

Studies on how to incorporate the old idea of "leaving blank space" with contemporary new Chinese interior design

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Abstract This essay investigates how the conventional idea of "white space" is used and integrated into contemporary neo-Chinese interior design. Through quantitative analysis and experimental verification, the study aims to assess the effects of white space ratio, color simplicity, material naturalness, embellishment density of decorative elements, and application of smart home technology on spatial visual effects, user satisfaction, and functionality. In this work, each design parameter is quantitatively analyzed using the comprehensive evaluation index (E) . The findings of the experiment indicate that a variety of factors, including the density of decorative elements, color and material combinations, white space ratios, and cognitive level, significantly affect how visually comfortable and user-friendly a space is. A variety of white space ratios (α), color simplicity (C_s), material naturalness (M_n), decorative element embellishment density (D_e), and intelligence level (I_t) were set up for the experiment. Data were gathered visually, through questionnaire surveys and user satisfaction surveys, and statistical analysis techniques were used to process the raw data. The findings indicate that the best designs in terms of visual effects and user satisfaction have a high white space ratio ($\alpha = 0.4$), a high combination of material naturalness and color simplicity ($C_s = 0.9$, $M_n = 0.9$), a moderate density of decorative elements ($D_e = 0.03$), and a medium-to-high degree of intelligence ($I_t = 0.6$).

Index Terms blank space, modern new Chinese style, interior design, integrated application

1. Introduction

Modern interior design is emphasizing the integration of traditional cultural components more and more because of the ongoing growth of society and people's aesthetic notions. In this environment, modern new Chinese style interior design emerged, fusing modern design ideas with traditional Chinese culture to create a distinctive style [1]. Designers are now concentrating on applying the conventional idea of "leaving blank space for artistic conception" in their investigation of this style.

Rooted in China's aesthetic culture, the traditional idea of "leaving blank space for artistic conception" comes from ancient Chinese painting and cultural art. Leaving white space in ancient paintings is a technique as well as a means of communicating ideas and feelings [2]. Leaving space unfilled allows for a limitless sense of space and creative invention on a small canvas, stimulating viewers' imaginations and bringing them spiritual joy. A distinctive environment where visitors can sense the fusion of tradition and modernity, as well as the coziness and cultural legacy of the place, can be created by deftly incorporating this idea into contemporary interior design [3], [4].

In contemporary neo-Chinese interior design, the conventional idea of "white space" has great aesthetic and cultural importance, but its practical application still confronts numerous obstacles. First first, interior design creates three-dimensional space as opposed to flat painting art. It is a challenging design task to efficiently materialize the white space in space [5]. Second, there could be conflicts between classical aesthetics and the practical requirements of contemporary living. For designers, striking a balance between aesthetic effects and practicality is a challenging issue. Furthermore, using too much white space can give the room a depressing and empty feeling. More research is required on the topic of controlling the amount and placement of white space.

The majority of current research on the new Chinese style and the idea of blank space is case-based and theoretical in nature; rigorous quantitative analysis and experimental verification are missing [6]. A thorough examination of particular design criteria, such as the ratio of blank space to material naturalness, color simplicity, decoration density of decorative elements, and material naturalness, is lacking in some research, which have examined the aesthetic and cultural significance of blank space in interior design [7]. Furthermore, there is a dearth of experimental data regarding the effects of these design elements on spatial function and user experience.

Through quantitative analysis and practical verification, this research attempts to comprehensively explore the application effect of the traditional "white space concept" in contemporary new Chinese style interior design. In order

to build a comprehensive evaluation model, we introduced five key design parameters: white space ratio (α), color simplicity (C_s), material naturalness (M_n), decorative element embellishment density (D_e), and intelligence level (I_t). We also proposed a comprehensive evaluation index, E . This paper's experimental design comprises a questionnaire survey, a user satisfaction survey, and visual measurement. To guarantee the impartiality and scientific validity of the findings, the data is analyzed using statistical analysis techniques.

