

# Research on courtyard House design based on architectural Space combination Theory

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**Abstract.** With the change of time and the rapid and continuous development of economy and society, the traditional residential buildings in China have some common but slightly different characteristics in some parts. From individual building components to patio layout, all formed to adapt to the changes of local tribal customs. The characteristics of compound courtyard form are shown in various patterns from urban to rural courtyards. Courtyard housing can make people feel satisfied with the quality of life level and spatial design function requirements. As a kind of high-end commodity, the House has a high value and a long life. In the ordinary family, the house is usually the most valuable property, and people live in the house, which is closely related to their daily life. Therefore, it is very important whether the residential space function and the use characteristic can satisfy the customer request, the function design will have the direct influence to the entire space combination, novel and Innovative Space Design to meet the modern people on the high level of the requirements of the house, thus meeting the needs of customers will further expand the growth of space portfolio. Therefore, this paper briefly analyzes the courtyard house from the perspective of space combination theory.

**Keywords:** Space Combination; Compound House; House Design; Traditional Characteristics.

## 1. Overview of residential design of architectural space combination theory

### 1.1 Overview of space

Space is an unconscious form that transcends an expressible overview and cannot be simply expressed in words. In the sense of surface layer, space is fuzzy, which has layers and permeability. It is a place that the class has not touched, and it is also an untouchable realm, can not touch.

In the low material environment in the past, primitive people in order to resist the wind and sand, shelter from the wind and rain, to guard against the raid of wild animals need a resting place, that is, space, which is the formation of the building in the first place. Space has no definite distance, shape, color or size. It is a form generated by human's own needs and aesthetic improvement. In order to meet their own needs, there are many ways to organize space, such as enclosing multiple Spaces, separating individual Spaces and so on. In the history of space development, the following three factors play a decisive role: the requirements of functional use; Spiritual enjoyment and aesthetic requirements; Requirements for technical means. Through the above factors to divide different space, so that the space has a size, size, separation, connectivity and color and other properties.

### 1.2 Architectural space and structure

Functional space, visual space and structural space are three aspects of architectural space. The first part of functional space refers to the combination of space use functions according to the planned function flow chart in some types of architectural forms according to people's living habits and lifestyles. Some building types will have simple and fixed functions, such as public toilets, student dormitories and dining halls. Some of the building types are flexible. Therefore, it can be known that functional space is only a part of various architectural form systems, and cannot represent the whole architectural space.

The second part and the third part are visual space and structural space. The load-bearing forms of ancient buildings are all made of brick and stone materials. The wide beams of brick and stone and thick stone walls can support the spatial structure of the whole building. The heavy stone walls not only need to support but also constitute the maintenance function of the building, which extremely

restricts the use function of the internal space of the building. The architectural types of some fixed functions are especially suitable, such as restaurants and hotels.

This type of structural space is somewhat similar to the modern frame structure. At that time, the whole structural space form was covered with the whole plane by a point. With the development and changes in the future, the building system has a broader growth.

## **2. Problems existing in domestic courtyard houses**

More than 40 years after China's reform and opening up, new courtyard houses are increasing on a large scale, but most of them have some problems.

First, the site selection is not correct, the geographical conditions of residential construction is very important for residential construction. At present, many self-built courtyard houses choose to be built beside the urban road, which forms the current situation and extends the layout along the urban road, abandoning the traditional centralized layout of group living. The traditional courtyard houses lack the sense of neighborhood intimacy and reduce the activity area outside the house.

Second, the house is built randomly, without planning the function of the house according to the functional requirements of their own life. The internal and external materials, space forms and design styles of the house are incompatible with the traditional courtyard house, and it does not have a beautiful appearance in the external view.

The third, the dimensional function that blindly puts together all sorts of contemporary new development to rise is designed, be in a kind of only tall, wide, much is the thought that good residential space designs, brought about residential space function disorder and the idleness of a lot of useless space, also make people do not have comfortable sex when living in interior space.

## **3. Discussion on space design of courtyard housing**

### **3.1 Application of spatial combination in residential landscape design**

#### **3.1.1 The law of formal beauty**

Want to design a beautiful residential space environment must be in accordance with the law of formal beauty and combined with it, purification design on the basis of the law. It can be seen that people should design and create under the principle of formal beauty when they apply the combination of architectural space. Should pay special attention to a point, formal beauty and aesthetic appreciation is completely different two ideas, the two can not be taken in a period of mutual comparison and judgment. The law of formal beauty is universal, it has the most extensive side; Inevitability, will abide by the rules of formal beauty; Permanence, the rules of formal beauty will not change because of the change of time; The aesthetic will change with time, region, culture and times, which is the most popular and ruler of a period.

