

Retraction

Retracted: Architectural Interior Modeling Product Design Based on the Multimedia Three-Dimensional Hybrid Algorithm

Advances in Multimedia

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] T. Su and G. Ouyang, "Architectural Interior Modeling Product Design Based on the Multimedia Three-Dimensional Hybrid Algorithm," *Advances in Multimedia*, vol. 2021, Article ID 8195825, 6 pages, 2021.

Research Article

Architectural Interior Modeling Product Design Based on the Multimedia Three-Dimensional Hybrid Algorithm

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With the continuous development of social economy, people's aspiration for architecture is getting higher and higher. Designing more functional and aesthetically pleasing interior styling products is increasingly important research. Relying on the multimedia three-dimensional hybrid algorithm, the mathematical modeling of the relationship between visual comfort and chromaticity is modeled in this paper, to construct an economical and practical interior architectural design model that takes into account color comfort perception, that is, complete "design, conversion, editing and repair, and semantic and coordinate supplement" and other chain construction to realize usable interior architectural design models. The simulation experiment results show that the model based on the multimedia 3D hybrid algorithm has high practicability.

1. Introduction

The interior modeling products involve in many types, including the product itself on the one hand and objective factors such as color and style on the other hand [1–3]. Color is an important part of interior architectural design, and it is an extremely active and expressive modeling element. The choice and application of interior architectural colors need to meet the needs of psychology and life, as well as the social environment and structural characteristics of interior architecture. Meanwhile, the application of interior architecture colors is gradually becoming more complicated, so color design should fully consider people's comfort perception.

Landscape design is generally completed by architects, patterned planar landscape design techniques are abandoned, which is replaced with large areas of water, large paving, large areas of plane, and vertical greening, and the outdoor interface is reserved for architectural design and complementation of positive and negative spaces to respond

to the overall sense of the building. "Unified design" does not mean that all designs are completed by a designer or design company. The pace of design is accelerated, and the professional design is combined through market, which calls for collaboration in design. This is especially true in the design of public buildings. At the beginning of the architectural design, the architects have initially taken into account the outdoor layout, curtain wall structure, and interior space. Under the background of a good design environment, the high completion degree of architectural design products depends on the designer's comprehensive ability: the sensitivity of multiple visual arts, the ability to comprehend through a comprehensive study, and the cognitive ability of multidisciplinary engineering, and the communication and collaboration skills with the construction team, the owner, and other designers can produce a unified design under the "big design."

Based on the multimedia three-dimensional hybrid algorithm, the interior modeling products of the building are designed in an attempt in this paper, taking the description

of visual comfort and chromaticity as the starting point and constructing an economical and applicable interior architectural design model with color comfort perception.

2. Analysis of Dynamic Connection Structure Mode of Architectural Interior Products

Architectural space is a sense of spatial scale that people comprehensively perceive through the senses (hearing, visual sense, smell, touch, and psychology) [4–6].

2.1. Design Features of Architectural Interior Products. The design of building interior products must not only meet the characteristics of the product but also the characteristics of the interior space of the building, including the following.

2.1.1. Interior Products Have a More Direct and Close Impact on People's Body and Mind. As a large part of a person's life is spent in interior space, the quality of interior environment will inevitably directly affect people's safety, hygiene, efficiency, and comfort. The size and shape of the interior space of the building, the linear pattern of the interior interface, and so on will give people a strong long-term and close-range feeling physically and psychologically and even touch and feel interior furniture, lamps, and so on; hence, it is natural that the requirements for interior product design are more in-depth, detailed, and more meticulous. This must be considered more from the perspective conducive to people's physical and mental health and comfort and from the perspective conducive to enriching people's spiritual and cultural life.

2.1.2. The Composition Factors of Interior Environment Needs to be Considered More Carefully When Designing the Interior Products. The quantitative standards shall be established for most of the daylighting and lighting, tone and color configuration, material texture and lamination that constitute the interior light environment and visual environment, and the sound insulation, sound absorption, and noise background in the interior sound environment, which must be taken into account in modern interior product design.

