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A Comparative Study on the Spatial Layout of Hui-Style and Wu-Style Traditional Dwellings and Their Culture Based on Space Syntax

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Abstract: Hui-style and Wu-style traditional dwellings adopt different connection modes, reflecting different spatial characteristics and resulting in different spatial layout characteristics. The rationale for this is related to the differences between the two schools of Confucianism culture: the Huizhou culture emphasizes the commercial application of Confucianism and pays more attention to the idea of commercialization, and the space exhibits a certain degree of freedom, while the Wuzhou culture emphasizes the official application of Confucianism and pays more attention to the idea of officialization, and the space is more systematic compared to Hui-style traditional dwellings, more profoundly articulating the traditional notions of propriety. Therefore, this paper attempts to explore the correspondence between the spatial layout of traditional dwellings and Confucianism culture through a comparative analysis of the spatial layout characteristics of the two schools of traditional dwellings, and to provide reference for similar studies.

Keywords: Hui-style traditional dwellings; Wu-style traditional dwellings; space syntax; spatial layout; Confucian culture

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1. Introduction

Confucian culture is a cultural school of thought guided by Confucianism. It is the background of the entire Chinese traditional culture. The core of Confucianism is benevolence and propriety. Benevolence means promoting benevolent governance, allowing people from all walks of life to enjoy the right to survival and happiness. Propriety refers to the moral order of society, which requires people to follow moral norms that are consistent with their own social status. In traditional Chinese society for thousands of years, Confucian culture has been supported by rulers as the basis for maintaining the feudal social and political system and social order. It has become an important basis for social development and continuity and a significant part of Chinese traditional culture [1]. As an important carrier of traditional culture, Confucian culture is reflected in traditional dwellings over time and affects the spatial layout and characteristics of traditional dwellings [2]. Kent et al. studied the complex interaction between family structure and spatial layout in their book *Domestic Architecture and Use of Space*, and also explained the interaction between space organization and culture [3]. Guo et al. showed that the spatial meaning of architecture can be interpreted by some spatial symbols, including social culture, clan etiquette, and ideology [4]. Rapoport et al. discussed the relationship between architectural form and culture from a family perspective, pointing out that culture can affect specific aspects of architectural form, function, and spatial organization [5]. Using space syntax analysis, Bill summarized that the nature of the most integrated spaces in the house plan varied

across class and gender dominance by taking a sample of 17 dwellings from Normandy, and that these variations were closely related to the privacy needs and the location of the house, thus indicating, to some extent, that the composition of the residential plan was related to the social environment of the time, and linking the family spatial pattern with the social mechanism behind it [6]. Turgut et al. studied the topological relationship of space syntax in the same dwelling at different periods in Turkey, such as residential plan in the patriarchal, polygamous, and individualistic periods, and found that the degree of integration of the same space was not constant, thus revealing the influence of social culture on family patterns [7]. There are already some studies that show the mutual influence between architectural space and culture, and there are also some studies in Chinese traditional Confucian culture. The Chinese traditional residential space shows a normative mode of living behavior and ethical order that is influenced by Confucian thought. This moral ideal of the upper society is also reflected in the architectural layout, making the architectural space form and culture highly consistent [8].

The Huizhou and Wuzhou regions studied in this paper are the prevalent areas of Confucian culture [9]. Huizhou traditional dwellings are one of the important schools of Chinese traditional dwellings, and have important status and research significance in the field of traditional dwellings at home and abroad [10]. Wuzhou traditional dwellings share similar Confucian cultural origins and appearance with Huizhou traditional dwellings [11]. For a long time in the past, Wuzhou traditional dwellings were interpreted as Huizhou traditional dwellings, but, in fact, they have great differences in spatial layout. In view of this, this paper compares and studies the typical cases of traditional dwellings in the two regions by contrast.

The analytical ability of space syntax on the relationship between traditional dwellings and traditional culture provides a combination of qualitative and quantitative methods for the cultural interpretation of traditional dwellings. Space syntax theory has been widely applied in the urban [12–14] and architecture [15–17] fields, and, in recent years, this theory has also been widely used in the study of traditional dwellings. Firstly, some scholars study the spatial form of traditional dwellings, and analyze the correspondence between them. Mohannadi et al. used space syntax to explore the spatial connectivity of Qatar dwellings, and concluded that the social pattern determines the spatial form of the house, and the spatial form interacts with the social culture [18]. Yamu et al. conducted a spatial connection analysis of Palladio villas using space syntax, and found that the villa plan has a high degree of flexibility, and the salon (Salotto) is the space with the highest degree of connection and control, and the most important position in the villa. They concluded that the spatial pattern of the villa is related to the social and cultural configuration [19]. Chen et al. explored the spatial organization differences of dwellings in the Jinqu area of Zhejiang Province, China, and revealed the spatial system genotype. They concluded that regional social and cultural factors are the decisive force in shaping the dwelling space and its construction form [20]. On this basis, scholars from different countries also conducted comparative studies on the traditional dwelling spaces of different regions, and analyzed the specific correspondence between traditional dwellings in different regions or in different periods of the same region and traditional culture. Huang et al. interpreted the Chinese traditional courtyard house using space syntax, compared the traditional dwellings with modern dwellings, and found that the traditional courtyard house has a high degree of security, which can be used for reference by modern dwellings to promote the integration of culture and sustainable development of the dwelling [21]. Zolfagharkhani et al. used space syntax to calculate the courtyard houses in Iran, and analyzed the spatial changing rules by comparing the dwellings in different periods of Iran. They concluded that the depth of rooms around the courtyard were affected by the social and cultural changes, and the privacy gradually weakened as time moved backward [22]. Saeid Alitajer analyzed the behavioral patterns in the spatial configuration of traditional and modern houses in Hamadan, and pointed out that the spatial configuration of houses changed over time. The significant difference between traditional and modern houses in Hamadan was the degree

of integration of space, and privacy was gradually disappearing in modern houses [23]. Ana Moreira explored the relationship between the role of family members in the social structure and their use of family space by analyzing the different uses of house space by parents and children of different ages in a nuclear family [24]. Some scholars also specifically explored the influence of the hierarchical system in traditional culture on spatial relations. Zou et al. conducted a syntactic analysis of Zhang Guiying Village dwellings, and found that the symmetrical arrangement of dwellings along the central axis was a reflection of the hierarchical order of feudal patriarchy [25]. Seo et al. analyzed the traditional Korean dwellings under Confucian ideology in different social eras, and stated that dwellings, as a medium for materializing social hierarchy, were influenced by the class system [26]. The research team that the author belongs to also used the exhaustive axial analysis method to explore the traditional dwellings, and also argued for the existence of class differences in architectural space under clan culture [27].

It can be seen that space syntax has been more widely used in the study of the cultural interpretation of traditional dwellings, and has been explored, to some extent, in the study of the relationship between the spatial form of traditional dwellings and traditional culture, the comparative study of the relationship between the spatial and traditional culture of traditional dwellings in different regions and time periods, and the influence of the hierarchy in traditional culture on the spatial relationship. Based on the above research, in-depth research was conducted in terms of this paper on the relationship between spatial layout and Confucianism culture by comparing the traditional houses of the Hui and Wu school. In addition, the current research is more for Hui-style traditional dwellings but relatively less for Wu-style traditional dwellings, which leads to the fact that the characteristics of Wu-style traditional dwellings are more vague, and even the characteristics of Wu-style traditional dwellings are confused with that of Hui-style traditional dwellings. Therefore, this paper tries to use the space syntax method to carry out a comparative analysis of Hui-style and Wu-style traditional dwellings, combining qualitative and quantitative analysis; interpret the spatial layout characteristics of the two schools of dwellings and their differences from the root, while considering the traditional culture of the two places; and analyze the reasons, so as to provide useful supplements for similar studies.

2. Materials and Methods

2.1. Materials

This paper selects Huizhou region in Anhui Province and Wuzhou region in Zhejiang Province of China as the research areas, and the locations of the two regions are shown in Figure 1.

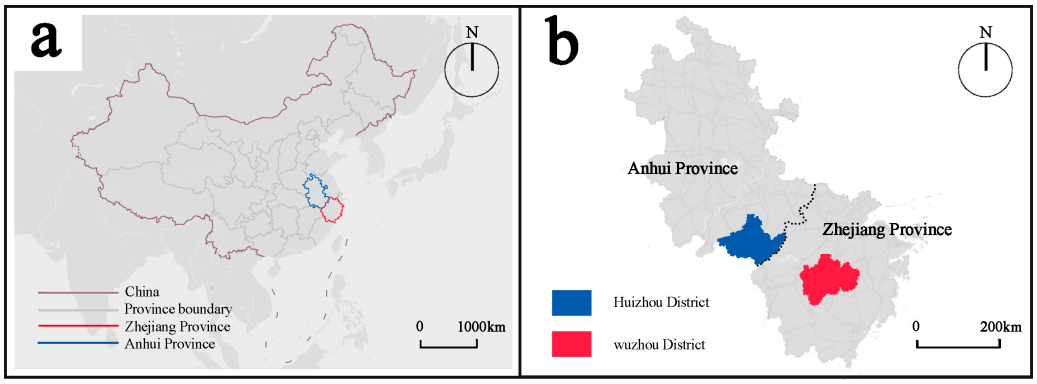


Figure 1. Geographical location relationship of Huizhou region in Anhui Province and Wuzhou region in Zhejiang Province: (**a**) the location relationship between Anhui Province and Zhejiang Province in China; and (**b**) the location relationship between Huizhou region and Wuzhou region.

