

A Study on the Spatial Characteristics of Jiarong Tibetan Settlements Based on the Theory of Pattern Language

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Abstract

This article selects three typical Jiarong Tibetan traditional settlements as the research objects, using the technical means of on-site surveying, mapping and drone photography to conduct field trips to the three settlements, and use this as a research basis to analyze the spatial layout characteristics of traditional Jiarong Tibetan villages in the region, and summarize their pattern language. The study found: 1) Although differences in geographic environment lead to slightly different types of pattern language in the same Tibetan village, but they are also similar to each other. 2) The Jiarong Tibetan traditional settlement has always adhered to the basic concept of "follow nature and adapt to local conditions" to develop in an orderly manner, conform to the terrain, and often present a spatial sequence of "religious space-connecting space-living space". 3) Jiarong Tibetan traditional settlements are characterized by a religious building as the core, and the surrounding buildings are distributed in a centripetal manner. 4) Jiarong Tibetan traditional settlements always follow the grammatical principles of locality and order in their development and expansion, the design and layout of spatial elements are mostly guided by traditional geomantic and religious views. 5) The spatial layout schematic language system of Tibetan traditional settlements has a positive effect on the inheritance and protection of the same type of villages. The spatial universality of vocabulary, syntax and grammar is conducive to the effective protection and sustainable development of traditional Tibetan village landscapes.

Keywords: *JiaRong Tibetan traditional settlement, Pattern Language, spatial characteristics, Inheritance and protection*

I. The Relevance of Pattern Language Theory and Traditional Settlement Space Research

The "Landscape pattern language" is an important branch of "Language of landscape"[1]. It is the product of the integration of the three ideas of Anne Spirn's landscape language, Christopher Alexander's "pattern language" and Simon Bell's "pattern" research. Pattern is a way of expression that takes both fiction and reality into consideration. It includes not only the cognitive structure that characterizes specific concepts, things or events, but also the constituent units of the knowledge system of cognitive strategies and frameworks. It has a systematic organizational structure and corresponding structural characteristics, can automatically adjust and improve the evolution and have a hierarchical nature[2]. Pattern language as a research method based on the schema and the logical relationship of the schema, regards the whole thing as a nested body formed by different scale units on the basis of horizontal splicing and vertical nesting, as a special language expression Form, which can more accurately and comprehensively reflect the spatial structure and logical relationship of things[3]. This kind of pattern language uses schema symbols as a form to analyze the regional characteristics, cultural values and connotations conveyed by schema symbols, and construct a regional expression method that integrates schema language with the spatial form and function of the landscape[4]. The spatial organization model of the traditional settlements of ethnic minorities in China is a "space-nature-humanity" mutual-feedback model based on traditional construction ideas and cultural concepts and formed after thousands of years of evolution. This model is typical and typified. This model has typical and typed characteristics. At the same time, ethnic minority traditional settlements have a

unique spatial structure and design vocabulary, and play a role in conveying humanistic information and organizing social activities in a regional context. The unique design language and development logic contained in its spatial combination, development context and spatial order are in common with the conversion of characters, words, and sentences in linguistics and the structural context, forming a unique traditional village spatial layout schematic language. The spatial layout schema language of ethnic minority traditional villages can be understood as the process of linguistic, vocabularyization and grammaticalization of the village spatial layout in traditional settlements under the influence of the logic and structure of the language. Different traditional settlements often form pattern language systems with different local characteristics due to differences in the composition of spatial elements and internal logical relationships, and they are reflected in different pattern vocabulary, syntax and grammar. Through the nesting of different spatial scales between words, vocabulary and phrases, the process of inverse schema deconstruction and unitization of the spatial layout of traditional villages is finally realized. This is the core point of the pattern language theory, which emphasizes the diversity of pattern vocabulary, splicing and nesting of different types of spaces[5]. From this point of view, the research thinking of applying the theory of landscape pattern language to settlement space is logically consistent. In recent years, under the influence of China's rapid urbanization, ethnic minority settlements have seen phenomena such as destruction of the ecological environment, changes in religious beliefs, changes in aesthetic values, and the dissolution of rural clan family structures, which has accelerated the decline and heterogeneity of the traditional settlement space of ethnic minorities. In the face of this dilemma, how to transform from the physical and cultural remains of ethnic minority traditional settlements to the logical cognition of spatial structure has become the core issue that should be dealt with in the inheritance and protection of traditional settlements. Therefore, studying how to construct a spatial pattern language system based on traditional building wisdom and cultural views is of great significance to the inheritance and protection of contemporary Chinese ethnic minority spatial settlements.

