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# Application Research of the "Undefined Blank Space Design Method" in Residential Interior Design - A Case Study of Interior Space Design in a Residential Community in Wuhan

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## Abstract:

In China's intensive urban development and the post-pandemic era, the value of residential housing is increasingly emphasized. However, capital constraints limit the spatial requirements of residential interiors, leading to repetitive constructions lacking individual value and spatial flexibility. This study intervenes in space by expanding the traditional concept of "blank space" through empirical design research on the interior of a residential community in Wuhan. We propose a compact residential space design method based on the "undefined blank space" concept, aiming to coordinate the interior space hierarchy of commodity housing and diverse individual demands. Results highlight that the removal of non-load-bearing walls maximizes the individuality and flexibility of space. Variable combined blank interfaces enable the space to fit multiple usage scenarios. The use of transparent materials can blur spatial boundaries to make it more open. Physical blank spaces and spiritual needs must be combined to truly achieve individual demands.

**Keywords:** Blank Space; Undefined Blank Space; Residential Interior Design; Individual Value; Spatial Flexibility.

## 1. Introduction

The general living spaces in modern interiors should possess multiple functionalities and accommodate expanding needs. However, current research on general living spaces primarily focuses on additive approaches and discussions about the spaces themselves, lacking studies on subtractive perspectives and dynamic viewpoints regarding functional space (Aziz Amen, 2017; Aziz Amen & Nia, 2018; Amen & Kuzovic, 2018; Amen & Nia, 2021). This paper draws inspiration from the artistic concept of "blank space" and the construction approach of "blank space" in two-dimensional and three-dimensional forms. By integrating Maslow's hierarchy of needs theory and focusing on residential interiors as the research focal point, the paper combines different needs to create combinations of functionality and form, resulting in various uncertain spaces. These uncertain spaces are then utilized to match different life scenarios and changing functional requirements, aiming to achieve flexible adjustments of the space for users. Through this exploration, the feasibility of the "undefined blank space" design method in residential interiors is demonstrated.

To accomplish this, the paper initiates a literature review from the existing research on "blank space" at the theoretical level, conducts a study of relevant literature, proposes the "undefined blank space" method, and combines empirical design research to demonstrate and evaluate the effectiveness of this method. By doing so, the concept of "undefined blank space" is interpreted and applied in design practice, enriching the theoretical and methodological aspects of interior space design. The paper is structured into four parts. The first part reviews the current status of "blank space" theoretical research. The second part introduces Maslow's hierarchy of needs theory and the derived demands of "undefined space," corresponding to the proposed methods and approaches of utilizing blank space in interior design. The third part conducts practical design research to empirically validate the "undefined blank space" design method. Finally, conclusions are drawn based on the theoretical and design practice findings.

## 2. Overview of Blank Space Design

### 2.1. "blank space" in art

The design technique of "blank space" originates from the widely used artistic method of "leaving empty space" in ancient Chinese art creation, aiming to achieve the effect of "emphasizing the subject with background" or "enhancing the background with the subject." In artistic works, the blank areas are not only presented in physical form but also exist as an "invisible form" that is inseparable from the artwork, providing viewers with unlimited imaginative space. When applied in interior design, it becomes an intangible complement to the tangible forms. As Yan Qiwen pointed out, "the 'blank space' in interior design is a expressive technique that involves the extraction and refinement of real visual elements. Its purpose is to highlight the subject, simplify decorative elements, replace

complexity with blank spaces, replace specific forms with emptiness, and manifest existence through the intangible."(Qiwen Yan&Zhibao Liu, 2009)

## **2.2. "blank space" in construction**

Apart from artistic creations, in ancient times, people also employed the concept of "blank space" in architectural space design. However, the application of "blank space" in construction tends to lean more towards functionality and spatial harmony. For example, in the northern Chinese courtyard houses known as "siheyuan," the enclosed layout often creates a central courtyard that features an intentional empty space. This central courtyard serves as the core of the courtyard complex, where most of the occupants' activities take place, reflecting the communal nature of such architectural style. This intentional empty space creates contrast and a sense of openness, enriching the spatial diversity.