In order to further explore the differences in spatial layout of Hui-style and Wu-style traditional dwellings under the influence of Confucian culture, 20 traditional dwelling cases were randomly selected in this paper, which were, respectively, built in the Ming and Qing dynasties (1368–1912) in Huizhou region of Anhui Province and Wuzhou region of Zhejiang Province for preliminary investigation (Table 1).

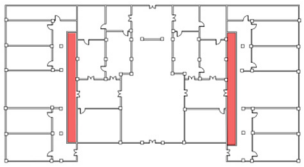
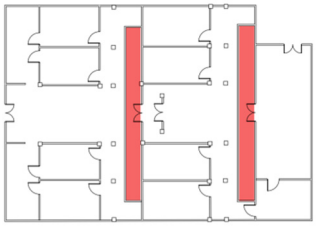
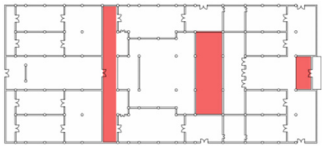
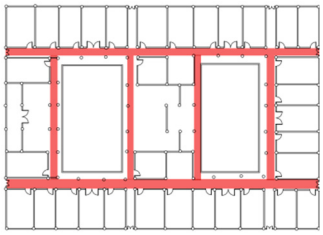
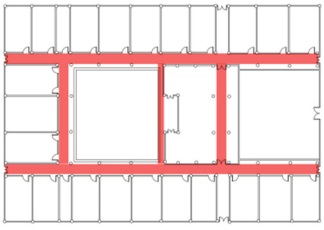
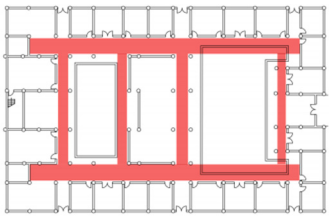
Table 1. Case studies of traditional dwellings.

Huizhou			Wuzhou		
Serial	**Dwelling Name**	**Construction Time**	**Serial**	**Dwelling Name**	**Construction Time**
1	Zhengrong Dwelling	Qing Jiaqing	1	Deshun Tang	Qing Qianlong
2	Yu Qing Tang	Qing Xianfeng	2	Ruiai Tang	Qing Jiaqing
3	Airi Tang	Ming Tianqi	3	Wuben Tang	Qing Jiaqing
4	Chengzhi Dwelling	Qing Xianfeng	4	Fanyu Dwelling	Ming Chongzhen
5	Lvfu Dwelling	Qing Kangxi	5	Yuhou Dwelling	Qing Qianlong
6	Dafu Dwelling	Qing Kangxi	6	Ye Dwelling	Ming Yongle
7	Taoli Tang	Qing Xianfeng	7	Wanhua Tang	Qing Guangxu
8	Wutingsha Dwelling	Qing Kangxi	8	Shengyuan Tang	Qing Jiaqing
9	Chunman Tang	Qing Daoguang	9	Yu Dwelling	Early Ming Dynasty
10	Wangguore Dwelling	Qing Qianlong	10	Peide Tang	Early Ming dynasty
11	Wangpeijian Dwelling	Qing Qianlong	11	Jiudao Tang	Qing Daoguang
12	Wangjinshou Dwelling	Qing Qianlong	12	Laozu Dwelling	Early Ming dynasty
13	Wangshunchang Dwelling	Qing Qianlong	13	Cuihua Dwelling	Qing Daoguang
14	Fengrenjing Dwelling	Civil War	14	Shende Tang	Qing Qianlong
15	Zhengcun Tang	Qing Qianlong	15	Ziren Tang	Qing Jiaqing
16	Yibentang Dwelling	Ming Zhengde	16	Suyong Tang	Ming Jingtai
17	Xulun Tang	Ming Zhengde	17	Lihe Tang	Qing Jiaqing
18	Lin Dwelling	Ming to Republic	18	Dunben Tang	Qing Jiaqing
19	Yuan Dwelling	Ming to Republic	19	Li Dwelling	Ming Yongle
20	Zhang Dwelling	Ming to Republic	20	Cai Dwelling	Yuan Dynasty

In the investigation of the dwellings in the two regions, the dwellings with two-entry to four-entry courtyards occupy a larger proportion, exceeding 60% in both regions. Therefore, the research group further analyzed this part of the dwellings, and screened them according to the symmetry of the spaces on both sides of the central axis in the dwelling plan. Influenced by Confucian culture, Chinese traditional architectural spaces tend to be symmetrically distributed along the central axis [8]. The investigation found that, among the dwellings with two-entry to four-entry courtyards in the two regions, the proportion of plans that are symmetrically distributed along the central axis is 83%, which has a certain representativeness and universality. The basic unit of Hui-style traditional dwelling plan is a simple three-sided courtyard. When the dwelling needs to expand the living area, it usually creates a larger living space by copying and connecting the basic units to meet the daily life needs. The dwelling space is generally symmetrically distributed along the central axis, and the spatial form is relatively simple. Wuzhou traditional dwellings are usually large courtyard-style residential dwellings due to large bureaucratic families gathering together, with a large spatial scale. Generally, a "thirteen-room head" are formed by the longitudinal and horizontal splicing of spaces, which consists of three upper rooms in the main house, two "cave houses" on both sides of the main house, three wing rooms on each side, and a large courtyard [28], and larger dwellings are composed of multiple such units, with a more complex spatial form. Finally, the research group selected 6 typical dwelling cases for plan display (Table 2) based on traffic orderliness, accessibility, and spatial diversity. The red area in the dwelling plan is the traffic space. Through comparative analysis, we found that, in Huizhou dwellings, residents can only reach other spaces through courtyards or halls. The courtyard is small and has four sides connected to other use spaces. The hall connects the rooms on both sides and the front and rear spaces.

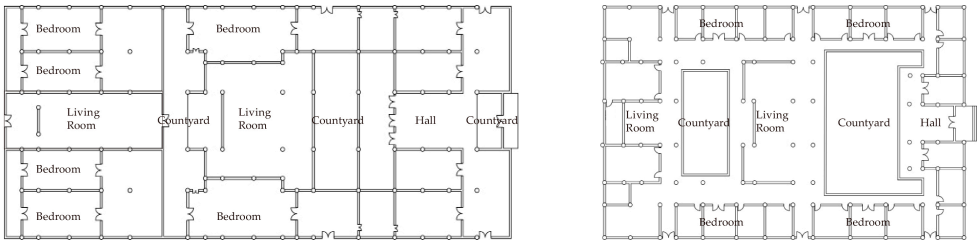
Therefore, the courtyard and hall become the traffic connection spaces within the dwellings, forming the "courtyard–hall" connection form of traditional dwellings in Huizhou region. In the dwellings in Wuzhou region, aisles connect to various spaces, and each space is connected by long aisles that intersect vertically and horizontally. Residents reach various use spaces through aisles, so the dwellings in Wuzhou region are "aisle" connection forms. This difference is also an important manifestation of the spatial layout difference between the two regions' dwellings.

Table 2. Plane of traditional dwelling cases.

Region	Dwelling Name	Construction Time	Spatial Relationship	Mode Connection	Plan
Huizhou	Zhengrong Dwelling	Qing Jiaqing	Two-entry patio and two-entry hall	Hall Patio Connection	
	Yu Qing Tang	Qing Xianfeng	Two-entry patio and two-entry hall	Hall Patio Connection	
	Airi Tang	Ming Dynasty	Two-entry patio and three-entry hall	Hall Patio Connection	
Wuzhou	Deshun Tang	Qing Qianlong	Two-entry patio and three-entry hall	Aisle Connection	
	Ruiai Tang	Qing Jiaqing	Two-entry patio and three-entry hall	Aisle Connection	
	Wuben Tang	Qing Jiaqing	Two-entry patio and three-entry hall	Aisle Connection	

In order to analyze the two schools of dwellings, this paper compared and analyzed the six dwellings in Table 2 one by one according to factors such as typicality and integrity

of the dwellings, and finally selected two dwelling cases, Airi Tang and Wuben Tang, for in-depth study. The floor plans of the two dwellings are shown in Figure 2.



(**a**) (**b**)

Figure 2. Plane of Airi Tang and Wuben Tang: (**a**) plane of Airi Tang; and (**b**) plane of Wuben Tang.

The surroundings of Airi Tang and Wuben Tang are also different, as shown in Figure 3. Airi Tang is near the middle of Huizhou region, and Wuben Tang is located in the north-east of Wuzhou region; Airi Tang is located at the foot of the mountain to the south of a village, and Wuben Tang is located in a small village with relatively dense houses. The actual view of Airi Tang and Wuben Tang is shown in Figure 4.