2.1.3. The Interior Products Reflect the Beauty of Space, Function, and Technology and the Beauty of Decoration Craftsmanship in Design Aesthetics in a Concentrated and In-Depth Manner. Interior design combines the interior space, interface line shape, and interior furniture, lamps, equipment, and other contents, giving people a feeling of interior environmental art. Therefore, interior product design is closely related to decorative art and product design.

2.1.4. The Change of Interior Product Functions and the Update of Materials and Equipment Are More Prominent. The design of architectural interior products is closely related to the time factor, with the update cycle shortened and the update rhythm accelerated. In the field of interior

product design, a series of corresponding issues must be considered even more, such as the layout, interface structure, and decoration, construction method, and material selection caused by time factors.

2.1.5. Interior Products Have High Technological Content and Added Value. The new interior environment created by modern interior product design often brought about new requirements in terms of computer control, automation, and intelligence, so that interior facilities and equipment, new decorative materials and hardware accessories, and so on, have a higher technological content. Due to the increase in technology content, the overall added value of the design of modern architectural interior products and overall interior space have also been increased [7–9].

2.2. The Characteristics of Dynamic Connection Structure in Architectural Interior Products. The several characteristics of architectural interior product design have been discussed, and then two important characteristics of the dynamic connection structure of architectural interior products shall specifically be analyzed.

First of all, the dynamic connection structure has the characteristics of making the architectural interior products able to meet the requirements of the space.

When the house has gradually become a luxury in people's lives, the interior living space that truly belongs to the person becomes more and more narrow. However, as the saying goes, the sparrow is small but full of all five internal organs, and the smallest interior space likewise needs furniture, lamps, kitchen supplies, and so on. Therefore, it is the key in design to make architectural interior products maximize their functions in a fixed space and meet the needs of people's daily life. As a result, the dynamic connection structure is used in interior products, which solves many problems of interior space.

For example, in furniture design, a large number of mobile connection structures are used. The most revolutionary result is the furniture that can be moved freely in the interior space of the building. This type of furniture uses mobile connection keys-rotating wheel to realize the movement of the furniture in the space. It not only solves the problem of limited interior space but also brings a lot of fun to life.

Another example is the design of lamps; mobile lamps can also save interior space.

The mobile lamp can be easily moved to the place we need it. Desk lamp lamps, floor lamps, and these various mobile lamps not only allow us to make high use of the limited space but also can be used to decorate our living environment.

In short, the dynamic connection structure is designed in the interior products to make the reasonable use of the building's interior space, and no longer worry about where a piece of furniture that cannot stand still is placed, nor be anxious about that there is no enough space for too many furniture to be placed. The dynamic connection structure allows people to use the interior space more flexibly.

Secondly, the dynamic connection structure has the characteristics of making the interior products of the building more suitable for use.

When people's material level reaches a certain height, their spiritual aspiration will also increase. Therefore, the ordinary interior products cannot be only used for the most traditional forms of use. Therefore, the dynamic connection structure helps building interior products to meet people's needs in one direction.

Take mobile lamps as an example. All kinds of mobile lamps can be used to decorate our living environment; please do not neglect its use value. Some small mobile lamps, such as pendant teelicht, flip lamps, adjustable mobile lamps, mini reflective spotlights, desktop lamps, and piano lamps, can meet our needs for lighting in special environments and special tasks (Figure 1).

The different needs of people have led to the labor production and creation of people to meet their needs, and the behaviors and results of people's creative actions show the inherent definitive property of the above five kinds of needs to varying degrees. The level of human needs is also different so are the scales of the architectural interior products designed. It can be divided into five basic levels: physiological needs, safety needs, social needs (or the need for attachment and love), the need for respect, and the need for self-realization.

A floor lamp generally plays a role in the lighting of the room, but when the owner of the room wants to play the piano, it can be moved through the rotating wheel connection key, and the light source can be moved through the principle of sliding rods. As a result, it satisfies the owner's demand for lamps and lanterns when playing the piano.