The traditional southern Chinese residential architecture, exemplified by the "sishui guitang" design, also showcases the use of "blank space" in construction. This design incorporates a courtyard, inspired by the philosophical concept of the unity of heaven and man, to create intentional empty spaces. This approach not only introduces variations in spatial levels but also cleverly addresses issues related to lighting, ventilation, and internal drainage within the building.

Similarly, traditional Chinese gardens embody the subjective emotions of the creators, expressed through guided means. Rather than relying on layering and accumulation of scenery, traditional gardens organize spaces through the arrangement of water features. The water element in Chinese gardens, much like the blank spaces in ink paintings, conveys the emotions and contemplation of the creators. The reflection of buildings on the water surface, with both dynamic and static qualities, forms a rich landscape and aesthetic ambiance in the garden, constituting a prominent characteristic of "blank space" in the construction of Chinese-style gardens. In terms of philosophical and emotional aspects, the use of "blank space" in the creation of traditional gardens aligns with the philosophical concepts of Taoism, exhibiting inherent consistency ( Yinghua Bao&Kun Peng, 2012).

## **3. Diversification of Space for Indeterminate Needs**

### **3.1 Maslow's Hierarchy of Needs**

With the enrichment of social lifestyles and the increasing expression of individual needs, the functional requirements within a single space are constantly being strengthened and updated. According to Maslow's hierarchy of needs theory, the physiological, safety, and social needs at the lower levels are generally satisfied among the existing social individuals. However, the needs for respect and self-actualization have gradually become the most valued motivating factors for people. Therefore, for an increasing number of individuals, spaces are not only intended to fulfill their physical sheltering aspects but are more of a reflection of their spiritual dimensions. The diverse satisfaction and self-realization within interior spaces have become a focal point that contemporary interior design needs to address.

### **3.2 Adaptability of "Indeterminate Spaces"**

Indeterminate spaces are derived from the psychological response to the hierarchy of needs. They possess characteristics such as flexibility and variability, allowing for the emergence of different personalized spatial forms and unique individual lifestyles within the standardized residential layouts prevalent in contemporary urban areas. Users can quickly adjust and modify the functions within their unit spaces based on their own needs and preferences, thereby adapting to various spatial constraints imposed by intensive construction requirements.

## **4. The Methods and Techniques of Blank Space in Interior Space Design**

### **4.1 Blank Space in Color Composition**

Blank space in interior space design refers to the deliberate use of color and empty areas to emphasize the main subject. In terms of decoration, blank space involves simplifying and summarizing intricate decorative elements, while in layout, it involves careful management of the specific placement of visual elements. (Wang, D.D., Qin, H. & Xing, H.N, 2017)When applied in interior space design, the effects of blank space primarily manifest in the two-dimensional plane of floors, walls, and ceilings, as well as the three-dimensional space created by these elements. The beauty of blank space in Chinese painting lies in its perfect balance between presence and absence. In interior spaces, blank space does not imply separation or exclusion of elements within the space; rather, it represents a vital aspect of cohesive connectivity by understanding and controlling the overall connotation. It encourages individuals to experience infinite meanings through limited vocabulary, ultimately leading to a sense of spiritual freedom.

### **4.2. Blank Space in Decorative Elements**

Interior decoration is an important component of interior space design, and using blank space as a means to control the arrangement of decorations helps shape the overall sense of interior space. In this context, decoration mainly refers to the decorative components on two-dimensional surfaces, such as walls, as well as three-dimensional elements within the interior space, including decorative fabrics, wall and ceiling decorations, and other forms. From

an aesthetic perspective embodied by the use of blank space, the decorations should neither be overly intricate nor simply placed without consideration.

Within the interior space, the decorations between dimensions should have a sense of hierarchy, and the decorations within each dimension should achieve a coordinated sequence. For example, when the design of the ceiling becomes the prominent feature, other dimensional decorations should correspondingly decrease their visual weight within the space and leave appropriate blank space. Furthermore, all decorations within the ceiling dimension, such as lighting fixtures and plaster moldings, should be adjusted to contribute to the overall ambiance and aesthetic impression.

utilizing blank space in the arrangement of decorative elements allows for a balanced and harmonious composition within the interior space, where each dimension of decoration plays its intended role, and the overall aesthetic coherence is achieved.