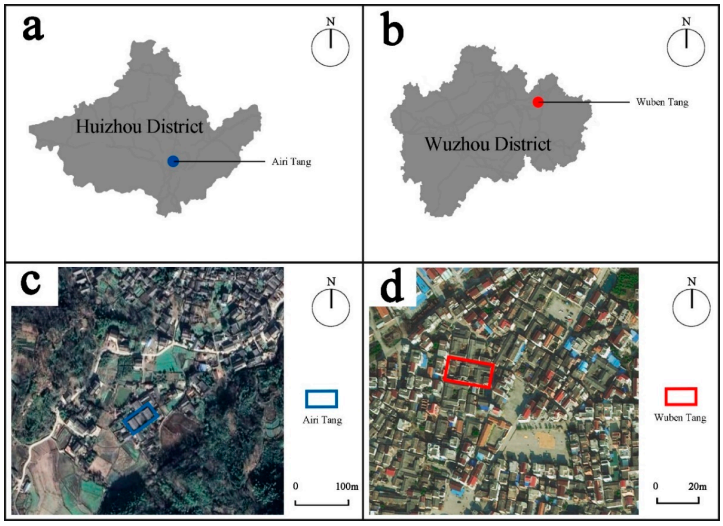


Figure 3. Geographical location relationship diagram of Airi Tang in Huizhou and Wuben Tang in Wuzhou: (**a**) the location relationship of Airi Tang in Huizhou region; (**b**) the location relationship of Wuben Tang in Wuzhou region; (**c**) the area where Airi Tang is located; and (**d**) the area where Wuben Tang is located.

(**a**) (**b**)

Figure 4. The real picture of Airi Tang and Wuben Tang: (**a**) Airi Tang; and (**b**) Wuben Tang.

Airi Tang is located in Chaji Village, Huizhou, which is one of the largest existing ancient villages of the Ming and Qing dynasties in China. It was built in the Tianqi period of the Ming Dynasty, and the residents were large local families of wealthy Huizhou merchant families. The architecture is well-preserved, and its spatial layout not only reflects the influence of Chinese traditional Confucian culture, but also has the characteristics of a commercial clan, which is typical and representative of the ancient Huizhou mansions. In terms of spatial function, the two courtyards and three halls of Airi Tang are symmetrically arranged along the central axis (Figure 4a). The front hall is close to the entrance space and is often used as a place to welcome guests. The middle hall, which is reached through the first courtyard, is a place for guests to sit and hold important meetings. The second courtyard of Airi Tang is a space that separates the inside and outside of the dwelling. Men were often active in the external space, while women generally lived in the rear hall and wing rooms in the back, which were more private, and outsiders were generally not allowed to enter, reflecting the idea of strict separation of inside and outside and emphasis on etiquette [29]. The publicness of each space gradually weakens from outside to inside, and the privacy gradually increases. There is no aisle in Airi Tang, and the spaces are connected by courtyards and halls, which are the main traffic spaces.

Wuben Tang was built in the Jiaqing period of the Qing Dynasty, and was originally the dwelling of Wu Pinheng, a metropolitan graduate in 1886 in the Guangxu period of the Qing Dynasty. Wuben Tang, as the gathering place of the Wu clan, is also the place for the descendants to worship and celebrate. The dwelling is well-preserved, and faces south from the north, with two courtyards and three halls symmetrically arranged along the central axis; three gatehouses, main halls, and rear halls each; and two wing rooms on each side. The wing rooms are arranged on both sides, and the main and secondary spaces are more distinct than Airi Tang (Figure 4b). The spatial layout on the central axis of Wuben Tang is similar to that of Airi Tang, but there are more wing rooms on both sides, because large families need more living space. In terms of traffic, Wuben Tang mainly relies on the main aisles on both sides and the aisles interspersed between courtyards and halls to connect various spaces. Therefore, aisles are the main traffic spaces, which efficiently connect spaces while maintaining the relative independence of various spaces. The middle hall is used for worship and holding important meetings, and is surrounded by aisles in the center of the dwelling. It has the highest status in family etiquette activities, which is similar to the ancient kings' palaces generally set in the center of the imperial city, both reflecting a highly centralized hierarchical system. Therefore, compared with Airi Tang, Wuben Tang's spatial layout is more rigorous and orderly.

2.2. Methods

This study mainly uses space syntax to analyze the spatial relationship of traditional dwellings [30]. Space syntax was proposed by the Hillier team of the University of London in the 1970s [31], and is a series of theories and techniques about space and society. The theory points out that space is part of the social and economic activities, and its purpose is mainly to analyze the spatial and social relationship of urban and architectural spaces. Space syntax was initially used in the field of urban research, and is now widely used in studying the correspondence between architectural spatial composition and social culture. It provides spatial concepts and various analysis techniques, and the use of this method in this paper helps to describe the spatial characteristics of dwellings and the relationship between space and social culture.

Space syntax treats space as an independent element, and analyzes the social and cultural relationship behind space through theoretical and software calculations [32]. For the research on the architectural scale, space syntax often uses two methods of spatial analysis, namely, convex analysis and viewshed analysis [33]. Convex space is a basic segmentation unit in space syntax modeling, and is the most basic means of segmentation in the graphic model. If any two points in a space can be seen by each other, it is called a convex space. Viewshed analysis is another more commonly used model in space syntax,

which mainly focuses on spatial line-of-sight analysis. It mainly uses infinitely subdivided grids to characterize the line-of-sight at each point in space. The modeling method is topological, similar to the convex space model [34].

Based on the above two analysis methods, this paper also uses scatterplots to further verify the analysis. Scatterplots can clearly determine the density of co-ordinate space, so as to analyze the degree of proximity of the interaction relationship between spaces. Through the above three analysis methods, the study quantitatively analyzes the spaces of the two schools of traditional dwellings and verifies the correspondence between traditional dwellings and Confucian culture by combining the characteristics of Confucian culture and historical classics.

The specific analysis process of this study is divided into two major steps. The first step is data analysis based on space syntax. The second step is verifying the correspondence between spatial data and culture.

The data analysis based on space syntax is carried out through the following steps. First, divide the spatial structure of the dwelling and draw the architectural plan in AutoCAD2019. Second, import the plan into depthmap2012 software and generate analysis diagrams by software calculation. Finally, use the software to export the analysis diagrams and data required for dwelling analysis, mainly based on convex space, scatterplot, and viewshed map. The data indicators used mainly include integration and fit, where integration is divided into HH integration and R3 integration, and fit is represented by R^2.

Integration refers to the degree of clustering or dispersion between an element and the other elements in the spatial system. The residential space is divided into "n" convex spaces, and the "k" convex space is "ak" ($1 \leq k \leq n$), and the formula is:

$$I(a_k) = \frac{D_n}{RA(a_k)} \tag{1}$$

$$RA(a_k) = \frac{MD(a_k) - 1}{\frac{n}{2} - 1} \tag{2}$$

$$D_n = \frac{n(\log_2(n + 2/3) - 1) + 1}{(n - 1)(n - 2)/2} \tag{3}$$

Integration measures the ability of a space to attract traffic as a destination, reflecting the centrality of the space in the entire system. The higher the integration index value of a space, the higher the accessibility, the stronger the centrality, and the easier it is to gather people, and vice versa. Among them, different scales of spatial systems can be further standardized. HH integration indicates the degree of connection between a node and all the other nodes in the entire system; R3 integration indicates the degree of connection between a node and the nearby nodes within a few steps, usually calculated for 3 steps or 5 steps. For the sake of research consistency, this paper sets the step number of local integration to 3. HH integration reflects the usage frequency of each unit in the architectural space, which is a comprehensive feedback on various behavioral activities. The higher the HH integration, the higher the comprehensive usage frequency of the space, and the stronger the accessibility. R3 integration reflects the ability of the corresponding space to attract local traffic accessibility. Each space has a small radiation radius, which is suitable for analyzing the living lines of people in residential dwellings. Spaces with high R3 integration indicate that users have more activities in these spaces. This study uses the integration index in three types of analysis diagrams, in order to compare and analyze the hierarchical relationship, change degree, and viewshed control degree of residential space, and, thus, explain the relationship between the spatial layout of the two schools of residential dwellings and Confucian culture.

The goodness of fit is an indicator in the scatterplot, which indicates the degree of closeness between the two co-ordinate axis spaces. The higher the R^2 value, the closer the relationship between the two co-ordinate axis spaces, and vice versa. If the R^2 value

is below 0.5, it is considered that the horizontal axis and the vertical axis spaces are not related. If the R^2 value is above 0.5, it is considered that the horizontal axis and the vertical axis spaces are related. When the R^2 value rises above 0.7, it is considered that there is a significant correlation between the horizontal axis and the vertical axis spaces. In this study, the goodness-of-fit index was used in the scatterplot analysis in order to comparatively analyze the closeness of the spatial relationship of the dwellings and to further illustrate the differences in the spatial layout of the dwellings of the two schools.

The second major step of the research is to conduct a cultural and spatial correspondence analysis and comparative study of the spaces of Airi Tang and Wuben Tang on the basis of data analysis. Figure 5 is the analysis process.

