Analysis of spatial structure and living culture of patio and courtyard dwellings in southern Hubei from the perspective of “cultural ecology” -- taking Ruijin Chuanfang ancient residence as an example

Xinyi Huang¹, Hong Xu¹,²,³, Ning Xie¹, Mengya Xu¹ and Jin Zhao¹

¹School of Urban Construction, Wuhan University of Science and Technology, Wuhan 430065, China; ²Institute of Smart City and Intelligent Urban-rural development, Wuhan University of Science and Technology, Wuhan 430065, China.

³Email: xuhong@wust.edu.cn

Abstract. The concept of cultural ecology is not only the basic requirement of self-innovation and self-protection of traditional culture, but also the effective response of traditional culture under the background of cultural crisis. From the perspective of cultural ecology, this study takes Ruijin Chuanfang ancient residence as an example to analyse the mutual adaptation between spatial elements such as spatial combination, functional distribution and construction structure of traditional folk dwellings in southern Hubei province and local unique cultural elements such as natural environment, economic environment and social environment.

1. Culture ecology background and history

1.1. Overview of cultural ecology

Cultural ecology is a new cultural discipline which is produced by the intersection of culturology and ecology. In 1955, Julian H. Stewart, an American cultural evolutionist, proposed the need to establish a “cultural ecology” in his theory of Cultural Change: Methods for Multi-Linear Transformation, marking the establishment of this discipline [1].

Stewart first introduced ecological thinking and systematic methods, discovered the causal link between culture and environment, systematically demonstrated the role, type and significance of environment for human beings and social organizations, and advocated focusing on the relationship between specific behavioral patterns in specific environments, and proposed the basic research steps:

(1) “Analyze the interrelationship between production technology and the environment.”
(2) “Analyze the patterns of behavior involved in developing a particular area with a particular technology.”
(3) “Determine the extent to which the behavior patterns required for environmental development affect other aspects of culture.”

Based on Stewart’s theories and methods, the practice and theory of cultural ecology advanced, and several representative works emerged: R. M. Nettin’s study of the inhabitants of Kofyar on the Jos Plateau, Nigeria [2]. R. Rappaport’s account of the rituals and war of Tsembaga Maring in the hinterland of New Guinea [3].
Several cultural ecologists of the first generation laid the theoretical foundation of this discipline. In the international academic circle, the influence of cultural ecology is gradually expanding. For example, Japan held an international seminar on cultural ecology in 1995 and organized several international academic seminars on “Disseminating New Technology and Cultural Ecology”. Kuala Lumpur held an international seminar on cultural ecology in 1999. The theory of cultural ecology is gradually absorbed and extended by more disciplines, or new disciplines are derived [4].

1.2. The brief history of traditional folk dwellings in Southern Hubei

The area of Southern Hubei mainly comprises the city of Xianning, the southern part of Wuhan, the city of Huangshi, Ezhou, Shishou and other areas. The southern part of Hubei Province is adjacent to the province of Hunan and Jiangxi. To the south of the adjacent line lies Mount Mufu, with Yangtze River running through it. Natural factors allowed the culture of Southern Hubei to impact on the culture of Huizhou, Ganjiang, Huxiang and Xijiang through time. Hence the culture of Southern Hubei has a pluralistic fusion of the form.

From the Tang dynasty to the Ming and Qing dynasties, the population of Jiangxi began to migrate to Hubei. These immigrants not only brought the culture of Ganjiang, but also brought the construction technology and the housing concept of Jiangxi area. To this day in most areas of Southern Hubei are still resided by the language family of Jiangxi, and the architectural style was even more closely related to that of Jiangxi’s [5].

1.3. The background of “Ruijin Chuanfang” ancient folk dwellings

“Ruijin Chuanfang” ancient folk dwellings are a form of traditional residential buildings with courtyards in Ming and Qing Dynasty, located in Longkou Feng Village of Ma Qiao Town in the southern part of Xianning (Figure 1). Feng Village near Longkou is a natural village in the mountainous area of Southern Hubei. The village is backed by Mount Longquan, while facing towards Mount Guanyin. Two streams at the foot of the mountain pass through the village then converge at the entrance of the village, forming a “new street near a pond.” The traditional buildings in the village radiate around the pond.

Figure 1. Location of Feng Village near Longkou.

Longkoufeng Village is a typical clan-blood village. The villagers are mostly surnamed Feng, descendants of Feng Jing, who was the deputy minister of the Northern Song Dynasty. During the King Hongwu period of Ming Dynasty, the offspring of Feng Jing moved from Nanchang, Jiangxi, to the mountainous area of Southern Hubei with the migration movement of the population from Jiangxi to the middle reaches of the Yangtze river. Ruijin Chuanfang” and other five ancient dwellings built by the Feng brothers during the King Chenghua period of the Ming dynasty, are typical representatives of rural architectures in Southern Hubei. During the Cultural Revolution, “Ruijin Chuanfang” was artificially damaged, its horse head walls and sculptures were damaged to varying degrees. In 2010, this building was identified as “immovable cultural relic” during the Third National Cultural Relic Census in Xian’an District. In 2016, People’s Government of Maqiao Town funded a series of renovation and protection work for the “Ruijin Chuanfang” architectural complex.
2. Culture ecology analysis of the spatial structure and living culture

