Space and Culture: Isomerism in Vernacular Dwellings in Meizhou, Guangdong Province, China

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Abstract
Taking Hakka vernacular dwellings as an example, this paper discusses the relationship between culture and architectural form. Using survey data from 2,189 traditional villages in the Meizhou region, the authors identify seven types of dwelling and their spatial distributions. Four housing types (Hengtang, Lung Wai, Bar and Pillow) have a high spatial overlap. Architectural morphology, with respect to symmetry, unit design and prototypes is then discussed. The four major dwelling types share the same cultural essence despite having different physical forms. This confirms the phenomenon of isomerism in architectural morphology. The authors hold that the homogenesis of vernacular dwellings, or the "spatial prototype" as a symbol and carrier of culture, strongly controls the consistency of architectural design. Meanwhile, heterogeneity reflects specific strategies of housing construction. It gives residential spaces adaptability to specific sociocultural and natural environments. Meanwhile, it exhibits itself indirectly in the form of diversity. Isomerism offers an appropriate mechanism through which vernacular dwellings can balance the needs of the top-down national system, bottom-up family needs, and the natural environment. This brings a new perspective that increases our understanding of vernacular dwellings.

Keywords: Meizhou; vernacular dwelling; spatial distribution; spatial morphology; isomerism

1. Introduction
The relationship between culture and the spatial morphology of vernacular dwellings has been extensively discussed in the field of architecture (Rapoport, 1982; Hays, 1984; Hodder, 1994; Johnson, 2003). It is generally accepted that culture plays an important role in shaping architecture, as if the form of each dwelling carries a "cultural gene". (Rapoport, 2005; Robinson, 1989; Knapp, 1989;) In his book House Form and Culture, Rapoport (1969) pointed out that housing is a cultural phenomenon with functions that are more than just physical and practical. The study of vernacular dwellings requires reflection on cultural features such as conventions, taboos and aspirations.

It is true that culture and buildings reflect each other. The spatial morphology of dwellings often represents the culture of their residents. However, does that mean that a culture only creates one type of dwelling? Is it a one-to-one correspondence? During a field survey in Meizhou, Guangdong Province, China, the authors found a common phenomenon that various types of dwellings could exist in the same village, although its residents have the same family name, ancestors, and language. Why, then, have they built different types of dwellings? This paper attempts to provide an answer.

2. Types and Spatial Distribution Patterns of Vernacular Dwellings in Meizhou
2.1 Types of Vernacular Dwellings
Meizhou borders Jiangxi, Fujian and Guangdong Provinces. Its main inhabitants are from the Hakka ethnic group who originally migrated from China's central plains (Leong, 1997; Nakagawa, 1975). Now located in remote mountainous areas, many Hakka dwellings built in ancient times have been well preserved as part of China's cultural heritage. With unique forms and various spatial morphologies, these dwellings have interested many scholars.

Studies began in the 1970s and abundant findings have been published in Culture of Chinese Hakka Architecture (Wu, 2008), Hakka Patriarchal Clan and Hakka Residential Architecture (Pan, 1998) and Hakka Dwellings (SCUT, 2012). Recently, The Collection...
of Traditional Chinese Vernacular Dwellings (2014) provided a thorough investigation of the topic, including the dwellings in Meizhou. Based on the previous researches and the authors’ field survey, this paper classifies vernacular dwellings in Meizhou into seven types: Hengtang, Lung Wai, Bar, Pillow, Cuobao, Square Tulou and Round Tulou (Fig.1.).