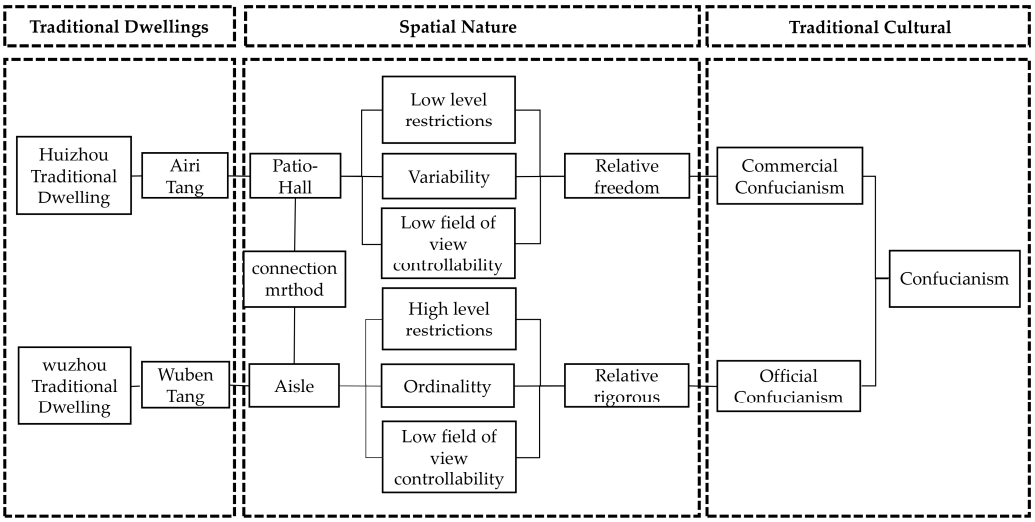


Figure 5. Analysis flow chart.

First, the data analysis was analyzed to verify the relationship between the spatial characteristic differences of Airi Tang and Wuben Tang and the different spatial connection forms; that is, the spatial data formed by the "courtyard–hall" connection and the "aisle" connection forms are significantly different. Then, a comparative analysis was conducted from three aspects—spatial layout, activity focus, and viewshed control of the two residential dwellings—and it is concluded that Airi Tang space has low hierarchical restriction, activity focus variability, low visual field control, and relatively free spatial nature. Wuben Tang space has high hierarchical restriction, consistency in the center of activities, high viewshed control, and relatively rigorous spatial nature. Finally, the corresponding relationship between the spatial nature of the two schools of residential dwellings and traditional culture was explored in combination with historical documents and other materials, and it is concluded that the difference in the spatial nature of the two schools of residential dwellings stems from the different influences of Confucianism for commercialization and Confucianism for officialization in traditional Confucian culture.

3. Study Process

Airi Tang and Wuben Tang, as representatives of Hui-style and Wu-style traditional dwellings under the influence of Confucian culture, have similarities and differences in spatial layout and spatial characteristics.

In order to make the calculation results more concise, this paper uses numbers to represent the different spaces, where 1–7 are the space labels of Airi Tang, and 1′–7′ are the space labels of Wuben Tang, respectively: front hall (1, 1′), first patio (2, 2′), middle hall (3, 3′), second patio (4, 4′), back hall (5, 5′), bedroom (6, 6′), and aisle (7, 7′). Using depthmap software to measure and analyze the different types of spaces in Airi Tang and Wuben Tang, the calculation indicators of HH integration and R3 integration are obtained. The results of the analysis are shown in Table 3.

Table 3. Syntactic resulted data of both Airi Tang and Wuben Tang layouts.

HH Integration						R3 Integration					
Airi Tang			Wuben Tang			Airi Tang			Wuben Tang		
Serial	Space Name	HH Integration	Serial	Space Name	HH Integration	Serial	Space Name	HH Integration	Serial	Space Name	HH Integration
1	front hall	0.99	1′	front hall	1.52	1	front hall	1.55	1′	front hall	1.58
2	first patio	1.23	2′	first patio	2.81	2	first patio	1.72	2′	first patio	2.81
3	middle hall	1.2	3′	middle hall	1.37	3	middle hall	1.33	3′	middle hall	1.42
4	second patio	1.35	4′	second patio	2.65	4	second patio	1.68	4′	second patio	2.65
5	back hall	1.15	5′	back hall	1.43	5	back hall	2.03	5′	back hall	1.48
6	bedroom	0.63	6′	bedroom	1.57	6	bedroom	0.86	6′	bedroom	1.74
7	aisle	/	7′	aisle	3.57	7	aisle	/	7′	aisle	3.57

In order to show the calculation results of Table 3 more intuitively, the numerical values corresponding to each space are converted into convex space maps with color differences (the change in value from large to small corresponds to the changes from red, orange, yellow, green, to blue), as shown in Figure 6:

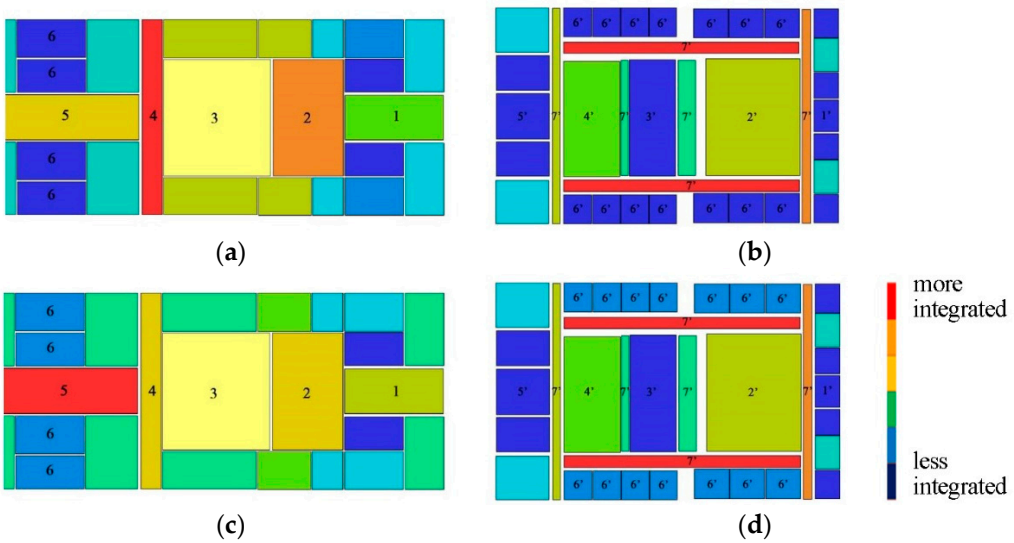


Figure 6. Integration of both Airi Tang and Wuben Tang layouts: (**a**) HH integration of Airi Tang; (**b**) HH integration Wuben Tang; (**c**) R3 integration of Airi Tang; and (**d**) R3 integration Wuben Tang. (1. front hall, 2. first patio, 3. middle hall, 4. second patio, 5. back hall, 6. Bedroom, 1′. front hall, 2′. first patio, 3′. middle hall, 4′. second patio, 5′. back hall, 6′. Bedroom, 7′. aisle).

Through the spatial measurement of the HH integration and R3 integration of Airi Tang and Wuben Tang, it was found that the indicators of both dwellings show consistent results from the data (Table 2) and convex space (Figure 3). The histogram is used to intuitively reflect the HH integration and R3 integration of Airi Tang and Wuben Tang. In Figures 7 and 8, the HH integration of both dwellings show a trend of aisle > patio > rest of spaces in terms of HH integration. In the case of Airi Tang, the trend is (7) > (2, 4) > rest of spaces. As seen in the convex space analysis diagram, the aisle, as a traffic space, connects the most spaces and is the most accessible, in red. The patio not only has many spaces lined up around it as an activity space but also acts the role of providing ventilation and light, so it is the most integrated space besides the aisle, in orange. The hall and the room are the most private spaces for gathering and sleeping and have the lowest degree of HH integration, which is blue. In Figures 7 and 8, the R3 integration of both dwellings differ, where Airi Tang presents the trend of back hall (5) > patio (2, 4) > front hall (1) > middle

hall (3) > bedroom (6), while Wuben Tang presents the trend of aisle (7′) > patio (2′, 4′) > bedroom (6′) > hall (1′, 3′, 5′) (Figures 9 and 10). The convex space analysis diagram shows that the back hall of Airi Tang is red, as the center of internal activities at a local scale, connecting more internal spaces with strong aggregation. The patio, as the center of external activities, has fewer external spaces directly connected to the patio and is not as strong in aggregation as the internal spaces; hence, it is yellow. The R3 integration and HH integration of Wuben Tang show the same trend. Based on the differences in spatial relationships between the two dwellings, we further analyze their spatial indicators.

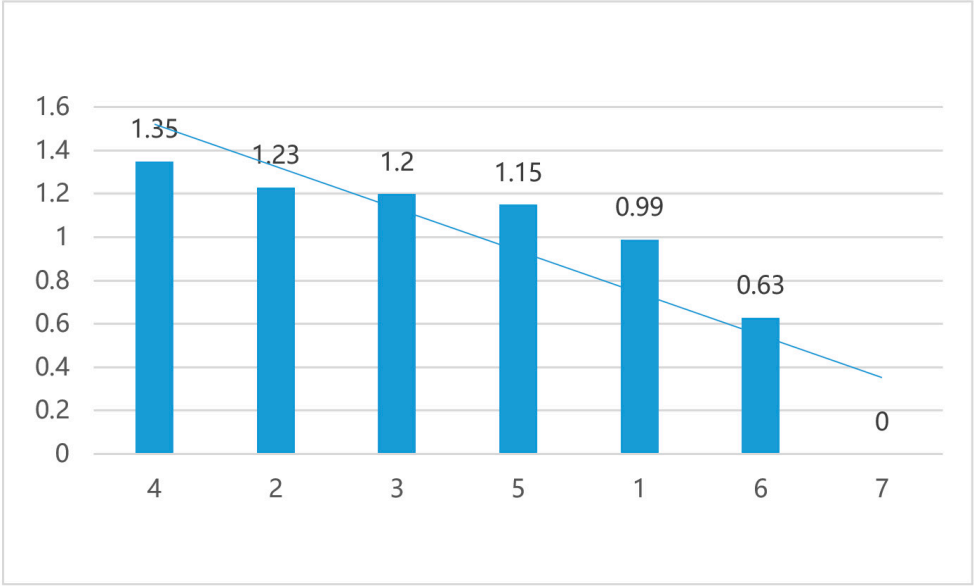


Figure 7. HH integration of Airi Tang (1. front hall, 2. first patio, 3. middle hall, 4. second patio, 5. back hall, 6. bedroom, 7. aisle).