2.1. Special gate of Ruijin Chuanfang residential

The gate is an important symbol of the entrance to a dwelling. In “Ode to the Heart of Snow” once said: “the gate is also the mouth of gas. The mouth of gas is just as the mouth of people, people’s mouth is upright in order to breathe and eat; the door of the people is upright so it would be easier for the house to accept gas, people and things in and easier to let them out”. “The door is upright, so the family will be successful”, said in Boshan Article. “The gate is of great importance to the mansion as a whole. Its orientation and form indicate the social status of the host, as well as affecting the layout of the house, and assigning the host’s expectation of “success in his family”.

In the aspect of gate orientation, there is a saying that “open the door to see the well-lit plain “in ancient Chinese geomantic theory, that is to say, the gate of the house should be suitable to face the open flat ground or the water surface. If the gate is facing a distant mountain peak, the ancients believed that the placement would cause pressure that “block the door”. Thus the “power flow” could not circulate smoothly, inflicting bad effects on the owner’s fortune and health. Therefore, when the ancients chose the orientation of the door during the construction of the residence, they would try to avoid this situation of “coming straight to the mountain”. If the placement is also subjected to other conditions, the door will be placed slightly oblique to avoid the impact of the hilltop on the residence.

![Figure 2. Photo of gatewall.](image1)

![Figure 3. Plan of gatewall.](image2)

The gate-facing design of Ruijing Chuanfang’s ancient dwelling is used in this way. The gate is not parallel to the external wall, a slight angle is formed between the southeast and the outer walls, so that the entrance is directly opposing the far-off mountain depression. (Figure 2, Figure 3) According to a local old resident, such gate orientation allows the mountains to fully enclose the house (like Green dragon on the left and White tiger on the right), shielding it from bad luck. The fresh wind from the mountain col will transport the fortune into the owner’s house. Scientifically, such orientation can bring more open field of vision, the psychology that gives a person with positive up is hinted, in the meantime, it provides better air circulations and healthier interior climate.

![Figure 4. Vertical view of eight-character gatewall in Huizhou Architecture (Yao Guangyu. Huizhou Ancient Residence eight-character wall and door practice).](image3)

![Figure 5. Vertical view of Ruijing Chuanfang eight-character gatewall.](image4)
The gate of Ruijing Chuanfang is an eight-character gatewall, but it is different from the eight-character wall of Huizhou. On typical eight-character gatewalls of Huizhou architecture, brick-eave tiebeam, carved decorations and plaques are built on the upper part of the gate frame for several layers [6]. At the top of the door frame, 3 layers of brick cornices was extended. The walls on both sides of the door meet to form a figure resembling the Chinese word “eight” [7] (Figure 4).

Table 1. Comparison of the eight-story door building components.

| Component                  | Eight-Character Gatehouse in Anhui | Ruijing Chuanfang |
|----------------------------|------------------------------------|-------------------|
| corner pier                | √                                  | √                 |
| stacking head wall         | √                                  | √                 |
| screen wall                | √                                  |                   |
| trench tile                | √                                  |                   |
| fish kiss                  | √                                  |                   |
| golden flower board        | √                                  |                   |
| stone door frame           | √                                  |                   |
| gatehouse                  | √                                  |                   |
| flower ridge               | √                                  |                   |
| diagonal ridge             | √                                  |                   |
| sealing wall               | √                                  |                   |

Compared with the eight-character gatewalls in Huizhou architecture, the eight-character gatewalls in the ancient folk houses of Ruijin Chuanfang have a simpler style. There is a plaque of “Ruijin Chuanfang” above the door frame, with no engravings, no independent diagonal ridges and without decorative fish kisses (Table 1). The stacking head walls of eight-character walls of Hui-style architecture are lower stacking head wall than the gate-roof itself and are not connected to the gate-roof independently. The stacking head walls on both sides of “Ruijin Chuanfang” ancient residential buildings are higher than the gate-roof. The stacking head walls pass through the black tile eaves (which is above the gatewall), connecting with the gatehouse as a whole. The top of the stacking head walls of the Hui-style architecture is rectangular in shape, while the two corners of the stacking head wall of “Ruijin Chuanfang” ancient residential buildings are flying up, shaped like the head of a dragon with a pearl in its mouth, reflecting the (lack adjective) identity of the owner of the mansion (Figure 5).

2.2. Plane layout and clan concept

Ruijin Chuanfang is a building of five-layer ancient dwelling in Ming Dynasty. As a whole, Ruijing Chuanfang ancient residential buildings combine virtual with reality in space and are scattered in heights. The whole plane is approximately rectangular (Figure 6).