#### **4.3. Blank Space in Layout**

Blank space in the context of interior space design refers to the deliberate management of the placement of furniture and furnishings within the layout. Blank space in layout is manifested by taking human actions into consideration, rather than randomly arranging items. In ancient times, there was a saying, "Sparse enough for horses to run, dense enough to block the wind." These two effects often appear together, serving as a contrast to express the spatial density. Such contrast is a subjective abstraction and exaggeration based on the study of real-world principles.

Blank space in layout also reflects in the flexible handling of spatial division. Flexible handling avoids dividing the interior space into fixed small units. Instead, it adopts a soft partitioning approach that allows room for flexibility, aiming to meet the changing functional needs of modern interior spaces. Soft partitioning involves enclosing space using elements such as glass, screens, and furniture. Visually, these elements are transparent or semi-transparent, resulting in visual effects that are more conducive to artistic expression and the creation of a desired atmosphere.

In summary, incorporating blank space in the layout of interior spaces involves strategic placement of furniture and furnishings based on human actions. Additionally, the flexible handling of spatial division through soft partitioning allows for adaptability and enhances artistic expression and the creation of a desired ambiance.

### **5. "Undefined Blank Space Design Method" in Residential Interior Design**

#### **5.1 Design background**

From a macroscopic perspective, contemporary cities can be described as a collection of "shelf machines" that make up the urban landscape (Victor S, 2015). These cities, large and small, resemble supermarket shelves, offering a wide array of choices but lacking individuality and spiritual essence. On a microscopic scale, the spatial commodities on these shelves can be likened to "enclosed containers." Each shelf is stacked with countless bottles and cans, their interiors constrained by technical specifications, leaving no room for alteration. Neatly arranged in rows and columns, these shelves are filled with bodies devoid of freedom, and these spatial containers gradually transform into shells of self-consolation for individuals.

#### **5.2 The Application of "Undefined Blank Space Design Method"**

The "undefined blank space" design approach combines the creation of blank spaces with the ever-changing nature of human needs, integrating it into interior design. By infusing the concept of blank space as a decorative design technique with functional and dynamically optimized requirements, it aims to create various possibilities for spaces based on residential aesthetics.

This approach starts from a human perspective, satisfying higher-level needs and liberating individuals from immense psychological pressure, allowing them to feel at ease and enjoy their living environment. From a spatial perspective, it transforms residential interiors into the smallest units that constitute an organic organism within the city. This infusion brings life to the city, endowing it not only with structure, but also with vitality, metabolism, and spirituality.

The living space is not a static container but a dynamic entity that perceives and adapts to people's needs, emanating diverse possibilities. By incorporating the "undefined blank space" design approach, the living space becomes a platform for fulfilling multifaceted requirements. It creates a harmonious interplay between the human experience and the ever-evolving spatial configuration.

the application of the "undefined blank space" design approach aims to optimize the functionality and adaptability of interior spaces, creating a multitude of possibilities that cater to the diverse needs and aspirations of individuals. It transforms residential interiors into vibrant and responsive units within the urban fabric, enriching the living experience and fostering a sense of harmony between people and their surroundings.

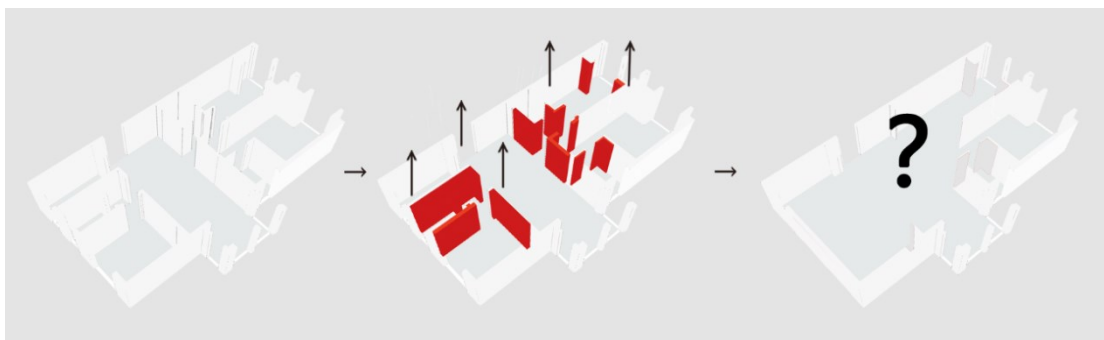
We have selected a typical commercial residential property in Wuhan city for interior space remodeling. By integrating blank spaces and indeterminate spaces, our design aims to provide a mental blank space and a natural blank space. The concept of "blank space" is intended to create a space for the mind to find solace and for nature to