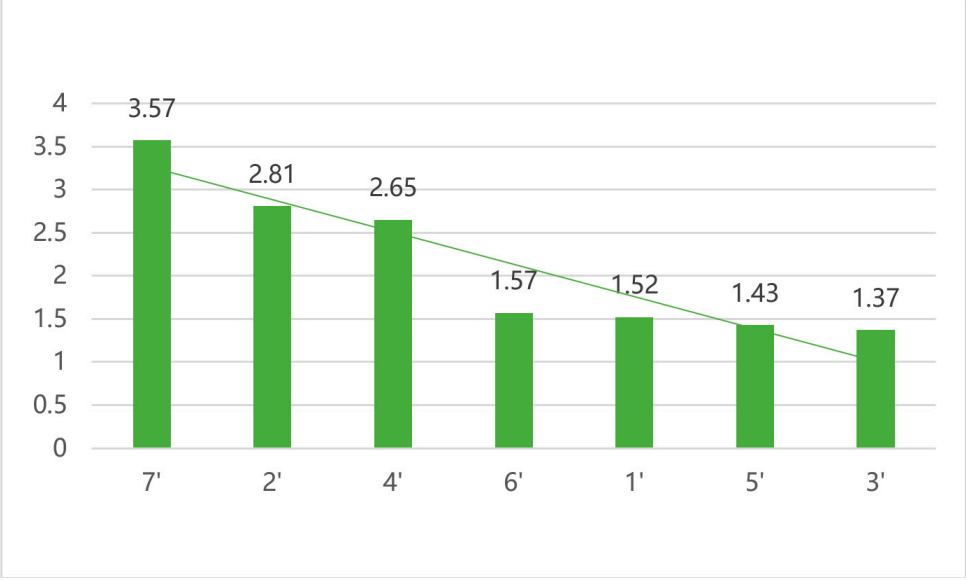


Figure 8. HH integration of Wuben Tang (1′. front hall, 2′. first patio, 3′. middle hall, 4′. second patio, 5′. back hall, 6′. bedroom, 7′. aisle).

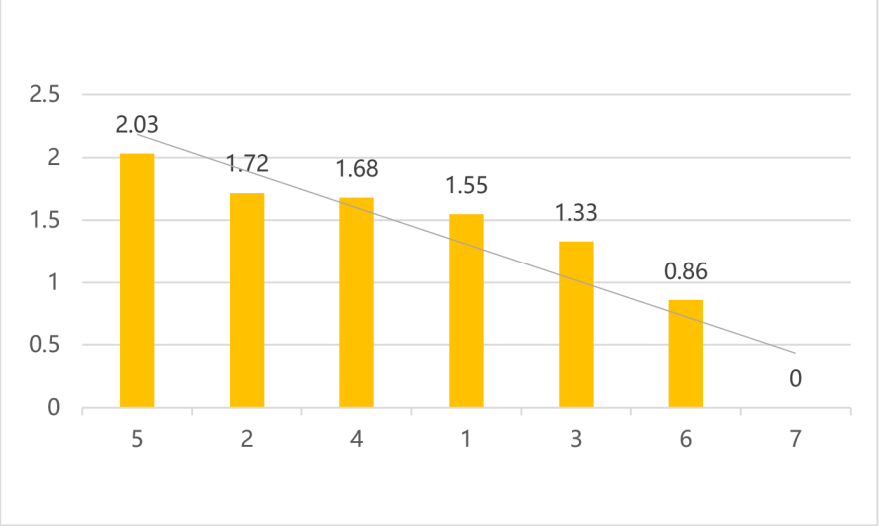


Figure 9. R3 integration of Airi Tang (1. front hall, 2. first patio, 3. middle hall, 4. second patio, 5. back hall, 6. bedroom, 7. aisle).

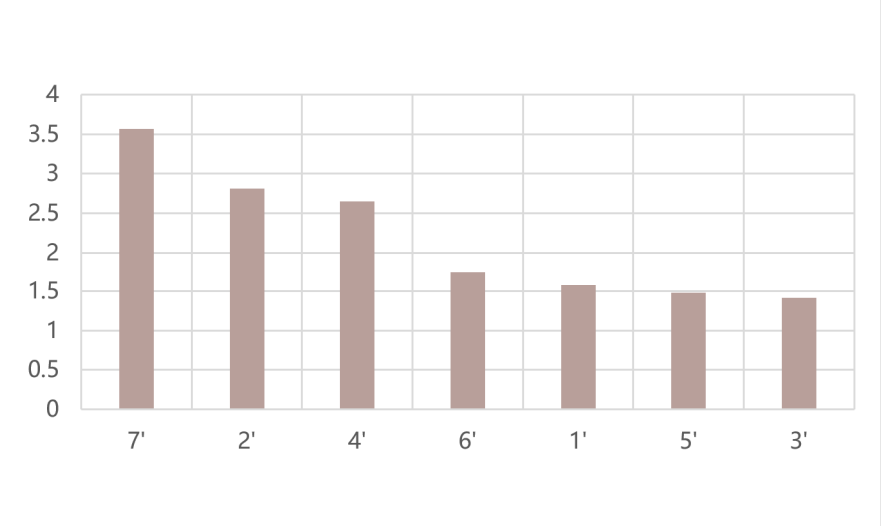


Figure 10. R3 integration Wuben Tang (1′. front hall, 2′. first patio, 3′. middle hall, 4′. second patio, 5′. back hall, 6′. bedroom, 7′. aisle).

Further argumentation analysis is made for the corresponding indices, and three differences of the following spatial layout characteristics are derived: 1. the low-grade restriction of Hui-style traditional dwellings and the high-grade restriction of Wu-style traditional dwellings; 2. the relative variability of Hui-style traditional dwellings and the relative consistency of Wu-style traditional dwellings; and 3. the lower viewshed control of Hui-style traditional dwellings compared to that of Wu-style traditional dwellings.

3.1. The Low-Grade Restriction of Hui-Style Traditional Dwellings and the High-Grade Restriction of Wu-Style Traditional Dwellings

In order to further compare and analyze the differences in the HH integration of the two dwellings, the fold line of the HH integration of the two dwellings spaces was plotted based on the results obtained from Figures 7 and 8, as shown in Figure 11, while the spatial data were organized into Table 4.

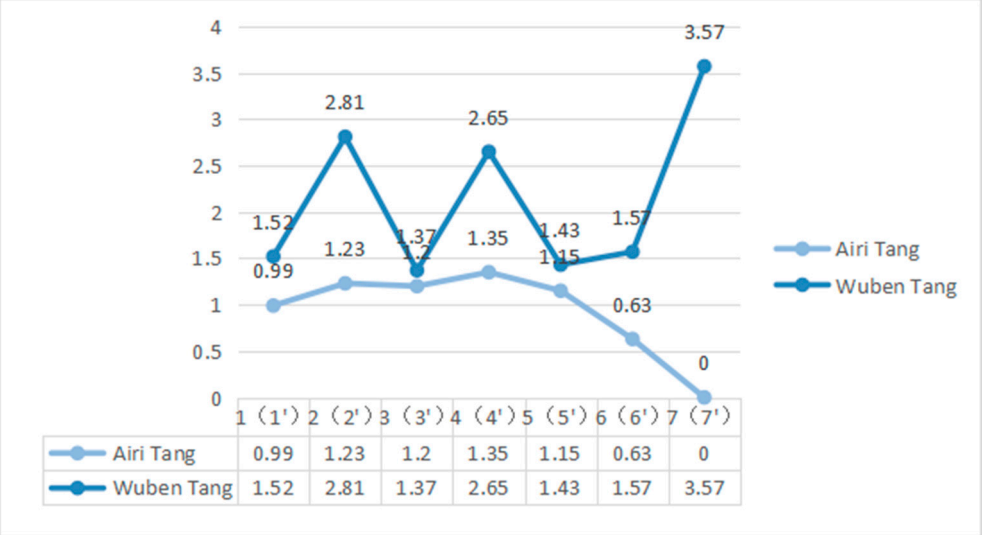


Figure 11. Fold line of HH integration (1. front hall, 2. first patio, 3. middle hall, 4. second patio, 5. back hall, 6. bedroom, 7. Aisle, 1′. front hall, 2′. first patio, 3′. middle hall, 4′. second patio, 5′. back hall, 6′. bedroom, 7′. aisle).

Table 4. Comparison of HH integration values.