II. Overview of the Research Area and Data Sources

The western Sichuan region is an ethnic harmony circle in which the Tibetan, Han, Qiang, Mongolian, and Hui ethnic groups in western China have migrated for a long time, collided with each other and integrated with each other. The special geographical location and historical background enable the Jiarong Tibetans not only have a special external spatial form caused by the marginalization of geographical location, but also have the consistency of traditional Tibetan context[6]. The Tibetan settlements and buildings in this area strongly show their ethnic regional attributes in terms of overall spatial form, plane layout, architectural modeling, structural construction, craftsmanship, and decorative patterns, and become a unique regional cultural landscape, and has research value. The Malkang County investigated in this article is located in the northwest of Sichuan Province and the central part of the Aba Tibetan and Qiang Autonomous Prefecture. It is bordered by Hongyuan County and Li County in the east, Jinchuan County and Xiaojin County in the south, and Hongyuan County and Aba County in the north. The Tibetan dwellings in Malkang County not only inherit the characteristics of traditional Jiarong Tibetan dwellings, but at the same time, due to the mutual cultural integration, they also have some regional architectural cultural characteristics of other Tibetan tribes and surrounding ethnic groups such as Qiang. Its special geographical location and historical and cultural background have created a particularly special settlement pattern and diverse architectural and cultural characteristics today. The research team conducted on-site investigations in Zhibo, Songgang, and Daiji villages in Malkang County (Figure 1) with typical representatives, and obtained local natural environment, traditional culture, architectural forms, and typical detailed information on elements, location distribution, etc., and with the help of drone aerial photography, obtained the image map of the traditional village layout.



Fig 1. Location map of Tibetan of Jia Rong in Malkong County, West Sichuan

III. Research Ideas and Methods

Based on the research data obtained from the survey, starting from the basic characteristics of the traditional village spatial layout pattern language, the construction of the traditional village spatial layout pattern language system is regarded as based on the words, vocabulary and phrases in the schema vocabulary, and each element is in the corresponding The morphology, syntax, and grammar are combined and nested with each other to form an orderly and diverse traditional village spatial layout. Among them, the spatial units that are composed of different elements and have a certain level of progressive relationship are the words, vocabulary, and phrases in the pattern language. The internal logical relationships formed by the combination of different elements constitute the grammatical system of the pattern language (syntax, grammar). Although the same type of space has certain differences in the composition of spatial elements and transformation and splicing, the overall layout characteristics presented by them are similar. Through the excavation and analysis of the settlement space in the survey area, and the construction of local landscape space, it is of great significance for grasping the overall spatial characteristics of traditional settlements, analyzing the combination order and spatial relationship of various elements, and also provide theoretical basis for other traditional settlement landscapes.

In the process of long-term development and evolution, traditional Tibetan settlements in western Sichuan have formed a complex and rigorous village spatial layout. Understanding the spatial element characteristics and spatial structure texture of the village has become the key to protecting and continuing the traditional village landscape. The internal elements of traditional villages are closely related to each other, and the change of a single space element often results in a change in the overall layout of the settlement. Therefore, in the analysis and deconstruction of the traditional settlement space layout, we should abide by the independence of the elements of the settlement space and the integrity of the spatial structure, and its spatial division should also ensure that all types of spaces and elements can achieve structural integrity and clear "boundaries". This paper chooses to study and analyze the three typical Tibetan traditional villages of Zhibo Village, Songgang Village, and Daiji Village in Malkang County from the settlement site selection and the settlement space form (working space, public space, connection space, and residential space). Use the principles of internal uniqueness, external uniqueness, local uniqueness and overall uniqueness of landscape gene theory for reference [7] to deconstruct and extract spatial elements, and use CAD software to abstract, draw, and analyze the extracted spatial elements. Summarize the commonality of schema language in the same type of space in different traditional Tibetan villages in the region, (Figure 2) and lay a foundation for the realization of the nesting of schema language spaces between different regions and the establishment of a schema language system for the spatial layout of traditional Tibetan villages.