find its place. The concept of "indeterminate" seeks to break away from fixed forms and cater to the diverse psychological needs of individuals.

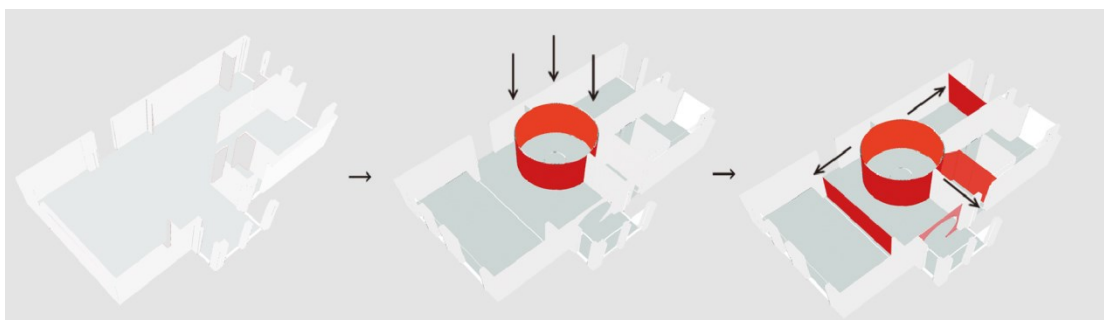
Based on these ideas, the core concept of our design is encapsulated in the phrase "Between Opening and Closure, there is No Interval." "Opening and closure" refers to the dynamic changes in spatial openness. "Opening" represents an open and spacious environment, while "closure" represents a private and intimate space. It can also be understood as the distinction between public and private spaces. Moreover, it signifies the transformation between social interaction and individual self-expression, with "opening" oriented towards the community and "closure" focused on self.

"No interval" can be interpreted in two ways. First, it represents the boundless nature of the mind, allowing it to soar freely without constraints, enabling individuals to fully express themselves and showcase their uniqueness. Second, it signifies the seamless integration of spaces, blurring the boundaries between different functions and states within the space, and creating a continuous and fluid experience.

The specific design process and application of the "undefined blank" design method can be divided into three levels. The first level involves flexible combinations of blank spaces at the layout level. The original floor plan was a 106 square meter apartment with three bedrooms and two living rooms, and each space was quite cramped due to the small total floor area. The first step was to remove all non-load-bearing walls in the layout, maximizing the elimination of constraints and creating an open space that maximizes the spatial openness. Based on this open space, composite spaces were created by integrating the core blank space at the junctions of load-bearing walls and extending it to other areas, forming various undefined blank spaces that serve different purposes. Eventually, all these spaces were unified within a single floor plan, accommodating various functions (Figure 1, Figure 2).