When compared to previous studies, the approach used in this work offers the following benefits:

The investigation of blank space's impact on spatial visual impacts and user experience is done quantitatively through the introduction of the complete evaluation index E and particular design elements.

The true impacts of various combinations of design parameters are confirmed through experimental design and data collecting, offering trustworthy empirical backing.

To thoroughly assess the design effect, the three characteristics of visual comfort, user happiness, and spatial functionality are taken into account.

The study's findings offer precise design guidelines and optimization recommendations for blank space application, which aids in striking a better balance between conventional ideas and contemporary demands.

II. Integration Strategy

II. A. Pay attention to how open and uncomplicated the entire area is

The idea of "leaving blank space for artistic conception" calls for consideration of the overall space's transparency and simplicity in order to produce a calm mood. Only the essential furniture and decorations should be arranged in the main rooms, like the living room, to allow for adequate space. To help people see the beauty in the details, various tiny ornaments or plants can be positioned in certain areas [8], [9].

II. B. Focus on quality before quantity

We should prioritize refinement over complication when incorporating the traditional idea of "leaving blank space for artistic conception" into contemporary new Chinese style interior design. We can also invest additional time and effort in certain little aspects in design to give the room a more unique feel. For instance, rather of overcrowding, we could select a limited amount of excellent decorations to make each object appear simple and exquisite [10]. To create a stunning overall look, each piece should be placed precisely so that it emphasizes texture and taste.

II. C. Combining artistry and emotion

The emphasis of the conventional "white space artistic conception" is on artistic and emotional expression. Through creative use of white space and arrangement, designers may create a room that is full of artistic conception and emotion, allowing people to feel emotionally connected and creating a more meaningful and deep living space [11].

II. D. Emphasize the artistry of space treatment

Designers can provide additional sense of layering, space, and three-dimensionality to a room through thoughtful planning and the use of blank space, which will increase the space's diversity and visual appeal. This method shows the designer's inventiveness and skill while also enhancing the space's beauty [12], [13].

II. E. Stress the qualities and spirit of traditional culture.

In the contemporary new Chinese style, the classic notion of "white space" highlights the spirit and disposition of traditional culture. Designers can include traditional cultural features into interior design by utilizing appropriate white space and line processing. This shows the dignity, elegance, and significance of Chinese culture while also giving the area a distinct cultural charm.

III. This article's design

A formulaic approach can be utilized for quantitative analysis and design optimization in addition to theoretical study and empirical research in order to incorporate the conventional idea of "white space" into contemporary new Chinese interior design [14]. The idea of "white space" is used to contemporary new Chinese interior design in the formula derivation scheme below:

1) Computation of the space blank ratio One important design factor that has a direct impact on the room's overall ambiance and visual impact is the percentage of blank space. If we define the space blank ratio as, we can partition the whole area A into two parts: the actual usage area (A_u) and the blank area (A_w).

$$A = A_w + A_u \quad (1)$$

The definition of the blank ratio an is

$$\alpha = \frac{A_w}{A} \quad (2)$$

In order to achieve good white space effect, the value range of α is generally between 0.2 and 0.4, which means that 20% to 40% of the space should be left blank.

2) The material and color selection greatly affects the room's atmosphere.

Describe the material naturalness index (M_n) and the color simplicity index (C_s), both of which have a range of 0 to 1. The more natural the material or the simpler the hue, the higher the value.

The following formula can be used to compute the threshold T for the overall simplicity and naturalness of the space, which is the design goal.

$$S = \beta_1 C_s + \beta_2 M_n \quad (3)$$

β_1 and β_2 are weight coefficients among them, and $\beta_1 + \beta_2 = 1$. It is thought that the choice of material and color is fair if $S \geq T$. T typically ranges from 0.7 to 0.9.

3) Density of decorative element decoration.

Another crucial aspect of design is the density of ornamentation on decorative elements. There are N_e designated ornamental pieces in all, and A_u 's actual usage area is A_u . Consequently, the density of ornamentation is

$$D_e = \frac{N_e}{A_u} \quad (4)$$

The value of D_e should typically be kept within a specific range, often 0.01 to 0.05, that is, no more than 5 decorative items per square meter of space, to prevent visual confusion produced by excessive decoration.