Figure 6. Plane diagram of 5-layer layout.  
Figure 7. Front 3-layer plane diagram.
Inside the first outer wall, there are five bays. The middle bay faces the patio, forming a semi-enclosed space, shaped like a hallway, which plays the role of transition between indoor and outdoor space. The bays on both sides are distributed symmetrically with the gate as the center. Due to the fixed small stone window on the external wall, the four rooms of the first layer are in poor ventilation and lighting conditions, thus being used as kitchen or storage for servants and even as pigsty (Figure 7).

The two square rooms on both sides of the patio, which are approximately of the same width as the patio, are called “wings” by local people. In some literature, these two rooms are sometimes called “aisles” [8]. The two words “wing” and “aisle” are derived from siheyuan style dwellings in the north. In siheyuan styled dwellings, principal room is the center of the building. The rooms on the both sides of the principal room which are short in height and shallow in depth like two ears hanging on both sides of the main room, so called “er fang (aisle)”. The wing is located on both sides of the principal room. Together with the principle house, they enclose a courtyard. aisles can also be built on both sides of the wings, which are called the chamber rooms (Figure 8) [9]. In the patio-courtyard residential buildings in Southern Hubei, patios are the core of the buildings, and the planar structure is gradually growing and dispersing on the basis of the central axis of the patios (which are made of the roofed semi-open gray space and the hall extending out of the patios). Therefore, on both sides of the main axis, the symbolic meaning and distinction between “chamber” and “ear room” become blurred. According to the interview, the villagers of Feng Village near Longkou believe that the “wing” is close to the patio, which grants it access to the sky light, absorbing the aura. Hence, the wing room is generally used as a separate living space or study for the younger generations of the family, a promising eldest son, or an unmarried daughter.

Rooms on both sides of the hall are called parlours, which are used mainly as bedrooms. Parlours that go further out are sometimes referred to as “side room”, which are mainly used as bedrooms.
Ancient dwellings of Ruijin Chuanfang have roadways in the middle of every part (Figure 9). It is understood that in the past, these roadways are generally used as passages for servants or women. The second and the fourth layers have plank walls in the middle of the halls, which is wrongly called “Bao bi (the treasure wall)” by the local people. (Figure 10) The pronunciation symbolizes people’s desire for wealth and luck. On both side of the plank walls opened a door. The middle of the wall is sealed off. Contrary to the patio, which keeps the spaces separated but interacted, the plank wall creates essential divisions of the space. The first wall makes it impossible for the guest to see through the living space of the host, while the second wall keeps the ancestral niche out of the visible distance of the younger generations in the family at a glance. In the patriarchal Ming Dynasty, women were not allowed to pass by the “treasure wall”. They could only walk between the roadway and the residence behind the treasure wall. The boards in the middle of the “treasure wall” are usually sealed, only when families pick up relatives or perform funerals do they remove the boards. They would later put the boards in coffins or sedan chairs.

2.3. The axis of patio-courtyard

There are two kinds of patio in the ancient residence of “Ruijin Chuanfang”, one is called the soil-glyph (refers to the Chinese character “earth” glyph) patio that has a high ground in the middle, and the surroundings resembling a drainage ditch (Figure 11). The other is referred as the “tiger eye patio” whose horizontal edge is attached to the wall. (Figure 12) [10].

The soil-glyph patio in the middle of the courtyard and the tiger-eye patio that are symmetrically distributed on both sides of the wing house form the core together and form unit modules in series with the patio, laneway and room. They are stacked successively from south to north, forming the plane space of the entire “Ruijin Chuanfang” ancient residential house (Figure 13).

The central axis of the mansion rises from south to north, with four patios on the four corners. It makes the living space of each house room separate from each other. The paths on both sides of the plank wall (Figure 14) make the units separated but blending with each other. The axis of the whole mansion led to the solemn ancestral hall in the alternating light and shadow as well as the spatial transformation of “patio (open space) → hall (grey space) → patio”.

This trick which uses the axis to express the solemnity of the end space is common in ancient dwellings in Southern Hubei, such as the ancestral hall space of “Wang Mingfan’s house”, a Qing Dynasty residence located in Wutian Village, Dalu Town, Xianning City.
The hall of the house was hidden in the depths of the mansion that had five or eleven rooms. The Ancestral hall was in the center of the room, with a corridor of large and small patios leading to the outside. On front facade, the central axis composed of patios has a strong sense of enclosure and vertical feeling on both sides. Additionally, daylight comes from above the patio, making the axis interlaced with light and shadow, the ancestral hall at the end of the axis more mysterious and solemn. This is also the embodiment of clan ethics in the space organization of ancient houses [11].

3. Conclusions
As one of the basic narratives of culture, traditional residential architecture is an important value, indicating its relationship with its environment. Due to this, the continuity of culture in rural areas is closely related with the sustainability of traditional residential architecture [12]. The regionalism of traditional dwellings in southern Hubei is the development base of its sustainable development [13]. A healthy and green model of harmonious coexistence of humanity/industrial development with nature coincides with the core value advocated by today’s society. Therefore, the traditional residential dwellings have their unique and irreplaceable value, which can bring reference to modern architecture, and should be protected, learned and used by modern people [14].

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