**Figure 1.** Non-load-bearing wall demolition process diagram (Developed by Author).



**Figure 2.** Put in undefined blank spaces interface (Developed by Author).

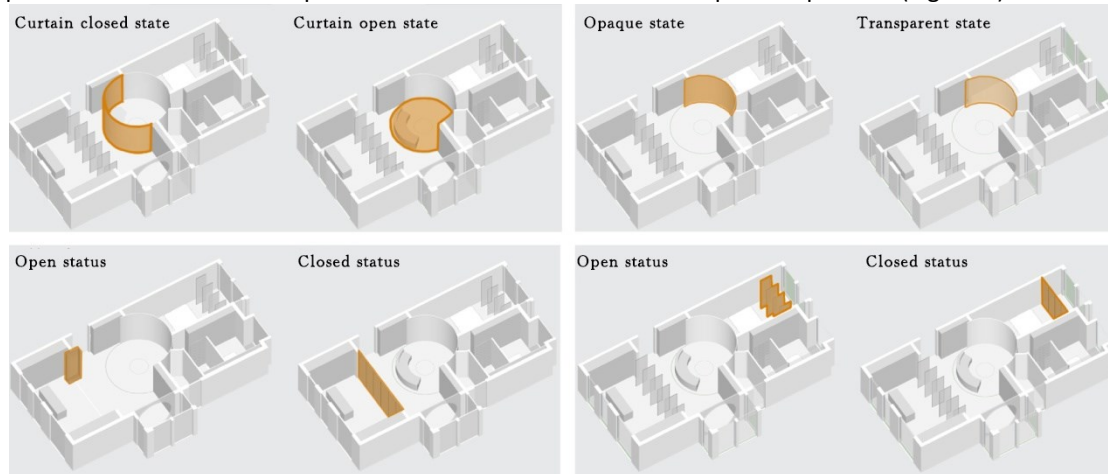
The creation of indeterminate blank spaces is primarily achieved through vertical interface variations. The interplay of solid and void, presence and absence in the vertical interfaces determines the sense of spatial boundaries. In this design, several different forms of variation are implemented in the vertical interfaces, including retractable curtains, adjustable glass elements, movable pivot doors, and rotating partitions.

Retractable curtains are employed in the central circular space of the living room, allowing for vertical expansion and contraction. When lowered, the curtains create a private enclosed space within the circular area, while raising them opens up the space into a more expansive public area. Adjustable glass elements are utilized at the boundaries between the central circular space and the two bedrooms. Using smart glass technology, these glass elements can transition between opaque, translucent, and transparent states, effectively blurring the spatial boundaries.

An intelligently controlled glass pivot door is installed between the kitchen-dining area and the living room, providing flexibility to merge the two spaces completely, partially, or separate them as needed, thus creating diverse

indeterminate spaces. Multiple rotating partitions are placed at the separation between the bedroom and the balcony, defining the spatial boundaries while allowing for interplay between the two spaces.

By incorporating these design elements, the vertical interfaces in the space achieve dynamic transformations, enabling the creation of flexible and indeterminate areas. Through the implementation of retractable curtains, adjustable glass elements, movable pivot doors, and rotating partitions, the design fosters a versatile environment that adapts to various functional requirements and enhances the overall spatial experience (Figure 3).



**Figure 3.** Multi-interface variation combination diagram (Developed by Author).

The circular space in the living room serves as a multifunctional core area, where the use of curtains allows for the creation of a serene meditation or tea ceremony space when lowered, and transforms into an open living and circulation space when raised. The application of smart glass blurs the spatial boundaries between the secondary bedroom and the living room, enabling visual connectivity between the two spaces and providing ample natural light. The use of movable smart pivot doors adds richness to the configuration of the public space. When fully open, the interior public space can expand to its maximum capacity, accommodating various activities. When partially open, it serves for daily activities, and when closed, it allows for different public activities in separate spaces. The rotating partitions between the bedroom and the balcony enable independent yet interconnected spaces. The introduction of green plants on the balcony distinguishes the two spaces and adds a touch of individuality while still maintaining a sense of unity.

In addition to the use of blank space in the interface, the color blank space in this design adopts a typical two-dimensional approach, treating color processing as a means attached to the three-dimensional interface. In interface design, the application of color follows the principles of low saturation and large areas of solid colors, avoiding excessive use of prominent colors. The overall color scheme of the space is primarily composed of classic black, white, and gray blocks, as well as natural and earth tones represented by green plants. In dealing with color blank space, not only the choice of colors needs to be considered but also the further expansion of its inherent significance and value.

Firstly, the purpose of color blank space is to create a simple, clear, and balanced visual effect. By using low-saturation colors, visual impact and distractions can be reduced, allowing people to experience a state of tranquility and comfort in the space. Secondly, the use of large areas of solid colors creates more possibilities and flexibility for the space, providing space for personal style and individuality for future occupants. This not only makes the space appear brighter and more transparent but also allows for greater freedom of imagination and expression. In addition, the application of large areas of solid colors helps to highlight important elements and details in the space, making them more eye-catching and prominent.