<table>
<thead>
<tr>
<th>Type</th>
<th>Satellite Image</th>
<th>Photo</th>
<th>Sketch Map</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hengtang Housing</td>
<td></td>
<td></td>
<td><img src="image" alt="Hengtang Housing Sketch Map" /></td>
<td>The hall is located in the geometric centre and is flanked by rows of houses oriented perpendicular to it. Locations of the hall and the transverse houses can be moved outward to form multiple courtyards within the complex.</td>
</tr>
<tr>
<td>Lung Wai Housing</td>
<td></td>
<td></td>
<td><img src="image" alt="Lung Wai Housing Sketch Map" /></td>
<td>The structure of the front half is the same as Hengtang Housing, while the rear half has an added semi-circular configuration known as a Lung Wai. It can also move outward to form multiple courtyards.</td>
</tr>
<tr>
<td>Bar Housing</td>
<td></td>
<td></td>
<td><img src="image" alt="Bar Housing Sketch Map" /></td>
<td>Consists of several rows of transverse houses. Gable walls are arrayed in the front, giving the name &quot;Bar Housing&quot;. It can have configurations of two to six bars.</td>
</tr>
<tr>
<td>Pillow Housing</td>
<td></td>
<td></td>
<td><img src="image" alt="Pillow Housing Sketch Map" /></td>
<td>Similar layout to Lung Wai Housing, except that the semi-circular Lung Wai is replaced by a rectangular structure.</td>
</tr>
<tr>
<td>Cuobao Housing</td>
<td></td>
<td></td>
<td><img src="image" alt="Cuobao Housing Sketch Map" /></td>
<td>Several rows of detached houses surrounded by longer houses to the sides and rear. Similar to Pillow Housing but without a rear courtyard and with different spatial organization.</td>
</tr>
<tr>
<td>Square Tulou</td>
<td></td>
<td></td>
<td><img src="image" alt="Square Tulou Sketch Map" /></td>
<td>A square or rectangular building with multiple floors that encloses a courtyard. There is sometimes a separate building in the courtyard.</td>
</tr>
<tr>
<td>Round Tulou</td>
<td></td>
<td></td>
<td><img src="image" alt="Round Tulou Sketch Map" /></td>
<td>A multi-storey building of one or more circles that encloses a courtyard or venue for ritual activities.</td>
</tr>
</tbody>
</table>

Fig.1. Spatial Forms and Descriptions of Vernacular Dwellings in Meizhou

These types of dwelling have been mentioned in previous studies, with the exception of Cuobao Housing. Cuobao Housing has a similar spatial morphology to Pillow Housing, but they are significantly different in internal structure (Fig.5.). This will be elaborated on in the third part of this paper.
2.2 Spatial Distribution of Vernacular Dwellings

The authors conducted a survey of vernacular dwellings in 2,189 villages throughout Meizhou over a period of more than one year (from 2013 to 2015). Geographical information was used to analyze the spatial distribution of dwelling types (Fig.2.).

**Number:** Hengtang Housing was the most common configuration of vernacular dwellings, and was present in 1,948 (90%) of the study villages. Lung Wai, Bar and Pillow Housing were present in 883, 285 and 246 villages, accounting for 40.3%, 13% and 11.2% of the total, respectively. Cuobao Housing was present in 69 villages. Only five villages included Square Tulou, and six featured Round Tulou.

**Distribution:** Hengtang Housing was, by far, the most widely-distributed type of dwelling, and can be seen almost everywhere in Meizhou. Lung Wai, Bar and Pillow Housing are also extensively distributed, but not throughout the whole city. Cuobao Housing, Square Tulou and Round Tulou have a low distribution.

**Agglomeration core:** Located in Xingning Basin and Wuhua Basin, the spatial distributions of Hengtang and Lung Wai Housing largely overlap. A similar pattern exists for Bar and Pillow Housing, which are mainly distributed in the periphery of Meizhou city and in Pingyuan County. The agglomeration core of Cuobao Housing is in Fengshun County, while there are no distribution cores for Square Tulou or Round Tulou designs.

3. Isomerism in Vernacular Dwellings in Meizhou

3.1 Core and Marginal Cultures of Vernacular Dwellings

According to the cultural region theory, a mature cultural region has a relatively consistent overall culture as well as spatial differences between core and marginal regions. The core region holds the major feature of the overall regional culture and determines its development, whereas marginal regions are often influenced by neighbouring cultures (Crang, 1998; Kitchin, 2013). In terms of number, distribution and
density, Hengtang Housing, which accounts for the large majority, occurs across the whole region and has obvious agglomeration centres. According to cultural regional theory, this would undoubtedly make it the core cultural dwelling type of Meizhou. On the other hand, Cuobao Housing, Square Tulou and Round Tulou are in the minority or are narrowly distributed without a distribution core, they represent marginal cultural dwelling types.

However, the cases of Lung Wai, Bar and Pillow Housing are quite different. On one hand, the numbers of these dwellings are smaller than those of Hengtang Housing but larger than those of Cuobao Housing, Square Tulou and Round Tulou. On the other hand, though these types of dwellings may be widely distributed, there is still a great difference compared with that of the predominant type of Hengtang Housing. Thus, it is difficult to theoretically define the three types of dwellings: do they represent the core or marginal dwelling culture? Is there a transitional culture? If not, how can this phenomenon be explained?