Airi Tang			**Wuben Tang**		
Max: 1.35 Min: 0.63		Difference: 0.72	Max: 3.57 Min: 1.37		Difference: 2.2
Serial	Space Name	HH integration	Serial	Space Name	HH integration
1	Front hall	0.99	1′	Front hall	1.52
2	First patio	1.23	2′	First patio	2.81
3	Middle hall	1.2	3′	Middle hall	1.37
4	Second patio	1.35	4′	Second patio	2.65
5	Back hall	1.15	5′	Back hall	1.43
6	Bedroom	0.63	6′	Bedroom	1.57
7	Aisle	-	7′	Aisle	3.57

From Figure 11 and Table 4, it can be observed that the HH integration of Airi Tang is relatively smooth, with less fluctuation in value. On the other hand, the HH integration of Wuben Tang has more fluctuations and the difference in values is more pronounced. From the perspective of each space, the values of the aisle (traffic space) and the patio are larger, while the values of the rest of the non-traffic spaces are smaller, forming two ranges of high and low values. The highest value of HH integration is 3.57 for space 7′ (aisle), and the lowest is 1.37 for space 3′ (middle hall), with a difference of up to 2.2. In comparison, the HH integration of Wuben Tang's space presents a large difference.

The difference in the HH integration of the two dwellings indicates that there are some differences in the spatial layout of Airi Tang and Wuben Tang. To analyze the reasons for the spatial differences between the two dwellings more clearly, the dwelling space is deconstructed into traffic space and non-traffic space. Figure 9 shows the spatial deconstruction of the two dwellings, where the dark area represents the traffic space and the light area represents the non-traffic space. The traffic space of Airi Tang is space 2 (first patio) and space 4 (second patio), while the traffic space of Wuben Tang is space 7′ (aisle).

From the spatial deconstruction diagram in Figure 12, it can be seen that Airi Tang connects the other five spaces with two traffic spaces, where the courtyard serves as a traffic hub and directly connects to the hall, forming a "courtyard–hall" connection mode. From the perspective of connection effectiveness, the courtyard as a traffic space mainly

connects the two halls in the front and back, and the number of connected spaces is small, and there is no significant difference from the rest of the spaces. Therefore, there is not much difference in accessibility between the courtyard and the rest of the spaces in Airi Tang, and the level of restriction is light, and the spatial relationship is relatively equal. Wuben Tang consists of six traffic spaces and seven non-traffic spaces, and the aisle can reach all spaces, showing extremely high accessibility, forming an aisle connection mode. The central hall has important functions such as holding sacrifices and gatherings, and not everyone can reach it. It has a high status and a sense of awe due to its secrecy. The level of space restriction is high. The highly accessible aisle and courtyard have a large difference in spatial status from the highly secretive central hall, resulting in a hierarchical nature of Wuben Tang's space.

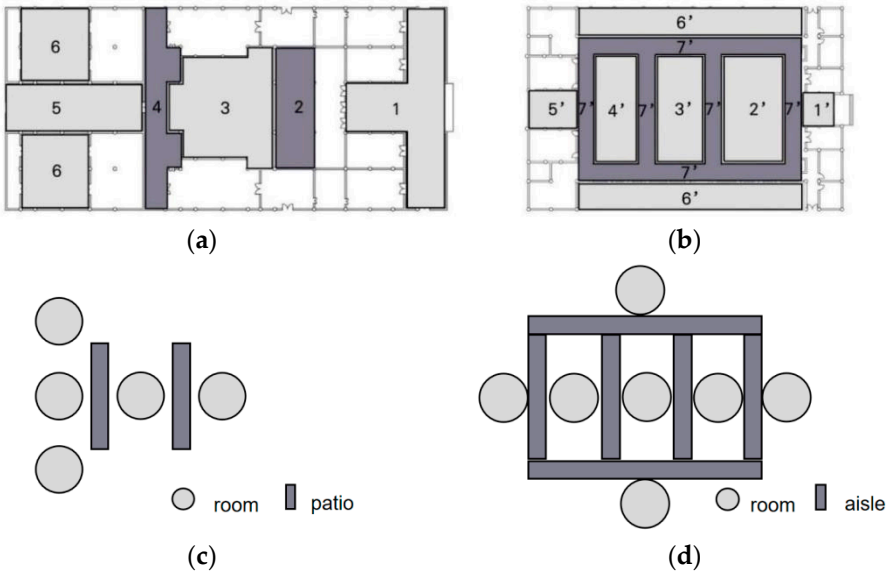


Figure 12. Modes of space connection in Airi Tang and Wuben Tang: (**a**) before deconstruction of Airi Tang; (**b**) before deconstruction of Wuben Tang; (**c**) after deconstruction of Airi Tang; and (**d**) after deconstruction of Wuben Tang (1. front hall, 2. first patio, 3. middle hall, 4. second patio, 5. back hall, 6. bedroom, 1′. front hall, 2′. first patio, 3′. middle hall, 4′. second patio, 5′. back hall, 6′. bedroom, 7′. aisle).

Exploring the historical origins of the two schools can reveal that the inconsistency of the spatial relationship between the two schools of dwellings is due to the different social and cultural influences of Confucian culture on the two regions. The difference in accessibility between the various spaces in Airi Tang is relatively small, and the spaces are relatively unblocked, which is related to the prosperous Confucian merchant culture in Huizhou. Huizhou merchants were famous merchant groups in Chinese history. They traded salt, tea, timber, and other commodities in various places in Jiangnan during the Ming and Qing dynasties. Because they often communicated and co-operated with foreign merchants, they emphasized the connectivity of commercial paths. In order to avoid cargo congestion caused by the low smoothness of traffic paths during the process of commercial development, the smoothness of each traffic path becomes particularly important. The long-term business trips of merchants brought more openness and tolerance in social and cultural thoughts, and their Confucian culture also reflected more on the commercial use of Confucianism, pursuing freedom, equality, and wealth through business [35]. After succeeding in business, Huizhou merchants also used more wealth in the education of their descendants and the construction of dwellings [36]. The ancient people of Huizhou were less influenced by the traditional hierarchical thinking, and reflected this open and tolerant thinking in the construction of dwellings, pursuing a spatial form that adapts to local conditions and is equal and comfortable. In terms of spatial layout, a complete dwelling is

composed of "small units", which are based on a single family as a unit and are the smallest unit of economic activity. Its spatial prototype generally includes two to three rooms, which are relatively independent and have convenient connections with each other [37]. The status of small units is relatively equal. The difference in accessibility between the various spaces in Wuben Tang is relatively large, and there are large hierarchical restrictions between the spaces, and their status is not equal, which is related to the hierarchical culture of officialdom in Wuzhou. In the Ming and Qing dynasties, a large number of bureaucratic families immigrated to Wuzhou, and the local Confucian culture was deeply influenced by the bureaucratic clans. Confucianism pays attention to respecting the old and loving the young, respecting teachers and education, and following rules. Therefore, it attaches more importance to the feudal patriarchal system and shows a strong color of official education discipline, which is reflected in the official use of Confucianism. The manifestation of official education is to define the hierarchical relationship between people, and even introduce the traditional Confucian etiquette in the communication between superiors and subordinates or among peers. This unequal mode of thinking directly leads to the lack of freedom in the mode of behavior and weakens people's mobility. Materialized to the living space, the result is that the rooms used by each family member should follow a certain order. The spatial status is clearly distinguished by the orientation based on the central axis. For example, the middle position is the highest, so the middle hall has the highest spatial status, which means it is highly centralized. And, as another example, the wing rooms on both sides of the central axis also are divided into different levels, of which the left side was more honorable, in the period when Wuben Tang was built. Considering the level difference, there is a large gap in accessibility between each space, and there are large hierarchical restrictions between the main use spaces, and aisles are used for efficient connection.

3.2. The Relative Variability of Hui-Style Traditional Dwellings and the Consistency of Wu-Style Traditional Dwellings

To compare and analyze the relationship between the HH integration and R3 integration of the two dwellings, a scatterplot was drawn by depthmap software. The horizontal co-ordinate was defined as R3 integration and the vertical co-ordinate was defined as HH integration. The intersections represent the different rooms in the residential house, and the value of the fit degree (R^2) was calculated as shown in Figure 13. This was carried out to compare the values of the dwelling spaces more clearly, as shown in Table 5.

Table 5. Comparison of HH integration values and R3 integration values.

Airi Tang					Wuben Tang				
Serial	**Space Name**	**HH Integration**	**R3 Integration**	**Difference**	**Serial**	**Space Name**	**HH Integration**	**R3 Integration**	**Difference**
1	Front hall	0.99	1.55	0.56	1′	Front hall	1.52	1.58	0.06
2	First patio	1.23	1.72	0.49	2′	First patio	2.81	2.81	0
3	Middle hall	1.2	1.33	0.13	3′	Middle hall	1.37	1.42	0.05
4	Second patio	1.35	1.68	0.33	4′	Second patio	2.65	2.65	0
5	Back hall	1.15	2.03	0.88	5′	Back hall	1.43	1.48	0.05
6	Bedroom	0.63	0.86	0.23	6′	Bedroom	1.57	1.74	0.17
7	Aisle	-	-	-	7′	Aisle	3.57	3.57	0

As can be seen from Figure 13, the distribution of co-ordinates of each space in Airi Tang are relatively dispersed, and the local integration degree of the spaces with high global integration is not necessarily high, indicating that there is no consistency in the pattern of high and low values of the global integration degree and the local integration degree of the space in Airi Tang. As shown in Table 5, the space with the highest global integration in Airi Tang is space 2 (the second courtyard) with a value of 1.35, but the space with the highest local integration is space 5 (the rear hall) with a value of 2.03. The co-ordinates of each space in Wuben Tang are relatively concentrated, and the space with high global integration, space 7′ (aisle), also has the highest local integration. The rule of high and low values of global integration and local integration of Wuben Tang's spaces is consistent. At

the same time, it can be seen from the scatterplot that the fit degree R^2 = 0.99 of Wuben Tang is close to 1, indicating that there is a very high correlation between the values of global integration and local integration, which are almost consistent. As shown in Table 3, the differences in the values of global integration and local integration of each space in Wuben Tang are relatively small.