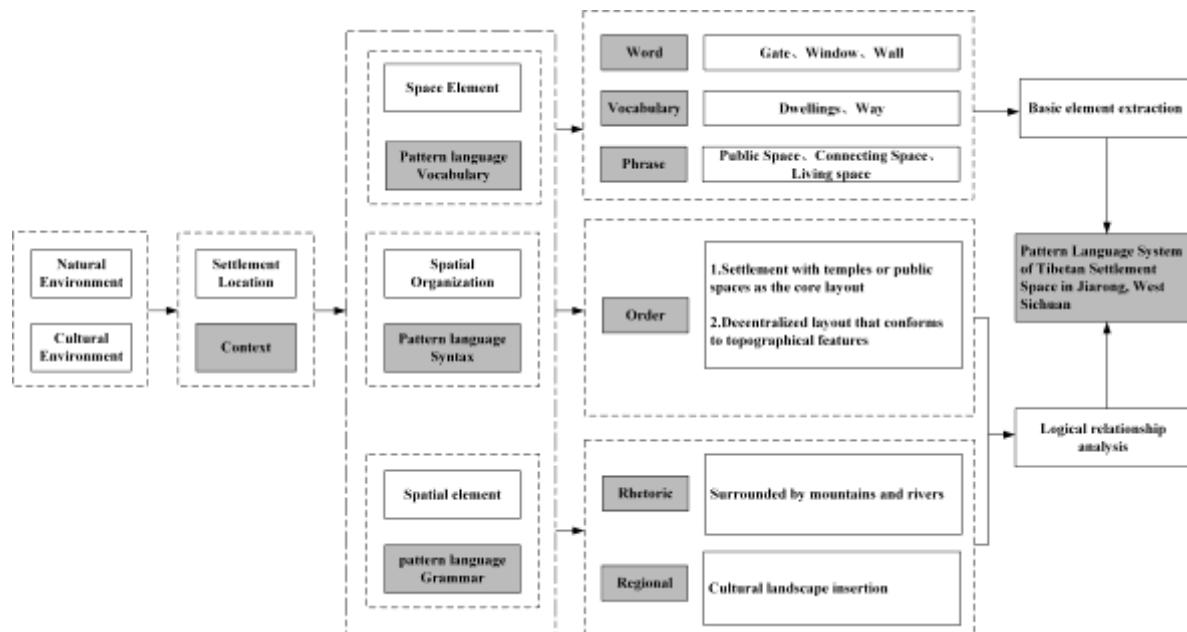


Fig 2.Illustration of research ideas

IV. The Local Characteristics of the Jiarong Tibetan Village in Malkang County from the Perspective of Pattern Language

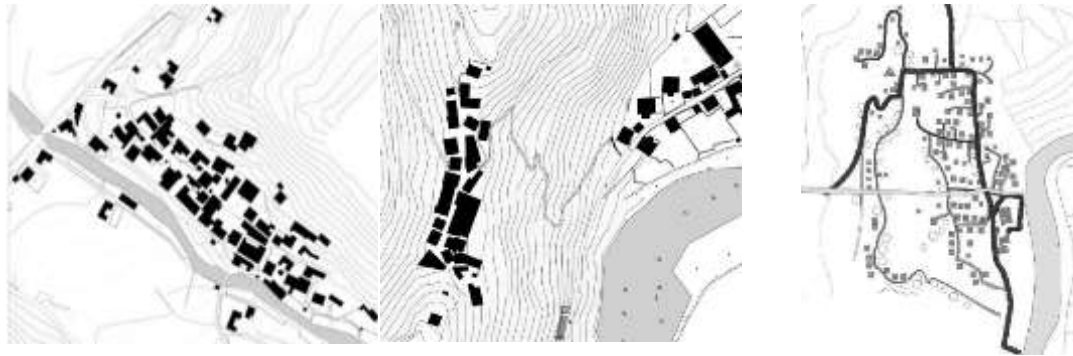
4.1 Settlement location

Malkang County has a continental plateau monsoon climate with obvious mountain climate characteristics. The main feature is that the climate varies greatly at different altitudes, the dry and rainy seasons are distinct, the winter is severely cold, the summer is cool, the daily temperature difference is large, the sunshine is abundant, and the spring is very windy[8]. The main considerations for settlement site selection are climate, water sources, production activities and other factors. Therefore, when selecting the location of Jiarong Tibetan settlements in Malkong County, more consideration should be given to areas that are sunny and sheltered from the wind, and are close to water sources and suitable for human habitation. Secondly, consider a semi-agricultural and semi-pastoral production mode. Therefore, the terrain and climate around the village should be suitable for this ways to produce. After investigating the Zhibo Village, Songgang Village and Daiji Village in Malkang County, the research team found that there are two main types of relationships between the three Tibetan settlements and the surrounding mountains and river. (Table 1)

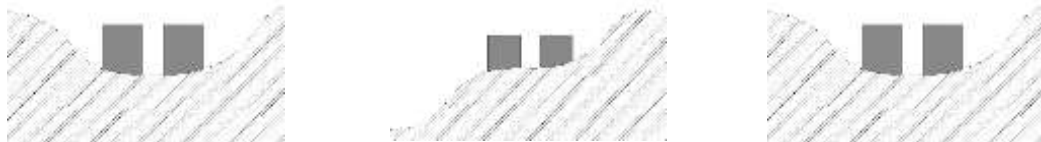
Table 1 Site selection type

	Foothill valley type Settlement (Zhibo Village)	Mountain terrace type Settlement (Songgang Village)	Foothill valley type Settlement (DaiJi Village)
Spatial image map			

Settlement
plan



Diagram



4.1.1 Foothill valley type Settlement

This type is the main form of Jiarong Tibetan settlements in Malkang County. Most of the sites are located on relatively flat terraces at the foot of the mountain, close to rivers, with convenient transportation, more opportunities for contact with the outside world, and more developed economy and culture. Zhibo Village and Daiji Village are typical representatives of this type of settlement.

4.1.2 Foothill valley type Settlement