3.2 Homogeneous and Heterogeneous Cultures of Vernacular Dwelling

When it is difficult to define a phenomenon within an existing theoretical framework, it can be useful to return to common experiences. In light of a priori or intuitive understanding, the authors can formulate a logical hypothesis and verify it, then decide whether to revise the existing framework or to re-examine the problem itself.

In previous studies, Lung Wai Housing has always been regarded as representative of Meizhou. Therefore, defining it as a marginal culture is not in accordance with the authors' prior knowledge. Even Bar Housing and Pillow Housing are frequently mentioned in relevant studies (Lu 2008, Pan 2013). In fact, statistics indicate that these types of vernacular dwellings exist at a relatively large scale and should not be considered as marginal culture. However, if we assume them to be representative of the core culture in Meizhou, or as different manifestations of one culture, we need to demonstrate that culture, and the spatial form of vernacular dwellings, is not a stereotyped one-to-one correspondence. Under some circumstances, one culture may manifest multiple forms of dwelling.

Fig.2 shows that, apart from covering a wide area and forming obvious agglomeration cores, the more important feature is that the distribution of the four most common dwelling types (Hengtang, Lung Wai, Bar and Pillow Housing) largely overlap with each other. Table 1. and Fig.3. offer further details of this feature.

From Table 1., it is evident that the overlap ratios between Hengtang Housing and other types of dwellings are extremely high. The high ratios are due to the large cardinality and wide coverage of Hengtang Housing. The overlap ratios between Lung Wai Housing and other types of dwellings are also relatively high. However, there is a special relationship between Lung Wai Housing and Square or Round Tulou. The high ratios are the results of the small numbers of the latter—only three and five respectively, while other relationships are built on the large numbers of shared villages. Besides, Bar or Pillow Housing, and Cuobao Housing, Square Tulou, Round Tulou have extremely low overlap amounts and ratios with each other.

Based on the overlap numbers and ratios (Table 1.), the seven types of vernacular dwellings can be categorized. Hengtang, Lung Wai, Bar and Pillow Housing are, to a certain extent, within the same category where their overlap ratios are high and the core regions overlap with each other. Cuobao Housing, Square Tulou and Round Tulou belong to another category. These types of dwellings share extremely low overlap ratios and their distribution cores rarely overlap. By this categorisation, together with the previous hypothesis, we can infer that Hengtang, Lung Wai, Bar and Pillow Housing all represent the core vernacular dwelling culture. The authors define it as the "homogeneous dwelling culture" because the high degree of non-accidental spatial overlap indicates some indisputable internal links. On the other hand, Cuobao Housing, Square Tulou and Round Tulou differ in terms of spatial distribution. They represent different cultures and can be defined as the "heterogeneous dwelling culture".

3.3 The Archetype and Isomerism of Vernacular Dwellings

The above results are inferred from spatial distribution patterns rather than from physical forms. Thus, the authors will return to the spatial morphology of dwellings to test the theory that one culture can exist in multiple forms of dwellings.

3.3.1 The Spatial Axis

There is a significant relationship between the axis and traditional Chinese culture. As the axis is a frequently used factor to explain the spatial sequence (Zhang, 2015; Zhu, 1997). As a representative destination of Hakka migrants, the dwellings in Meizhou have inherited the patterns from traditional Chinese architecture. Thus the nature of using an axis has its historical evidence (Dai, 1996). Fig.4. shows the common feature of the seven dwelling types—they are all symmetrical. The number and direction of the axes of symmetry vary—Hengtang, Lung Wai, Bar, Pillow and Cuobao Housing are bilaterally symmetrical. Round Tulou are radially symmetrical, while the Square Tulou has two axes of symmetry.

A small structure for sacrificial rites is built at the geometric centre of some Square or Round Tulous (Wang, 1993). It often faces the direction of the axis of symmetry, or the direction of the front gate. In this sense, there is only a single axis in Square or Round Tulou. Nevertheless, the authors should admit that no matter whether observing the concrete architecture...
itself or analysing the abstract graphic pattern, the axis of Square or Round Tulou is indeed different from that of the other types of dwellings. More importantly, these differences accord precisely with that of their spatial distributions.