At the same time, the use of classic black, white, and gray tones also holds unique meaning and purpose in the design. The combination of black, white, and gray can create a minimalist and refined atmosphere, highlighting the modernity and quality of the space. Furthermore, the use of black, white, and gray helps to emphasize the form and structure of the space, making its decorative elements more prominent (Figure 4).



**Figure 4.** Black, white and grey kitchen space (Developed by Author).

The addition of green plants is also an important component of the color blank space design. The natural colors and organic forms of green plants inject a touch of vitality and liveliness into the space, breaking the artificial attributes of the constructed environment. Additionally, the inclusion of green plants establishes a connection between the indoor and outdoor environments, acting as a bridge. Through the application of green plant colors, the space establishes a connection with nature, allowing people to experience the tranquility and harmony of the natural spirit within it (Figure 5).



**Figure 5.** Master bedroom with greenery (Developed by Author).

The third aspect is the concept of blank space in interior decoration, which involves extracting and abstracting the elements of "mountain," "water," and "bamboo" that represent the spirit of Chinese nature. These elements are simplified and used as decorative elements to connect the overall spatial design. Additionally, indoor greenery is introduced to create a harmonious relationship with the decorative elements. The selection of these elements as the foundation for decoration is inherently linked to the concept of blank space. In Chinese painting, "mountain,"

"water," and "bamboo" are commonly used elements in blank space techniques, allowing for the creation of effects such as "using the base to enhance the form" and "using the form to enhance the base."

For example, we construct decorative components with the intention of representing "mountains" at the entrance. In the dining room, we utilize water patterns to create a sense of blank space on the background wall. On the side of the master bedroom, we create a narrow area where bamboo is planted, complemented by the placement of rocks below and the bamboo lattice pattern on the wall, evoking the artistic ambiance of "bamboo" found in Chinese paintings (Figure 6).



Figure 6. Mountains, water and bamboo in decorative elements (Developed by Author).

Allocating blank space in the interior to green natural landscapes and aligning it with the blank space found in traditional Chinese paintings differs from the concept of structural blank space in architectural art. Here, the showcased blank space refers to creating a pure, natural, and artistic haven that allows people to experience its inherent beauty and serves as a spiritual blank space. This approach aims to purify and alleviate the mental stress caused by the overwhelming societal pressures of today, offering individuals a personal sanctuary of natural serenity and tranquility amidst the bustling environment.

## 6. Discussion and Conclusions

Based on the empirical research of our proposed "undefined blank" design approach, we have collaborated with the client to establish the final implementation plan. The execution closely aligns with our proposed design concept, demonstrating the feasibility of applying this method to typical residential properties in Chinese urban areas. It effectively addresses the contradiction between the extended home activities in the post-pandemic era and the limited functionality of compact residential layouts. Results highlight that the removal of non-load-bearing walls maximizes the individuality and flexibility of space. Variable combined blank interfaces enable the space to fit multiple usage scenarios. The use of transparent materials can blur spatial boundaries to make it more open. Physical blank spaces and spiritual needs must be combined to truly achieve individual demands.

However, our subsequent research on the residents' daily activities has identified some factors that were not initially considered. For instance, an excessive amount of blank space for flexible activities may result in a high degree of variability within the space. In situations where the spatial functions remain unchanged over a prolonged period, certain areas of the flexible interface may experience lower usage frequency.

Secondly, the addition of activity units can increase the overall construction cost in later stages. Therefore, when considering economic factors, it may be necessary to adjust the layout and levels of flexible blank space combinations based on the preferences of different clients.

Thirdly, this design approach involves aesthetic and stylistic variations. Different clients have their own interpretations of various decorative styles, so it is not possible to replicate this design method entirely in terms of decorative blank space.

The technique of blank space creation, originating from the field of art, has expanded into the realm of spatial design. It has transcended aesthetics and extended to the functional aspects of space. Currently, designers need to continue exploring how to unleash its value and better serve users under multiple restrictive conditions. Moreover, in the context of intensified urban development, it is essential to discover more possibilities for interior spaces and accurately identify their development positioning. These are crucial considerations for contemporary interior design.

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