The form of this type of settlement is quite special, and the settlement is located on the top of a mountain. The settlements are mostly based on winding ridges and the terrain is relatively flat. However, due to the restrictions of the topography, the distribution of settlements is relatively concentrated. Songgang Village is a typical representative of this type of settlement.

The above two types of Tibetan settlement site selection modes are common in Malkang County. The site selection adapts to the special topographic characteristics of the local area and reflects the survival wisdom of the villagers.

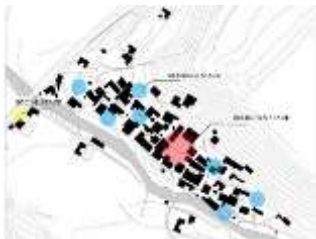
4.2 Settlement spatial form

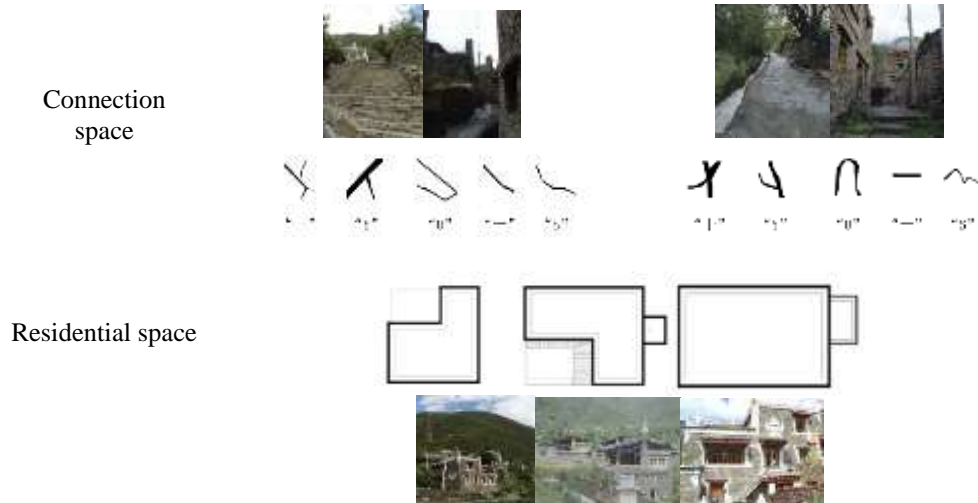
The settlements seem to be randomly arranged in the mountains, but their arrangement and combination are all organically arranged and combined according to different geographical conditions and in accordance with the natural environment. According to the above survey and research on the location model of Jiarong Tibetan settlements in Malkang County, it is found that Zhibo Village and Daiji Village belong to the foothill valley type settlements, and Songgang Village belongs to the Mountain terrace type settlements. Due to land restrictions, all three settlements are adopted. The tighter layout and settlement patterns all reflect the characteristics of "cohesion". This characteristic has guiding significance for the structure of the settlement and the arrangement and combination of single dwelling. In addition to the centrality and defense requirements, the compact layout is mainly to save farmland to meet production needs. Therefore, most of these settlements are distributed around the fields that are suitable for farming. Settlement location selection is the basis for the formation of Jiarong Tibetan settlements. The main material elements of the traditional settlement space of Jiarong Tibetans in Malkang County can be divided into natural elements and artificial elements from the macro level. Natural elements and artificial elements form a complete layout of the village space through the joint effect of production space, public space, connection space and residential space.