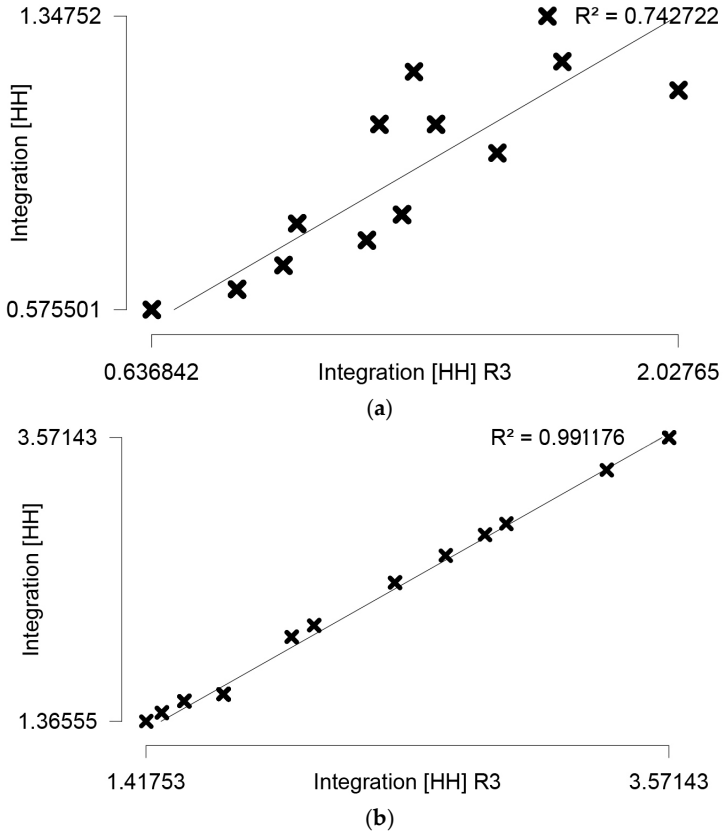


Figure 13. Scatterplot on the fit degree of both Airi Tang and Wuben Tang: (**a**) scatterplot on the fit degree of Airi Tang; and (**b**) scatterplot on the fit degree of Wuben Tang.

The space with the highest global integration in Airi Tang is space 2 (the second courtyard), which is the boundary between the internal and external relations of the dwelling, connecting more spaces, and has high aggregation, and also is the center of the dwelling in the global scope. But, in the local scope, the space with high aggregation of the dwelling is space 5 (the rear hall). The rear hall, as an internal space of the dwelling, is generally a place for women's daily activities, which connects many wing rooms, has a high degree of aggregation in the local scope, and becomes the center of the dwelling in the local scope. The space with the highest global integration and local integration in Wuben Tang is space 7′ (aisle), which connects all spaces of the dwelling. Whether in the global or local scope, the aisle is the most concentrated space, so there is consistency in the fact that the center for both global and local congregation of Wuben Tang is in the aisle.

The characteristics of the spatial center of Airi Tang, which is dynamic, and Wuben Tang, which is consistent, are closely related to the different life activities of the people in the two places under the influence of different Confucian cultures. The ancient Huizhou people paid more attention to the social relations established by human feelings, which was reflected in the importance of life activities within the family. Therefore, the spatial center would change accordingly within a smaller range of life activities. Huizhou Confucian culture is a kind of "popularized" thought that starts from the internal family ethics. Zhu Xi's family rites and village covenant are based on "a kind of grassroots social relations established by blood ties, locality, and human feelings" [38]. In ancient times, the middle door of the dwelling was generally used as the boundary to distinguish the internal and

external space when men were at home, under the influence of the idea that men and women were different inside and outside. Women were not allowed to cross the middle door and generally stayed in the internal space such as the back hall and wing rooms, and their life activities were mostly concentrated in the back hall, so the back hall became the spatial center of the dwelling within a local range. When men went out, women became the main users of the dwelling, and they would also cross the middle door. Therefore, the spatial center of Airi Tang was influenced by life activities and was variable. Due to the migration of a large number of bureaucratic families, Wuzhou Confucian culture was deeply influenced by feudal bureaucracy, reflecting the "officialized" thought. This thought was also reflected in the sense of order that people followed in their lives. No matter what range of activities they were in, the spatial center remained consistent. In daily life, people also followed rules and order. They reached any space through aisles and did not shuttle freely. Therefore, aisles became the most frequently used space in life, with exclusive traffic attributes, forming a consistency in the spatial center and emphasizing the order principle. This officialized thought prevailed and there were a large number of normative books. Lv's Village Covenant and Village Rituals and Zheng's Norms are the integration of Jinhua bureaucratic clan thought, of which the main text was divided into "Encouraging Virtue and Business" and "Interacting with Rituals and Customs", etc., to regulate behavior, manners, clothing, and seniority order [39]. The books expound the embodiment of the feudal clan system in the family, which, once again, confirms the influence of the orderliness of the clan system on the space of ancient people's life activity in Wuzhou, characterized by the consistency of the center.

3.3. The Lower Viewshed Control of Huizhou Traditional Dwellings Compared to That of Wuzhou Traditional Dwellings

To compare and analyze the differences of the two schools of dwellings in terms of the control of the viewshed, the HH integration of the dwellings is used as an indicator. The analytical map of the viewshed integration of the two dwellings is derived from the depthmap software, as shown in Figure 14.

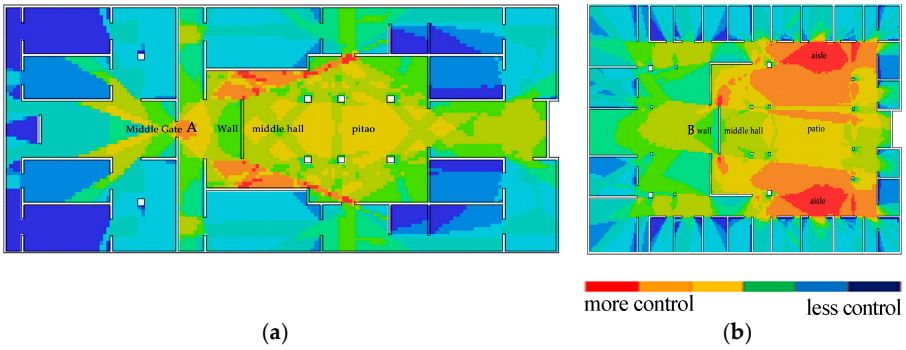


Figure 14. The analytical map of the viewshed integration of the two dwellings: (**a**) The analytical map of the viewshed integration for Airi Tang; and (**b**) The analytical map of the viewshed integration for Wuben Tang.

As can be seen from Figure 14, the color of the courtyard and the central hall of Airi Tang is warm, and the viewshed integration is high. The color of the space behind the dwelling screen wall is cold, and the viewshed integration is small. The color of the aisle and the first courtyard of Wuben Tang is warm, and the integration is high. The color of the space behind and around the screen wall of the dwelling is cold, and the viewshed integration is small. It can be seen that the sight lines of the two dwellings are blocked by the screen wall, which is set behind the central hall, and this often serves as a barrier to separate spaces, prevent spaces from being seen at a glance, block sight lines, weaken openness, increase spatial levels, and reflect the hierarchy in spatial perception. The sight lines blocked by the screen wall do not disappear completely, but converge to a point,

becoming the center of vision. The center of the viewshed is also the area with the highest viewshed control [20], so starting from the center of the viewshed to analyze the vision of the dwelling can more comprehensively observe the vision of each space of the dwelling. For ease of description, we denote the center of the viewshed of Airi Tang as point A and Wuben Tang as point B.

Observing from the center-of-viewshed points A and B, it can be found that the two dwellings have different visible distances and visual concentration ranges. In terms of visible distance, the sight line of Airi Tang extends from point A to both ends of the screen wall and then to the end of the central hall, forming a long visible distance. The sight line of Wuben Tang starts from point B, extends to both ends of the screen wall, and then almost disappears, forming a short visible distance. The reason for this difference is related to the distance between the screen wall and the middle door. The screen wall of Airi Tang is far from the middle door, and the extension of sight line is long, and the visible distance is large. The screen wall of Wuben Tang is close to the back door of the central hall, and the extension of sight line is short, and the visible distance is small. In terms of visual concentration range, the visual field of Airi Tang is concentrated in the courtyard and the central hall, while the visual field of Wuben Tang is concentrated in the first courtyard and the aisle. The visual concentration range corresponds to the spatial connection mode. Airi Tang is in a "courtyard–hall connection" form, and it can be seen from the previous analysis that Airi Tang does not have a highly aggregated space, the relationship between spaces is relatively equal, and there is no situation where one space is highly concentrated and controls other spaces, indicating low control. Wuben Tang is in an "aisle connection" form, where the aisle connects and controls each space, showing high control.

The low visual control of Airi Tang and the high visual control of Wuben Tang are both related to their spatial forms and the setting positions of the screen walls, and these two aspects of differences are deeply influenced by the different ideological and cultural characteristics of the two places.