By utilizing smart home technologies, the fusion of contemporary technology and conventional ideas can maximize spatial functionality. Define the intelligence index I degree, which has a 0–1 value range. The higher the number, the more intelligent the person is. Achieving or surpassing a threshold T_i of intelligence is the aim of intelligent design, which is as follows:

$$I_i \geq T_i \quad (5)$$

T_i values typically fall between 0.5 and 0.8. By combining the aforementioned factors, a comprehensive evaluation index E may be established to thoroughly assess the design's logic. This is the formula.

$$E = \gamma_1 \alpha + \gamma_2 S + \gamma_3 D_e + \gamma_4 I_i \quad (6)$$

By modifying different indicators and weight factors to maximize the complete assessment index, design optimization optimizes the design.

An example calculation uses the following design parameters and assumes that the total area A of a new Chinese interior design project is 100 m².

$\alpha = 0.3$ (blank ratio)

$C_s = 0.8$ (color simplicity)

$M_n = 0.7$ (naturalness of material)

$N_e = 3$ (total number of decorative elements)

$T_i = 0.6$ (intelligence level threshold)

$\beta_1 = 0.5$, $\beta_2 = 0.5$ (color and material weight coefficient)

$\gamma_1 = 0.3$, $\gamma_2 = 0.3$, $\gamma_3 = 0.2$, $\gamma_4 = 0.2$ (comprehensive evaluation weight coefficient)

Calculated:

$$A_w = \alpha A = 0.3 \times 100 = 30 \text{ m}^2$$

$$A_u = A - A_w = 100 - 30 = 70 \text{ m}^2$$

$$S = \beta_1 C_s + \beta_2$$

$$M_n = 0.5 \times 0.8 + 0.5 \times 0.7 = 0.75n$$

$$D_e = \frac{N_e}{A_u} = \frac{3}{70} \approx 0.043n$$

$$E = \gamma_1 \alpha + \gamma_2 S + \gamma_3 D_e + \gamma_4$$

$$I_i = 0.3 \times 0.3 + 0.3 \times 0.75 + 0.2 \times 0.043 + 0.2 \times 0.6 \approx 0.537$$

The design scheme can be further adjusted by varying weight coefficients and factors to make sure that the modern new Chinese style interior design not only adheres to the idea of "blank space," but also suits the demands of contemporary living.

IV. Utilizing the conventional notion of "leaving blank space" in contemporary home design with a new Chinese flair

IV. A. Use to maximize the arrangement of interior design

Incorporating the conventional notion of "blank space" with contemporary new Chinese style architecture showcases the seamless fusion of contemporary components and customary traditions. The four basic components that are applied in interior design layout optimization are as follows:

1) The fusion of classic and modern design components. The "blank space" is mixed with contemporary aesthetic concepts in modern new Chinese style interior design to create a new art form that emphasizes the reinterpretation of traditional aspects from a contemporary viewpoint. In order to produce more unique and creative design impacts, designers might include contemporary design aspects based on traditional cultural elements[15].

2) Vibrant color scheme. Color selection also reflects the use of traditional "white space" in contemporary new Chinese interior design. One can make a richer color combination by slyly combining modern gray, white, black, and other hues with traditional red, yellow, and blue. The use of color not only enhances the space's sense of layering but also gives it more energy and vibrancy.

3) Customized décor and furnishing choices. Traditional furniture and decorations can be imaginatively redesigned and arranged by designers, who emphasize originality and distinctiveness. A distinctive home style can be developed by reinterpreting classic components, giving the area a distinct personality and charm.

4) Coziness and spatial qualities. Applying the conventional "white space" idea can also improve the comfort and naturalness of the contemporary, new Chinese-style area. The area can be made to feel more open and conducive to a laid-back lifestyle with the right amount of white space and arrangement[16].