There are many characteristics of dynamic connection structure in architectural interior products. They were viewed from a different perspective. Here, only the two characteristics that meet the needs of space utilization and use are analyzed to reflect that the dynamic connection structure is important in product design [10].

2.3. Multimedia Three-Dimensional Hybrid Algorithm. E is described to describe chromaticity with the unit of bit. The multimedia 3D hybrid algorithm uses $\ln E$ as the basic function. In order to reflect the multifactors of visual comfort, the visual comfort Z is converted into a power series expansion of $\ln E$, which is as follows:

$$Z = a_0 + a_1 \ln E + a_2 (\ln E)^2 + \dots + a_n (\ln E)^n + \dots \quad (1)$$

In the formula, a_0, a_1, \dots, a_n can be obtained through experimental data. In order to make the visual comfort consistent with the objective law, the values of a_0, a_1, \dots, a_n are determined through the relationship between visual comfort and chromaticity in the four-color environments of a certain interior building, as shown in Figures 2 and 3.

Through the experimental data of the relationship between visual comfort and chromaticity of the general interior color environment (warm color) described in Figure 2, the 3rd power formula and the 4th power formula can be obtained as follows:

$$Z = 285.544 - 191.874 \ln E + 44.5959 (\ln E)^2 - 3.40665 (\ln E)^3, \quad (2)$$

$$Z = -829.239 + 808.9702 \ln E - 301.498 (\ln E)^2 + 47.8419 (\ln E)^3 - 2.90444 (\ln E)^4. \quad (3)$$

In formula (2), 4 sets of experimental data are used to obtain 4 coefficients, and in equation (3), 5 sets of experimental data are used to obtain 5 coefficients. The curve of visual comfort with chromaticity is drawn according to formula (2) and formula (3) and is described in Figures 2 and 3.

Through analyzing Figure 4, it can be seen that the curve drawn according to formula (2) can pass 4 experimental data points. Meanwhile, the visual comfort in the range of 8~24bit gradually increases with the increase in chromaticity, and the maximum value of the visual comfort appears near 32bit; when the chromaticity continues to increase, the visual comfort will gradually decrease with the increase in the chromaticity, which is consistent with the objective experience of human visual comfort, indicating that when the chromaticity is in the range of 8~24bit, Formula (2) can effectively reflect the objective law of visual comfort and speed; however, when the curve is in the range of 4~8bit, the visual comfort gradually decreases with the increase in chromaticity, which is inconsistent with the objective experience of human visual comfort, so formula (2) cannot correctly reflect the correct relationship between visual comfort and chromaticity in the range of 8~24bit.

Through analyzing Figure 5, it can be seen that the curve drawn according to formula (3) can not only pass 5 experimental data points but also match the objective experience of human visual comfort between 4 and 32 bits, so the 4th power formula is a more excellent mathematical model describing the relationship between visual comfort and chromaticity, that is,

$$Z = a_0 + a_1 \ln E + a_2 (\ln E)^2 + a_3 (\ln E)^3 + a_4 (\ln E)^4. \quad (4)$$

The maximum value of visual comfort obtained through formula (4) is not strictly 1, and the maximum value of visual comfort obtained through formula (4) in various color environments is not strictly equal, resulting in difficulty in comparison between visual comfort in different color environments. In order to solve the above problems, the maximum value of visual comfort is normalized by formula (4); that is, the maximum value Z_m of visual comfort in formula (4) is divided by Z ; then,

$$Z_b = \frac{1}{Z_m} (a_0 + a_1 \ln E + a_2 (\ln E)^2 + a_3 (\ln E)^3 + a_4 (\ln E)^4). \quad (5)$$

Equation (5) is the mathematical model of the relationship between visual comfort and chromaticity that meets the normalization requirements.