4.2.1 Analyze the spatial form of Foothill valley type Settlement with Pattern language

The Zhibo Village and Daiji Village in Malkang County investigated by the research team belong to the piedmont riparian settlements. Because the locals believe in Tibetan Buddhism, most of the villages adopted the layout of “the temple is on the mountain and the settlement is under the mountain”. The settlement is centered on the temple, which occupies a very important position in the entire village. Villagers will pay homage on weekdays, and grand Buddha worship activities will be held every Zhai festival, and religious space nodes are formed around the temple. Other public spaces include production spaces and social spaces. The Jiarong Tibetans in Malkang County have different production ways from traditional Tibetan pastoral areas due to their geographical location and climate. Their production ways are mainly semi-agricultural and semi-pastoral, and agriculture is mainly used in the surrounding area of the settlement. Because Zhibo Village and Daiji Village are located on relatively flat terraces on the banks of the valley and rivers, in addition to building land, the surrounding areas near the foothills are used as production spaces because of the steep slope. Compared with Zhibo Village, Daiji Village has a larger area, the distribution of production space is relatively concentrated and large in scale. The social space in the settlement is a place for people to communicate in the slack time, with the characteristics of life and humanity. In the Tibetan settlements of Zhibo and Daiji villages, social spaces are concentrated on the main road nodes of the villages. The spaces formed around the gates, bridges, and village committees are not only the central nodes of the villagers’ communication and life, but also the "Sub-core" area. The settlement pattern of the two villages is closely arranged around the religious space in the village. The square in front of the temple serves as the "core" area of the whole village and is a place for gatherings and activities in the whole village. With the collapse of china’s chieftain system and the expansion of the settlement scale, the social space of the village has also begun to be scattered in the "sub-core" areas around Zhaimen, Qiaotou, and village committees. Residential buildings generally use roads as the connecting space between each other, and are arranged closely in accordance with the direction of the road and the changes in topography. Because the settlement space layout of the two villages follows the changes of topography, the main roads and secondary roads in the village show irregular characteristics. From the overall point of view, there are mainly five types of connecting space: "十", "Y", "U", "一" and "S". Most Tibetan buildings in Malkang County have three floors above ground. One floor is used as a place for poultry breeding. The second floor is equipped with various main living rooms. The top floor is equipped with a oratory and a terrace for drying the harvested grain. The general floor plan of the building is mostly rectangular. (Table 2)

Table 2 Analyze the spatial form of Foothill valley type Settlement with Pattern language