IV. B. Utilization to enhance interior design artistry

The traditional idea of "white space" lends the modern new Chinese interior design works a significant artistic quality. The following three factors primarily demonstrate how application can enhance interior design artistry:

1) The creative arrangement of space. It is possible to generate a roomy and light sensation of space by utilizing "white space". As Figure 1 illustrates, this arrangement creativity is evident in the room's balance and harmony in addition to its comfort.

2) The precision with which colors match. The precise color matching in the modern new Chinese style also reflects the use of the ancient notion of "white space". Designers can create rich and varied color levels by integrating classic and modern components with the correct color choices.

Assess the impact of material naturalness and color simplicity on the overall design environment. - Confirm the influence of blank space ratio on the visual effect of space.

Examine how the density of decorative elements affects the comfort level of the eye

Examine how smart home technology is applied in the new Chinese fashion.

- Enhance design via thorough assessment index $\backslash(E)$

IV. C. Test subject

The experimental objects consist of a collection of identically sized (one hundred square meters) replicated interior spaces that are designed according to various design specifications. The following particular design situations are included in the experimental samples (Figure 1 - Figure 4):

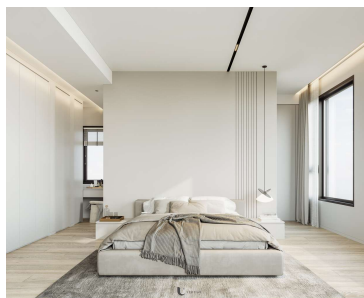


Figure 1: Scene 1: Low proportion of white space



Figure 2: Scene 2: A moderate amount of white space



Figure 3: Scene 3: A high proportion of white space



Figure 4: Scene 4: Naturalness of materials and low color simplicity

To create a calm, cozy, and harmonious environment, strive for elegance and harmony. Strive for elegance when decorating to give the area more appeal and artistic flair. In terms of lines, aim for smoothness; employ curves and smooth lines to give the area a cozy, soft vibe (Figure 5 - Figure 6).



Figure 5: The creativity of a contemporary, new Chinese-style room arrangement



Figure 6: The natural harmony of furniture placement

V. Application Effect

1) Theme highlighting and emotional communication are two of the numerous benefits that come from applying the classical concept of "white space" to current, new Chinese interior design. Through the strategic use of white space, designers can enhance the theme and emotional impact of the room, giving visitors a deeper understanding of the design goal. The most expressive area of the room can be brought to light and people's attention can be directed there by using white space.

2) Strengthen the perception of vertical hierarchy. A place with a reasonable amount of white space can have rich shifts brought about by light, giving it greater depth and layer richness.

3) Give the space a better, more refined appearance. White space, as a specific method, is more than just a plain white space; it's a carefully placed artistic expression by the designer. By carefully arranging white space, a designer can give a room more bounce and vitality and increase the overall dynamic of the piece.

4) Highlight the cultural significance. There are more options to showcase traditional cultural features when there is blank space. Traditional components treated with blank space in the current new Chinese style can draw attention to their refinement and elegance, helping people to comprehend and value traditional culture's meanings on a deeper level.

5) Create tranquility and comfort. Through blank space, the space becomes more tranquil and comfortable, allowing people to feel a peaceful atmosphere. The use of blank space can create an environment that makes people feel happy and relaxed, which is in sharp contrast to the busyness of modern life.

6) Conform to nature. The classic "blank space concept" can be applied to bring the area closer to nature and foster a natural mood. To establish harmony with the surrounding environment, include natural components into the room's appropriate blank space.

VI. Conclusion

Incorporating and utilizing the age-old notion of "leaving blank space" into contemporary interior design in the new Chinese style preserves the core of ancient Chinese culture while blending seamlessly with contemporary design

elements to provide a refined and uncomplicated living space. We can help people build a living space that has more cultural significance by conducting thorough research and having a discussion about how to apply this design concept in interior design. In order to help designers better balance traditional notions and contemporary needs in practice, the experimental results will offer a mathematical foundation for the implementation of the traditional concept of "leaving blank space" in current new Chinese style interior design. In addition, this study encourages the creative fusion of traditional culture with modern design and offers a reference path for future design optimization.

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