After completing the interior architectural design model, the model point is just a custom coordinate system. In order to realize the positioning function of the interior space, the

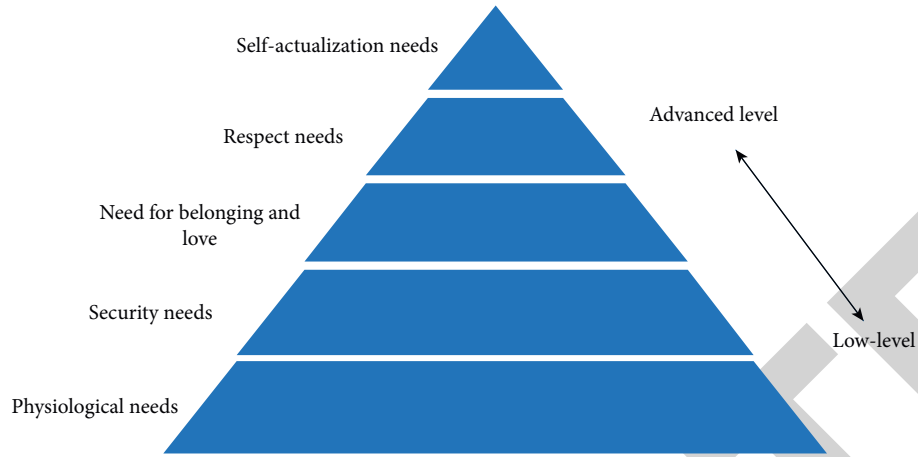


FIGURE 1: Demand hierarchy diagram.

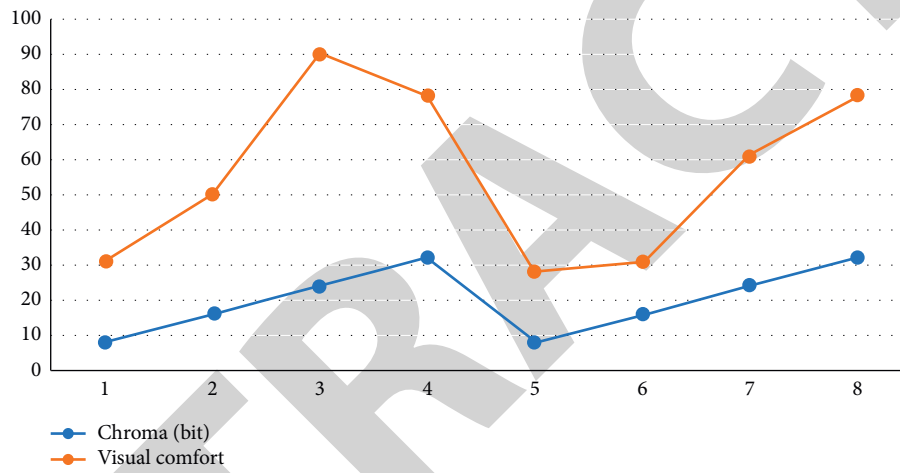


FIGURE 2: Color environment in general interior conditions.

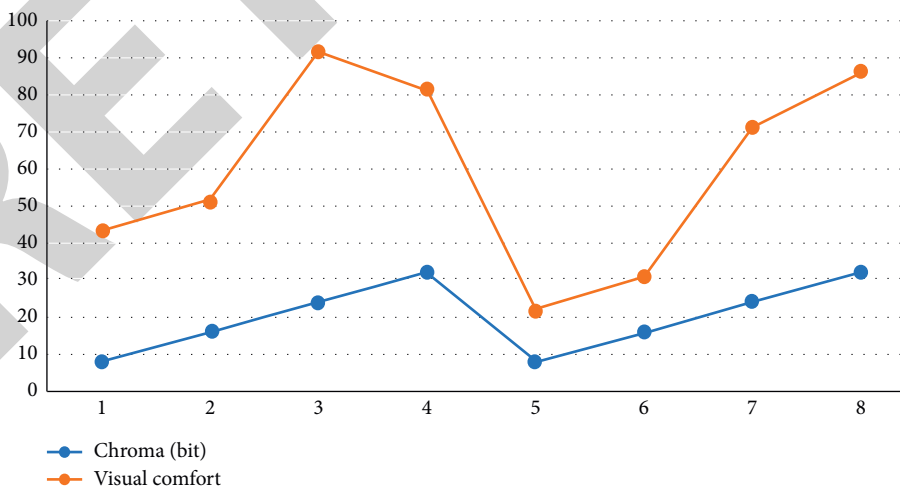


FIGURE 3: The relationship between visual comfort and chromaticity of the interior light environment for meeting guests.