In fact, many studies have revealed that Square or Round Tulous are widely distributed in southwest Fujian Province and are typical of the local culture (Huang 2002). Although these two types are also Hakka dwellings, they differ greatly from those in eastern

Note: As Hengtang Housing is distributed throughout the whole city of Meizhou, the overlap ratio between it and other types of dwellings is extremely high. Due to limited space, pictures of these ratios are not shown here. Refer to Table 1. for specific data about Hengtang Housing.

Fig.3. Spatial Distribution of Traditional Vernacular Dwellings in Meizhou

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung Wai - Bar Housing</td>
<td>Lung Wai - Pillow Housing</td>
<td>Lung Wai - Cuobao Housing</td>
</tr>
<tr>
<td>(n = 116)</td>
<td>(n = 134)</td>
<td>(n = 10)</td>
</tr>
<tr>
<td>Lung Wai - Square Tulou</td>
<td>Lung Wai - Round Tulou</td>
<td>Bar - Pillow Housing</td>
</tr>
<tr>
<td>(n = 3)</td>
<td>(n = 5)</td>
<td>(n = 64)</td>
</tr>
<tr>
<td>Bar - Cuobao Housing</td>
<td>Bar Housing - Square Tulou</td>
<td>Pillow - Cuobao Housing</td>
</tr>
<tr>
<td>(n = 1)</td>
<td>(n = 1)</td>
<td>(n = 4)</td>
</tr>
<tr>
<td>Pillow Housing - Square Tulou</td>
<td>Square Tulou- Round Tulou</td>
<td></td>
</tr>
<tr>
<td>(n = 1)</td>
<td>(n = 1)</td>
<td></td>
</tr>
</tbody>
</table>

Note: As Hengtang Housing is distributed throughout the whole city of Meizhou, the overlap ratio between it and other types of dwellings is extremely high. Due to limited space, pictures of these ratios are not shown here. Refer to Table 1. for specific data about Hengtang Housing.
Guangdong Province. Historically, large clans from the central Chinese plains were forced to migrate and settle in the mountainous region between the Nanling and Wuyi mountain ranges at the junction of Jiangxi, Fujian and Guangdong Provinces, and have developed into a stable Hakka subgroup. However, since the two ranges have long delineated administrative boundaries, Hakka subgroups have always been scattered across three provinces that have their own indigenous cultures. The integration of aboriginal ethnic groups and Hakka has facilitated cultural variation and resulted in the differences in traditional Hakka dwellings seen in Jiangxi, Fujian, and Guangdong Provinces. They are valuable demonstrations of adaptation to the local natural and cultural environments.

3.3.2 Unit Pattern

The preceding part distinguishes Round Tulou and Square Tulou from other types of dwellings. For Hengtang, Lung Wai, Bar, Pillow and Cuobao Housing, there is a single axis of symmetry oriented toward the front gate. This does not necessarily mean that these dwellings represent the same culture, because an axis is regarded as a common feature of traditional Chinese architecture. If we look at unit structure, we find two different patterns in these dwellings.

The first is the corridor-connected pattern, which is commonly seen in Hengtang, Lung Wai, Bar and Pillow Housing. In these dwellings, the hall, transverse rooms and Lung Wai are connected by corridors. Rooms are integrated and cannot be segmented into units. The second is the unit-by-unit pattern, mainly seen in Cuobao Housing. It is composed of a number of small independent courtyards arranged side-by-side. As distinct from the corridor-connected pattern, these small courtyards form a relatively comprehensive dwelling unit by themselves, which includes a living room, kitchen and bedrooms, etc. The roles they play in the whole dwelling reflect the features of a household layout. Therefore, spatial organisation in a corridor-connected pattern facilitates the entire dwelling, while the unit-by-unit pattern emphasizes individual units. Regarding spatial morphology, corridor-connected dwellings are like a single building, while unit-by-unit ones function like a village.
Pillow Housing are widely distributed except in Fengshun County, while Cuobao Housing is the opposite. Before the foundation of the People's Republic of China, Fengshun County was administered by Chaoshou city, and was profoundly influenced by Chaoshan culture, which emphasises commerce and industry. In order to reduce disputes between family members caused by commercial fortune sharing, each family plays an important role in clan structure. An individual family is the smallest unit of economic activity, which is reflected in the form of a small unit in the dwelling (Guo, 2013). While the Hakka culture emphasises collective agriculture which weakens the concept of individual families. Accordingly, the spatial boundaries of family units in Hakka dwellings are less delineated—rooms for each family are dispersed and not centralised. This suits their culture of collective agriculture in mountainous areas, which is a Hakka adaptation to their living conditions.

