("When someone starts to do something, other people will express an obvious tendency to participate, or join, or experience it themselves" [5]). The self-reinforcement of this space makes an ever-increasing influence of the square on people's daily life, so that the square becomes a type of space that exists independently of the function of the clan.

With the development of social economy, the change of modern life and production mode, the function of the traditional Guangfu village public space has also evolved. In the past, the public space was the only open space in the village with a large area of hard pavement. Frequent sacrifices, folk activities and gatherings were the main functions of the public space in the past. However, due to the changes in modern social living habits, these functions gradually deteriorated. Although Huangpu Village still maintains large-scale rituals, folk customs and other activities, it is usually only held once a year or every other year. Today's public space is mainly for the leisure and entertainment activities of the villagers and the temporary rest of the tourists, especially the chat, walking, chess and children activities are the most common.

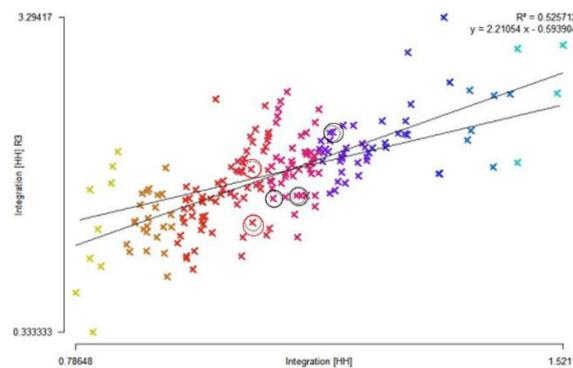


Figure 8. Huangpu Village Square understandable analysis chart

It can be concluded from Figure 8 that the overall intelligibility of Huangpu Village is  $R^2=0.525$ , while the road space around some squares in the figure is less understandable. (Intelligent value refers to the degree to which the observer further obtains the overall spatial accessibility information by observing the spatial connectivity in the local scope.) It shows that the square space is not easily perceived by tourists and is easily ignored.

## 5. Conclusion

Table 1 statistics the data of Huangpu Village, which is the main grammatical variable for the entire village system and street system. In general, the syntactic values in the global scope are significantly lower than the syntactic values in the local system, such as connection value, selectivity, local integration and global integration. In addition, the "understanding" value of Huangpu Village is slightly higher, indicating that the relationship between its local space is more compact than the overall spatial relationship. Spatial analysis has initially shown that as the scope of the village expands, the center of gravity gradually migrates from the edge of the dock to the space around the temple.

Table 1. Syntactic Study on the Spatial Form of Huangpu Village.

Spatial level	Research object	Syntactic configuration method	parameter
Overall and local	Overall space (Huangpu Village)	Line segment analysis	Integration
	Local space	Line segment analysis	Integration, choice, intelligence
Street space	Street space and land function	Correlation Analysis	

After field research, according to the analysis and summary, there are four existing problems in Huangpu Village: 1. The use of cultural space is insufficient 2. The color of the building space in the village is not consistent. 3. The development of tourism business space faced with problems. 4. The external transportation hub lacks guidance and the surrounding social space and historical space are not continuous, such as the discontinuity of historical space caused by the lack of cultural atmosphere, the lack of social space, the development of tourism and sustainable planning problem caused by architectural space and road space. In general, the existing problems in Huangpu Village are practically related to their space. At the same time of supporting commercial facilities, we must also pay attention to the influence of the distribution of internal and external space on tourists.

The traditional space is a clue to the development of the city. Without the continuation of the cultural space, the transformation and protection of the ancient village space will lose its connotation, which will lead to the historical blank of the development of the city, and this is contrary to the rules of urban development. Exploring the spatial pattern of traditional ancient villages and finally integrating them into urban space, the ancient village space will become one of the important components of urban cultural space. Therefore, exploring the spatial pattern of traditional ancient villages and the spatial characteristics of historical cultural villages will play more active roles in the protection and transformation of urban cultural space.

### Acknowledgment

Support by: 2015 Guangdong Philosophy and Social Science Planning Project: Research on Space Art and Aesthetic Evolution and Inheritance of Guangfu Traditional Villages and Towns (GD15CYS04)

### References

- [1] Xiao Youxing, Yang Honglie. (2011) Preliminary Study on the Development of Cultural Heritage in Huangpu Village in Guangzhou[J]. *modern city*,6(04):53-56.
- [2] WU Zizhen, LI Wei. (2013) Research on the Public Space Form of Traditional Guangfu Village—Taking Panyu District of Guangzhou as an Example[J].*Southern Architecture*, (04):64-67.
- [3] Tian Jun, Xu Ying. (2004) Study on the relationship between ancestral hall and residence [J]. *Architect*, (6): 82.
- [4] Yin Yi. (2018) Spatial morphological characteristics of the egret historical and cultural village based on spatial syntax [D]. Jiangxi University of Technology.
- [5] Southern Architecture - "Study on the Form of Public Space in Traditional Guangfu Village: Taking Panyu District of Guangzhou as an Example"
- [6] Zeng Linlin. (2017) Research on the construction of Guangzhou International Financial City from the perspective of policy implementation [D]. Jinan University.