coordinate data of the model need to be converted into the local coordinate system or the national coordinate system [11–13]. The Bursa 7 parameter is adopted in this paper, which is 3 translation parameters, 3 rotation parameters, and

one scaling parameter; the common points around the interior building with high accuracy and uniform distribution are selected; the seven parameters required for the conversion are obtained to complete the conversion from the

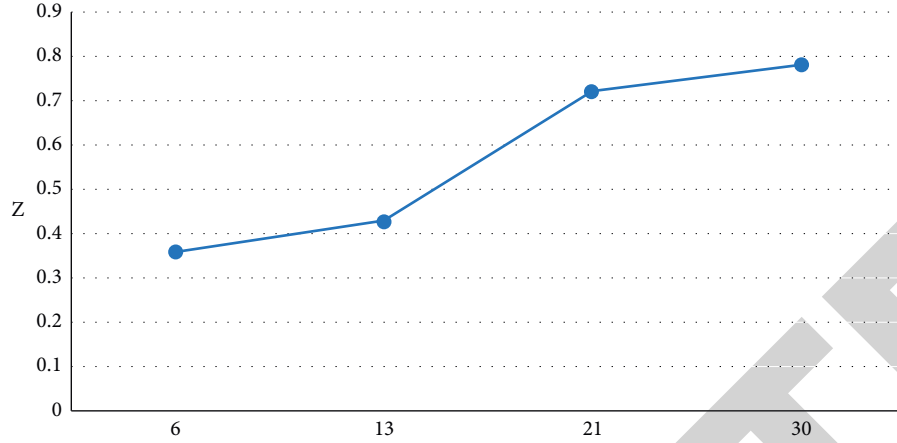


FIGURE 4: The change curve of visual comfort with chromaticity (the third power).

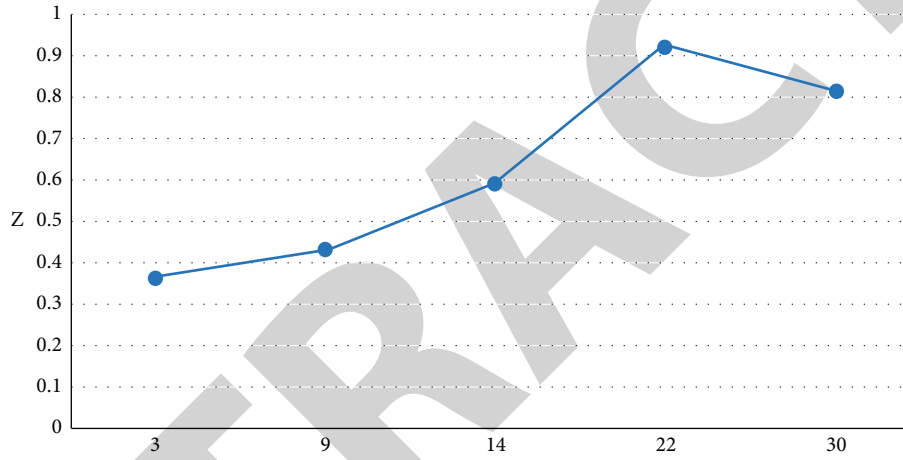


FIGURE 5: The curve of visual comfort change with chromaticity (fourth power).

interior architectural design model's custom coordinate system to the local coordinate system.