3.3.3 Spatial Archetype and Isomerism

The analysis of spatial morphology also leads to the conclusion that Hengtang, Lung Wai, Bar and Pillow Housing represent the same dwelling culture. If there is indeed a one-to-many correspondence between culture and architectural forms, how did this arise?

Studies show that from the late Tang Dynasty to the Song and Yuan Dynasties, Hakka immigrants introduced the "Tangwu" dwelling form, which was popular in the central plains, to the borders of Fujian and Guangdong Provinces. In these dwellings, a "wu" on both flanks surrounded the halls, which had the same layout as Hengtang Housing and eventually became it (Xiao, 2003). Therefore, Hengtang Housing is widely distributed in Meizhou and represents the region's main dwelling culture. More importantly, Hengtang Housing gradually became a core unit inside different types of dwelling. For example, Lung Wai Housing is based on Hengtang Housing with a rear semi-circular Lung Wai. Pillow Housing is Hengtang Housing with a rear square Lung Wai. Bar Housing also evolved from Hengtang Housing. So, many dwelling types evolved from Hengtang Housing and share the same cultural connotation. In this regard, Hengtang Housing is the "spatial archetype" of vernacular dwelling culture in Meizhou. This explains why Lung Wai, Bar and Pillow Housing are very similar in spatial distribution.

The "Spatial archetype" offers a medium for understanding the common features of different dwelling types. Regarding the spiritual aspect, it represents a specific culture; regarding the physical aspect, it serves as a spatial carrier that identifies this culture, but itself is just a part of the architecture. Based on the "archetype", people launch construction activities according to their own ideas and needs, creating a variety of morphologies using a series of organisation methods such as expansion, permutation and transformation, etc. Identical dwelling culture and archetype with different construction methods make up "isomerism" in vernacular dwellings in Meizhou.

For agricultural Hakka people, "isomerism" was vital for social stability and development. Essentially, it offers an appropriate mechanism through which vernacular dwellings can balance the needs of the top-down national system, bottom-up family needs, and the natural environment. As immigrants, the Hakka needed a strong identity to prove their legitimacy and have advantaged political relations with the indigenous people. Therefore, it was a significant feature of Hakka culture to consolidate the kings’ powers, and clan and ritual cultures. As a vehicle for visually displaying clan power, dwellings must perform consistently with the unified culture, and the "homogenesis" or "archetype" plays a key role in this regard. In addition, though the Hakka had strong attachments to their clans, the demands of each individual family were different. Only when the unified dwelling form adapted to this demand could it have value. Meanwhile, a certain type of dwelling could only adapt to a limited area. Only when it adapted to the local natural and cultural environment could it offer effective space for its inhabitants. This required that dwellings be highly flexible. "Isomerism" was a kind of wisdom developed by the Hakka based on this requirement.

4. Conclusion and Discussion

The key point of this study is to clarify that the phenomenon of "isomerism" may exist in vernacular architecture in some specific areas. Such architecture has different external forms but a uniform cultural essence. The traditional Hakka vernacular dwellings in Meizhou formed in a specific humanistic and natural environment that is a good example of this phenomenon. "Isomerism" is both a spatial phenomenon as a result and a spatial mechanism as a process, which serves as a blend of consistency and diversity in the culture of Hakka architecture. In
this mechanism, as a physical and spiritual medium, "archetype" strongly controls "consistency" by connecting specific cultures and spaces in different types of dwellings, and integrating them as a symbolic vehicle, so as to obtain identification inside and outside of the clan. Meanwhile, heterogeneity is an intended or unintended reflection of specific strategies of housing construction. It gives residential spaces adaptability to specific sociocultural and natural environments. Meanwhile, it exhibits itself indirectly in the form of diversity. Therefore, the in-depth integration of "homogenesis" and "heterogeneity" enables a cultural region to generate a rich and diverse spatial morphology of architecture on the basis of maintaining the dominance of mainstream culture. This offers us a new perspective for comprehending the relations between culture and architectural form. Culture is not an iron-cast mould that replicates the same product. It is more like a spotlight, whose height and direction are decided by specific circumstances. Under it, different objects have their unique shadows, but behind them all are common rules. In fact, this phenomenon exists not only in architecture but also in other expressions of culture such as language and clothing. Hence, isomerism may be a common law of culture worthy of in-depth research.

Acknowledgements
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