	Zhibo Village	Daiji Village
Public Space		

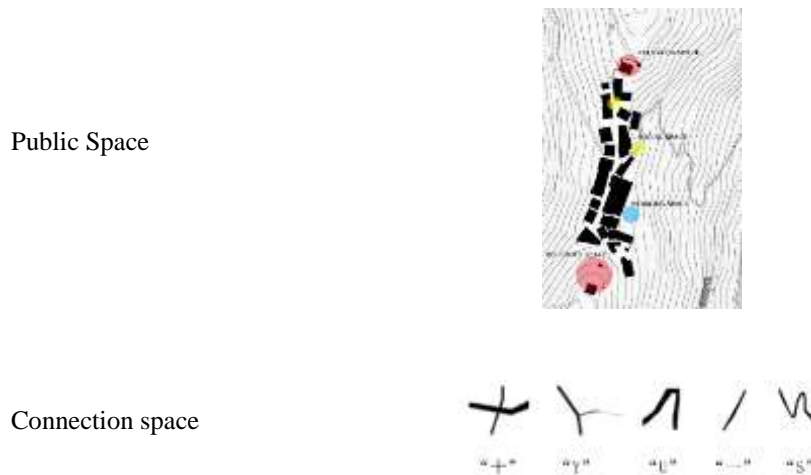


4.2.2 Analyze the spatial form of mountain terrace type settlement with pattern language

The Songgang Village in Malkang County investigated by the research team belongs to the mountain terrace type settlement. The entire settlement is distributed on the terraces of the ridge, and the topography is relatively flat. However, due to land limitations, the settlements are relatively concentrated. Its characteristics also share the commonality of Foothill valley type Settlement. Because the early development model of Songgang Village is similar to other traditional Tibetan villages, both are based on Tusi Guanzhai as the core, and the residential area is built around the Guanzhai. The village site is a mountain terrace type, and the settlement form is "Compact" Tibetan settlement space. Because it has the same climate and cultural characteristics as Zhibo Village and Daiji Village, the public space and residential space in the village are relatively similar. (Table 3)

Table 3 Analyze the spatial form of Mountain terrace type Settlement with Pattern language

Foothill valley type Settlement (Songgang Village)



Residential space



4.3 The Expression of Pattern Language in the Jiarong Tibetan Settlement of Malkang

4.3.1 Context: Settlement location

Like the concept of context in linguistics, context in a settlement specifically refers to the natural and human environment chosen by the settlement. It is specifically manifested in the site selection process of the settlement, how to deal with the surrounding natural and human environment. At the beginning of the formation of the Jiarong Tibetan settlements in Malkang County, the original inhabitants made the best use of the original conditions to select settlement sites based on the local special natural environment, forming a settlement layout of foothill valley type and mountain terrace type settlements. This form of layout has become the "bottom of the map" of the settlement. (Table 4)

Table 4 The context of the settlement

Foothill valley type Settlement
(Zhibo Village)



Mountain terrace type Settlement
(Songgang Village)



Foothill valley type Settlement
(DaiJi Village)






4.3.2 Spatial elements

(1) "Word"

The "words" in the pattern language include the smallest elements that make up the settlement space. The decoration of the doors of Tibetan residential buildings in Malkang County is generally reflected in the coloring of the door frames and lintels. In terms of color, there are two types of primary color and exterior coloring. The exterior colored door is generally maroon, and the more sophisticated people will paint simple auspicious patterns such as moiré on the door. A trapezoidal rain shed will be installed on the door lintel, and the lintel is mostly in the form of a two-story overhang. This kind of door can not only block the rain, but also has a certain decorative effect. Different shapes of windows have different decorations on the window frames. Simple windows have only one window beam and a simple small window underneath; for slightly more complicated forms, there will be overhangs on the window frame, and the lower level is The vertical square wooden strips picked out have a fan-shaped emission at the corners of the upper layer. The walls of the building use local materials such as soil, wood, stone and other materials, and the construction of the walls adopts the method of "shoufen". (Table 5)

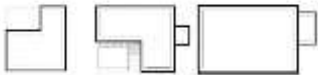

Table 5 "Word"

Word	Zhibo Village	Songgang Village	DaiJi Village
Door			
Window			
Wall			

(2) "Vocabulary"

The "vocabulary" in the pattern language include the flat form of dwellings and roads that constitute the settlement space. The load-bearing system of the houses in Malkang County is wall-bearing, and the plane is relatively free, but the layout is still square, most of which are rectangular planes. The residential buildings are arranged flexibly according to the topography. Because most of Malkang County is mountainous terrain, most of the settlement roads are set up with the trend of the terrain, specifically "+", "Y", "U", "—", and "S" five forms. (Table 6)