Official culture has an important influence in Wuzhou traditional culture. The strict feudal clan system in Wuzhou made people pay more attention to hierarchical order. Zhu Xi's *Classified Sayings* said, "Rites are natural, but they are called principles. When they are made into rites, there are also views of grades, sections and articles" [40], which shows the important existence of the ritual system. After the establishment of the Qing Dynasty, in order to quickly restore social order, the rulers strengthened the advocacy of Confucian education [41], and vigorously strengthened the construction of ritual and hierarchical order. There were many noble families who migrated from the north in the Wuzhou area. They settled together with blood ties within the clan after they moved south. This mode of clan settlement was reflected in the residential space as taking clanism as the center. Its residential plane layout was centripetal [42]. The middle hall space of Wuben Tang was located in the center of the dwelling, which was a reflection of clanism characteristics in the residential space. The middle hall was mainly used as an important place for discussion and sacrifice within the clan. It had the highest traditional status in the dwelling and was characterized by secrecy and solemnity. The aisle from the middle hall to the entrance was the "mouth" of the dwelling. The ancients believed that this was an important passage for the dwelling to connect with the external environment. The line of sight was restricted by the rooms on both sides and the screen wall. The rear space of the middle hall was the place where the elders lived, mainly acted as bedroom space, and had a high degree of privacy. In ancient China, there was a moral rule of "do not look at things which do not conform to the rites". The degree of sight extension was adjusted by blocking and limiting the dwelling for spaces with high status and high privacy. The sight restriction of the middle hall, the passage in front of the middle hall, and the rear space of the middle hall all showed that the ancients respected the spaces with high status and high privacy in terms of rites, and this was also a materialized expression of hierarchical order in Wuzhou traditional dwellings.

4. Discussion

4.1. Discussion of Research Methods

Based on the analysis ability of the corresponding relationship between architectural space and social culture, space syntax has shown its advantages in the research of traditional dwellings in some countries. However, previous studies have mostly used the combination of convex space and viewshed field for spatial analysis. This paper verifies the results of convex space and viewshed field analysis with the fit degree, thus better demonstrating the corresponding relationship between the spatial layout of Chinese traditional dwellings and different Confucian cultures. This provides a more feasible research idea and method for an in-depth study of the relationship between traditional culture and dwelling layout, so as to further trace the cultural origin of traditional dwellings. The combination of qualitative and quantitative research will bring a broader prospect for the future research of traditional dwellings.

4.2. Accurate Positioning and Differentiation of Spatial Layout Characteristics of Traditional Dwellings in Huizhou and Wuzhou

By analyzing the spatial layout of typical traditional dwellings in Huizhou and Wuzhou using space syntax and identifying the corresponding relationship between traditional dwellings and traditional culture in Figure 15, this paper finds that the connection mode, activity center, and spatial form in the spatial layout of traditional dwellings are the specific manifestations of the spatial characteristic differences of traditional dwellings. These differences are directly related to the fact that the Confucian culture of the two places is influenced by the two backgrounds of "commercialization" and "officialization", and the two cultural forms of Confucian business and Confucian government are formed to give the traditional dwellings adaptability to the specific socio-cultural and natural environments. This verifies that the deep integration of Confucian culture and local culture can produce rich and diverse forms of traditional residential spatial layout on the basis of maintaining the mainstream architectural style in different cultural regions. This provides us with a more specific perspective in order to understand the relationship between culture and traditional residential spatial form. Exploring the influence of Confucian culture on the spatial layout of traditional dwellings in different regions can enrich the cultural research content of traditional dwellings. At the same time, the academic argument about the "similarity" of Hui-style and Wu-style traditional dwellings' characteristics has been broken to a certain extent for a long time in the past, which has a positive significance for the research of the two schools of dwellings.

4.3. Traditional Dwelling Protection and Reuse Work

Traditional dwellings are the carriers of traditional culture inheritance and the most intuitive expression of regional characteristics. The purpose of using space syntax to study the influence of Confucian culture on the spatial layout of traditional dwellings is to further explore the relationship between traditional dwellings and traditional culture, and to conduct comparative studies on traditional dwellings in various regions of China and explore sustainable development strategies for continuing traditional dwellings.

For the traditional dwellings in the Huizhou and Wuzhou areas mentioned in this paper, and based on the research of the spatial layout of the traditional dwellings in the two places and the corresponding relationship of family culture, regional culture, and social culture, it can not only guide the protection and reuse work of the traditional dwellings in the two places according to local conditions, but also can sort out and corroborate the family life context of the ancient Huizhou and Wuzhou areas from the perspective of architectural space and explore the past life scenarios of the traditional dwellings in the two places, so as to better promote the cultural inheritance of traditional dwellings.

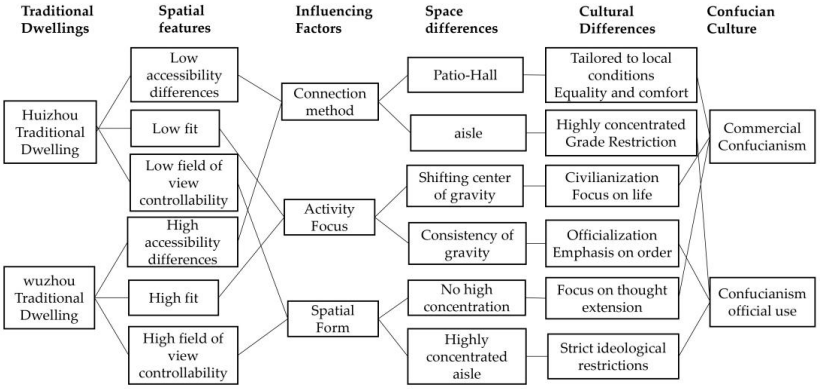


Figure 15. The correspondence between traditional dwellings and traditional culture.

4.4. Limitations and Further Research

There are some limitations in this study, which are reflected in the following two aspects. First, the comparative study of the relationship between the spatial layout and Confucian culture of Hui-style and Wu-style traditional dwellings has not yet gone deep into the research of each space detail of traditional dwellings due to the limitation of the historical and cultural books of traditional dwellings; and second, this study only analyzes the typical traditional dwellings in the central areas of the two schools, and has not yet involved the surrounding areas. In future, more research samples need to be further included, and a research system of the relationship between the spatial layout and Confucian culture of Chinese traditional dwellings shall be gradually established, which will provide a theoretical basis for the research and subsequent protection and reuse of traditional dwellings in areas where Confucian culture prevails.

Therefore, the next step of the research will be to further analyze the architectural history of the Huizhou and Wuzhou areas, and to deepen the research on the spatial details of traditional dwellings through multi-channel and interdisciplinary research methods. Secondly, we will further expand the research area, such as other areas under the influence of Confucianism and other regions of China, so as to gradually establish a research system on the relationship between Chinese traditional residential space and Confucian culture, and provide sufficient basis for extracting more clear cultural elements of traditional residential space in various regions and the subsequent protection and reuse of traditional dwellings.

5. Conclusions

In order to explore the differences between the ancient Huizhou and Wuzhou dwellings in China, this paper attempts to compare and analyze the spatial and cultural aspects of the two places. The research first selects typical cases of traditional dwellings in the two places, and uses space syntax to analyze their spatial characteristics. Since both places are areas where ancient Confucian culture prevailed, it further explores the reasons for the formation of different spatial characteristics according to the different Confucian cultural characteristics of the two places, explores the deep cultural differences behind the space, and then truly positions the two schools of dwellings from the spatial and cultural differences and, effectively, distinguishes the two schools of dwellings from the perspective of qualitative and quantitative analysis. This research has formed a useful supplement to the study of the space and culture of traditional dwellings in the two places, with the following findings:

1. Although the ancient Huizhou and Wuzhou dwellings in China have similarities in their architectural appearance, they have obvious differences in their spatial layout. Based on the Confucian culture of “Confucian merchants”, Hui-style traditional dwellings are more flexible in spatial combination than Wu-style traditional dwellings. It is manifested in the connection form. Hui-style traditional dwellings generally adopt the “courtyard–hall” connection mode, which reaches the surrounding space through the courtyard and

hall, so the space achieves strong permeability, and the spatial relationship is relatively equal and variable. Based on the Confucian traditional culture of "official learning" color, Wu-style traditional dwellings mostly use the aisle connection mode, which reaches each space through aisles, and in which different spaces form different levels, according to their relationship with the central axis, and also pay more attention to ritual and orderliness.

2. In terms of space use, the center of family activities in Hui-style traditional dwellings is variable. As a result of the commercial thought, its plane layout reflects more popularized thought on the basis of traditional orthodoxy, and the family members are relatively freer in their activities in the dwelling, paying attention to communication and living convenience. Wu-style traditional dwellings show the consistency of the activity center in various life scenarios, reflecting the officialized thought, and attaching importance to order.

3. Combining the spatial layout of the dwelling and the characteristics of family activities, Hui-style traditional dwellings present a low viewshed control and low concentrated visual range, integrating the spirit of Huizhou merchants pursuing freedom and equality into the spatial experience of the dwelling, and paying attention to the extension of thought and spirit. Wu-style traditional dwellings present a high viewshed control under the restriction of Confucian official culture, strictly integrating the spirit of not looking at things which do not conform to the rites in ancient China into the spatial layout and experience, strictly following the hierarchical restrictions, being in different positions according to different identities and statuses, and also concentrating people's visual range on the aisle, trying not to touch other spaces, following strict hierarchical order, and having high ideological restrictions.

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