The basic parameter formula of coordinate transformation can be described as follows:

$$\begin{bmatrix} X_2 \\ Y_2 \\ Z_2 \end{bmatrix} = (1 + m) \begin{bmatrix} 1 & \varepsilon_L & -\varepsilon_Y \\ -\varepsilon_Z & 1 & \varepsilon_X \\ \varepsilon_Y & -\varepsilon_X & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ Y_1 \\ Z_1 \end{bmatrix} + \begin{bmatrix} \Delta X_0 \\ \Delta Y_0 \\ \Delta Z_0 \end{bmatrix}. \quad (6)$$

Among them, ΔX_0 , ΔY_0 , and ΔZ_0 are used to describe 3 translation parameters; ε_X , ε_Y , and ε_Z are used to describe 3 rotation parameters; m is used to describe scale change parameters; X_1 , Y_1 , and Z_1 are used to describe coordinate of the local coordinate system, and X_2 , Y_2 , and Z_2 are used to describe the coordinates of the coordinate of model's custom coordinate system.

The interior architectural design model is converted into GML language through the data conversion tool. In the process of description, the differences between the data formats will often cause the occurrence of model's cracks or fractures, and topological relationships, semantic information, color usage, and so on need to be added to the model, so the visual editing and repair of the model need to be completed first, and finally the analysis of the model is

finished through the expansion of development kit, and semantics, coordinate color, and other information are added to realize the usable interior architectural design model.

2.4. Experiment Analysis

2.4.1. Model Application. In order to verify the validity of the interior architectural design model that considers color comfort perception proposed in this paper, relevant experimental analysis needs to be conducted.

According to visual effects, colors are divided into two types: cold tones and warm tones. The above two types have different effects on human physiology and psychology. Warm colors can bring people a warm, comfortable, and pleasant atmosphere while cold colors can bring people a cool and quiet atmosphere.

2.4.2. Experimental Verification. 50 people with normal color vision, naked vision, or corrected vision are selected randomly. They are randomly divided into 5 groups, and the design of the interior architectural design model and traditional interior architectural design model is evaluated

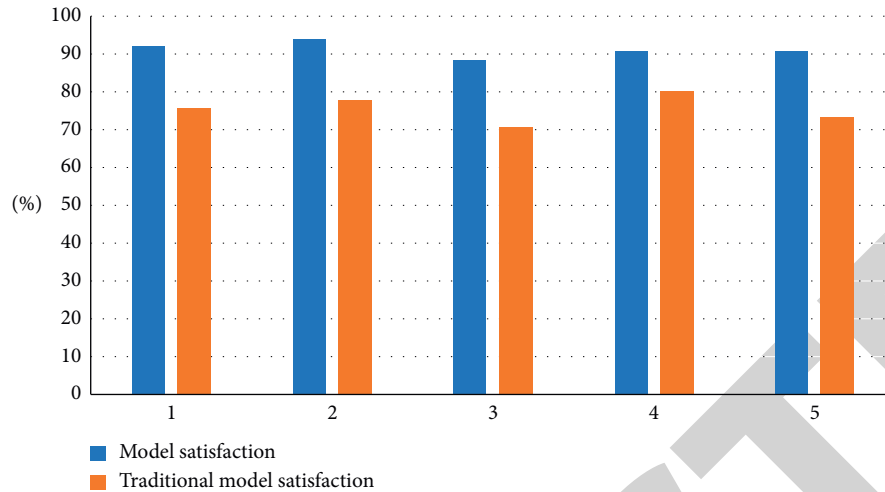


FIGURE 6: Comparison results of satisfaction between the model in this paper and the traditional model.

considering color comfort perception in this paper, respectively, and the results of the satisfaction obtained are described in Figure 6.

Through analyzing Figure 6, it can be seen that the satisfaction of the model in this paper is significantly higher than that of the traditional model, which shows that the model in this paper has higher practicability.

3. Conclusions

The products in the interior space of the building not only need to be exquisite, safe, and reliable but also have the characteristics of strong structure, strong operability, durability, wear resistance, and complete functions.

Relying on the multimedia three-dimensional hybrid algorithm, the mathematical modeling of the relationship between visual comfort and chromaticity is built, to explore the interior architectural design by using the chain-like construction model of “design, conversion, editing and repair, and semantic and coordinate supplement.” The simulation experiment results show that the model based on the multimedia three-dimensional hybrid algorithm has high practicability.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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