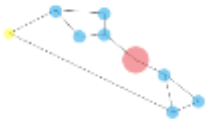
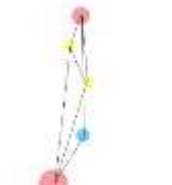




Table 6 "Vocabulary"

Vocabulary	Zhibo Village	Songgang Village	DaiJi Village
Dwellings			
Way			

(3) "Phrase"

The "Phrase" in the pattern language includes the public space and the connecting space that constitute the settlement space. We found in the survey in Malkang County that the Jiarong Tibetan settlements in the county are closely arranged around the religious space in the village. The square in front of the temple serves as the "core" area of the entire village, and the social space is concentrated on the main roads of the village. Nodes, the spaces formed around the gates, bridges, and village committees are not only the central nodes of the villagers' communication and life, but also the "sub-core" areas of the villages. Because most of the local residents are semi-agricultural and semi-pastoral production ways, according to the topography, the farmland is concentrated or scattered around the settlement. As the connecting space of the entire system, roads are mostly arranged flexibly according to the terrain and have relatively irregular shapes. (Table 7)

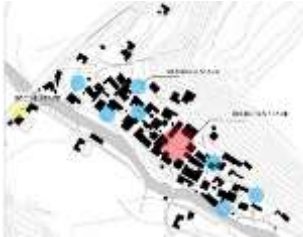





Table 7 "Phrase"

Vocabulary	Zhibo Village	Songgang Village	DaiJi Village
Public Space			
Connecting Space			

(4) "Order"

Order is the rule in language, and in the settlement space, it is reflected in the logic of the layout of the entire settlement space. As mentioned above, the terrain around Zhibo Village, Songgang Village and Daiji Village is surrounded by rivers and mountains. The three settlements are arranged in accordance with the terrain and are densely distributed. In terms of spatial distribution, the residential buildings are distributed in a centripetal and cohesive manner (subordination) with the core of religious buildings. Some residential buildings are distributed along the river bank and form a combination with the river bank. The Jiarong Tibetan superimposition compound space with a strong life atmosphere, that is, the superposition method in the syntax. (Table 8)

Table 8 "Order"

Order	Zhibo Village	Songgang Village	DaiJi Village
Settlement with temples or public spaces as the core layout			
Decentralized layout that conforms to topographical features			

(5) "Rhetoric"

Rhetoric used in the study of settlement space specifically refers to the regional culture that has an invisible

influence on the settlement space. Regional culture will create some cultural symbols that only belong to the local area. Because the Jiarong Tibetans in Malkang County are influenced by Tibetan Buddhism, this unique regional cultural symbol is reflected in the buildings and decorations of the settlement. The regional cultural symbols of the Jiarong Tibetans can basically be summarized as primitive totems and religious totems. These two regional symbols appear in specific areas of the settlement. (Table 9)

Table 9 "Rhetoric"

Rhetoric	Zhibo Village	Songgang Village	DaiJi Village
Decentralized layout that conforms to topographical features			
	Religious totem	Primitive totem	Religious totem

V. Conclusion and Discussion

5.1 Conclusion

On the basis of drawing lessons from language structure and logic, the Pattern Language theory regards the settlement landscape space as an orderly space formed by different elements under certain logical relations. Although the natural environment of the same area is different, because the same ethnic group has similar cultures in a small area, the spatial layout of the settlements is similar in terms of pattern vocabulary, syntax, and grammar. Excavating and analyzing the commonalities of the constituent elements and combination forms of similar traditional villages, and exploring their pattern symbols are of great significance to the protection of traditional ethnic villages. This paper conducts field investigations in Zhibo, Songgang and Daiji villages in Malkang County, and analyzes it according to the pattern language theory and finds that:

5.1.1 Although the three traditional Tibetan settlements have slightly different pattern vocabulary types for the same type of Tibetan settlements due to differences in their geographical environment, they have similarities with each other. On this basis, the construction of the Jiarong Tibetan village pattern language system can be used as a reference for the future protection and inheritance of the Jiarong Tibetan settlement.

5.1.2 When selecting settlement sites, the Jiarong Tibetans in Malkang County have always integrated the basic concept of "follow nature and adapt to local conditions" to develop in an orderly manner, presenting a spatial sequence of "public space-connecting space-living space".