#### **3.1.2 The processing technique of space combination**

The first is the contrast and change of space: in the case of two adjacent Spaces with obvious differences in individual directions, the difference can be used for spatial comparison, so that various unique characteristics can be compared. When people stay in one space for a long time, they suddenly go to another space, and there will be a huge change and surprise in emotion, which is the change generated after space comparison.

The contrast of space is mainly manifested in four parts: the contrast between tall and low, high and low; Between open and closed, open and closed space contrast changes; The contrast between different shapes and the collision of colored characters; The contrastive changes brought about by different directions.

The second is the repetition and reproduction of space: the repetition and reproduction of space need to form a regular sense of rhythm in the same type of space, such as continuous percussion or the repetition and regularity of the same beat. The regular repetition space will not form a new space

with a unified rhythm, but will be combined with other forms of space in the repeated reproduction to form a whole. It's a sense of rhythm that occurs through regular repetition.

The third is the connection and transition of space: the combination of two Spaces directly connected in the most common flat connection way will usually make people feel uncomfortable and full of sense of violation, and can not make people produce surprise or new ideas. At this time, the transitional role of space can be shown, the transition of two Spaces over the convergence zone, so that the transformation of space is not so stiff, let a person feel the slow change of space.

Fourth, the penetration and level of space: the two adjacent Spaces are connected with each other purposefully, and the two Spaces are completely isolated without the physical impermeable joint wall. Then, at the moment of separation, the two Spaces will borrow from each other, penetrate each other, and constantly friction, so that the sense of level of the two Spaces is improved.

Fifth, the guidance and suggestion of space: when the space combination design scheme, it is necessary to conceive how to use the way to guide or hint at the flow of people. The guidance of space can make people unknowingly walk into the space planned by designers and go to the design destination along a certain direction.

Sixth, spatial sequence and rhythm: spatial sequence and rhythm do not have any boundary, it is not a single limited spatial processing techniques. It contains all spatial processing and can use the other five processing methods in combination. The single and unitary spatial form can be integrated into a cohesive, regular, hierarchical and identical spatial cluster through the sequence and rhythm of space. The first exhibits symmetrical and regular forms; The second is the opposite, asymmetrical, irregular form.

## **3.2 Application of space combination in residential building design**

### **3.2.1 Improve the quality of the living environment**

At present, the planning and design of centralized central green space is incomplete. There is no green space construction between residences, and large green space only exists in one area. The practicability of central green space also needs to be developed. In addition to providing leisure for residents, some other supporting facilities with more economic benefits should be designed. Overhyping green space forms; There are also residential areas with high density of residential buildings, large central green landscape is difficult to implement.

Designers should follow the trend of expanding the design of the central green space for re-planning, the central green space should be matched with the green space between the houses, to avoid the occurrence of increased green space between the houses. The scale of central green space also needs to be planned within a certain range based on the geographical conditions of residential areas.

### **3.2.2 Design the recreation space for children in the house**

Designers can consciously set up safe play facilities for children, such as slides, sand traps, swings, etc. All of these facilities do not take up a lot of space in the house, nor do they cost a lot of money, but these children's amusement facilities can attract children's attention, so that they have a new understanding and experience of the residential living environment. Children's entertainment space adds an innocent and gorgeous color to the living environment.

### **3.2.3 The existing problems of residential space for the elderly**

Designers can focus on strengthening and improving the residential community supporting service facilities and elderly service institutions to assist in home design, thus reducing the burden of supporting the elderly and caring for the younger generation of struggling people outside the home. Such as the facilities and equipment used by the elderly, the elderly activities of the center. Also can design a place appropriately according to residential area condition, for old people fitness, recreational and recreational. Larger communities can also provide more domestic help for the elderly, or set up a service center to help the elderly solve their problems.

## 4. Summary

In the history of architecture, in-depth discussions on issues related to architectural space have been quite extensive. In particular, with the development of modern architectural space, more attention has been paid to the necessity of space and more systematic research has been conducted on space. While reasonably designing the space scale of residential buildings, the comfort and openness of residential building space are improved. Courtyard residential space design not only to ensure the comfort of residents in the residential space activities, the appearance of the internal and external environment, but also to ensure the privacy of residents' life, so that residents in the courtyard residential feel comfortable. The indoor activities of residents can also be extended to the outdoor courtyard space, which can enhance the friendly relationship between neighbors and experience the familiarity between neighbors in the traditional Chinese courtyard style. As a designer, we should attach equal importance to the interior and exterior of the house, and cannot ignore the exterior space formed by the residential building and the surrounding landscape environment. Whether to meet the functional needs of the client, to ensure that the indoor environment can meet the comfort of the living space. Only by perfecting each step can we improve the overall level of residential architectural design.

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