5.1.3 The spatial layout pattern language system of the Jiarong Tibetans in Malkang County has a rich and stable vocabulary, syntax and grammar. The overall space is manifested as a core of temples and official village buildings, and the surrounding buildings are distributed in a centripetal manner.

5.1.4 The development and expansion of the village always follow the grammatical principles of locality and order. In order to achieve the unity of nature and man, the design and layout of elements are often carried out with the help of feng shui concepts.

5.1.5 Faced with the destruction of the ecological environment of traditional Tibetan settlements, changes in religious beliefs, changes in aesthetic values, and the dissolution of rural clan family structures in the current rapid

urbanization process in China, we can start from the foundation of the construction of the same type of traditional settlement space layout pattern language system, Apply the commonality of its vocabulary, syntax and grammar to the inheritance and protection of the target villages, so as to realize the effective protection and sustainable development of the traditional minority settlements.

5.2 Discussion

On the basis of drawing lessons from the structural and logical nature of language, the Pattern Language Theory regards landscape space as a logical relationship between different elements[9]. In the process of summarizing the pattern language system of the traditional settlement space of Jiarong Tibetans in Malkang County, this article further verifies the feasibility of the system to nest the pattern language space in different regions. This provides new ideas and methods for the inheritance and protection of traditional settlements of the same type and nation in China in the future. However, there are some problems that need to be further resolved in the process of research: 1) In the process of development and renewal of traditional Chinese villages, due to the varying degrees of impact from rapid urbanization, when planning and designing traditional villages, the selection criteria for spatial design vocabulary need to be divided and unified. 2) Because many traditional ethnic minority villages are faced with relatively serious geological disasters, the original settlement sites cannot fit the current living environment well. The Chinese government has carried out immigration and relocation work in the face of such settlements. Therefore, the context (settlement site selection) in the traditional village spatial layout pattern language system is always in a process of constant change and update with the development of modern society. How to synchronize the current situation of the village with the context of the pattern language is ours Issues that should be further considered carefully.

Acknowledgements

This research was supported by the 2020 Open Fund Program of the Key Laboratory of Plateau Green Building and Ecological Community of Qinghai Province (Grant No. KLKF-2020-002); National Natural Science Foundation of China (Grant No. 51278415).

References

- [1] W. Yuncai, "The Progress and Prospect of the Research on the Pattern Language of the Traditional Cultural Landscape Space," *Journal of Tongji University (Social Science Edition)*, vol: 24, no. 001, pp. 33-41, 2013.
- [2] D. Daixin, & Y. Man, "The Reference and Enlightenment of C. Alexander's Pattern Language to the Subject of Landscape Architecture," *Landscape Architecture*, no. 002, pp. 58-65, 2015.
- [3] M. Xiaoying, "Landscape Pattern Language Expression Based on Diagram. Chinese Landscape Architecture," vol: 32, no. 002, pp. 18-24, 2016.
- [4] D. Zhaolong, & D. Zheng, "Analysis of the landscape pictures and language of Shicuo dwellings——Taking Jiufeng Village of Putian City as an example," *Journal of Putian University*, vol: 24, no: 005, pp. 71-76, 2017.
- [5] W Yuncai, C Yin, & F. Wen, "The Pattern Language of Land Form and Its Application," *Chinese Landscape Architecture*, vol: 32, no. 2, pp. 12-17, 2016.
- [6] Z. Yan, "A Study on the Houses of the Jiarong Tibetan Nationality in Shaerzong," *Western Sichuan. (Doctoral dissertation, Xi'an University of Architecture and Technology)*, 2013.
- [7] L. Peilin, L. Chunla, D. Yunyuan, S Xiuhua, L Bohua, & H. Zui, "Chinese Traditional Settlement Landscape Division and Influencing Factors of Landscape Genes," *Acta Geographica Sinica*, vol: 65, no:12, pp.1496-1506, 2011.

- [8] Z. Rongzhang, "Research on the Civilian Dwellings of Malkang Zhibo Tibetan Village," (Doctoral dissertation, Xi'an University of Architecture and Technology), 2012.
- [9] W. Yuncai, "On the Logical Thinking and System Framework of the Pattern Language of Landscape Space," Landscape Architecture, no.4, 2017.