Research on the Effect of Light and Shadow in Computer-aided Interior Design

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Abstract. For interior design students, in addition to learning the principles of interior design, the most important thing they learn is how to better use computer technology to assist their design. For example, AutoCAD drafting trains students to use computer software to draw their own designs according to industry norms; 3D MAX helps students to display their designs with realistic effects; not to mention PS and VRay rendering, which is a great help for lighting. All these situations show that today's interior lighting design is inseparable from the assistance of computers. Based on this, this paper explores the effects of computer-aided interior design lighting.

Keywords: Computer, Assistant, Interior Design, Light and Shadow Effect, Performance

1. Introduction
Japanese aesthetic writer Junichiro Tanizaki's essay "Shade Salute", expressing the traditional Eastern aesthetics in the way of shade, from the light and dark, find beauty enjoy dark, although there is a gap but there is a taste. The pursuit of space shade aesthetics is inseparable from the designers' practice and exploration of space lighting design. Natural light gives space inspiration, artificial light creates space emotion. Most of the design efforts are dealing with light and shadow, but the flexible use of the nature of light, but also need the help of computer technology. How to use light and shadow to create spatial atmosphere? How to integrate light and shadow creativity in design works? Today's interior design has become inseparable from the assistance of computers. In the following section, we will reveal the effects of computer-aided interior design light and shadow [1].

2. The relationship between light and shadow effects and interior space
Interior space is a private place, mainly to provide the necessary place for living, production and operation, and also to assume more other functions. The interior design should be able to meet the basic needs of the basic user, but also to be able to fully demonstrate the pursuit of the user's personality and other aspects. Computer-aided design is currently an important solution for interior design, and light and shadow are also the most important factors in interior design, therefore, the full mastery of light and shadow in the scene between the shape, color, quality and space, composition and other elements of the performance has a strong artistic impact, with the help of computer-aided technology, designers can carry out to meet the emotional needs and functional needs of the interior space design.
When an object is in the environment of light and shadow, as long as there is light, there will be shadow. There is an extremely close relationship between the two, and in interior design, people's perception of space comes entirely from the effect of light and shadow in the room. If the interior space is bright, the shadows of the objects are clearer; if the interior space is darker, the shadows of the objects are blurred. In the indoor space, can directly show the environmental atmosphere of the indoor space is the light and shadow. Such as when the interior space is brighter, people living in it will feel a comfortable, relaxed feeling; but if the interior space is darker, people living in it will feel a mysterious, depressed feeling. Therefore, the different indoor light, the sensory atmosphere created for people will be different. By the same token, in the rendering of interior effects, due to the special nature of the 3DMAX software operation, so the requirements for designers in the lighting layouts, tone rendering and other aspects of the operation is different, resulting in differences in interior design effects [2].

3. **The significance of computer-aided in interior light and shadow design**

Traditionally, most of the design work in interior design is based on two-dimensional design media, or with the help of two-dimensional media to achieve the effect of three-dimensional design. Computer-aided technology has made important applications in the design field, which is of great significance in enhancing the design effect and improving the efficiency of design. At present, the main impact of computer-aided design on interior design has the following aspects.

![Figure 1. The main impact of computer-aided design on interior design](image)

3.1. *Computer-aided design determines the practical feasibility of abstract solutions*

Many excellent interior design is derived from the designer's inspiration, in order to be able to accurately carry out the definition of inspiration, to achieve inspiration in graphics and other specific forms of precise definition, computer-aided software can achieve from inspiration to the completion of the final draft at the same time can also achieve the initial imagination to the precise measurement, can monitor the feasibility of the imagination through the effect of the picture. These applications are particularly evident in interior light and shadow design [3].

3.2. *Technical advantages of computer-aided interior design*

Computer-aided technology has now gained an extremely important application in the interior design industry and has become the first tool for interior designers. Computer-aided design in light and shadow design can produce a fundamental transformation, which can show the light and shadow, color, material, reflection, etc. that cannot be expressed in traditional design schemes. At the same time the computer can achieve the perfect embodiment of details and realistically reflect the actual effect.

4. **Light and shadow patterns in computer-aided interior design**

4.1. *Point light source line light source and surface light source*

Projection is inevitable with the action of light sources, and different light configurations and light sources will produce different light and shadow effects. At present, it is generally believed that the role of light and shadow in interior design is to illuminate the scene and beautify the environment in two ways. Excellent interior design, accurate lighting configuration, good light and shadow effect is one of
the most important reasons. The shadow of light and shadow is the hidden or invisible area when the light shines on the object. The existence of shadow has an important role in the determination of the spatial relationship with the light. Light and shadow effects can determine the location of the light source and the material of the object, is an important form of visual art effects in interior design, interior design is commonly used in photovoltaics is a point light source surface light source and line light source [4].

4.2. Computer-aided interior design of light and shadow art performance
Currently, as people's living conditions rise, they have higher requirements for material and spiritual aspects. In the design of computer-aided interior light, the strongest effect of reflective light sources are white, light yellow and light pink colors, so these colors are also used more in the living room, dining room and other places. Through the refraction of light, it not only enhances the diffusion of light and shadow in the interior space, but also improves the effectiveness of the development of interior design on this basis. Since green, light blue, beige, etc. belong to the cooler colors, they give people more calm and natural feeling, so they are more often used in the bedroom, bathroom and other places. Therefore, with the help of computer-aided design software, the convenient control is realized, and the different effects under different color matching are better reflected [5].

The artistic expression of light and shadow art form requires different intensity of light and shadow, generally in the interior design are divided into home entertainment space and office and other different requirements. In the design of the home space, the light and shadow requirements generally tend to be softer, so as to achieve a sense of warmth office generally for the brightness and openness of space, often using a higher brightness design; and entertainment space through the shaping of local light and shadow, the performance of a richer design. Therefore, in computer-aided interior design, to be able to follow the different requirements of different living in a reasonable light and shadow art performance.

5. The influence of light modeling and color on the interior scene

5.1. Light styling in the physical world
In the physical world of light types mainly from the photometric light level, light quality, light ratio, light shape and other aspects to distinguish. Photometric knowledge of the luminous intensity of the light source in interior design, light position refers to the projection of light orientation is the actual location of the light in three-dimensional space. The effect of backlighting in interior design is generally unknown and mysterious, while smooth light can play a role in emphasizing and highlighting the subject in interior design in general, light quality is divided into two types of soft light and hard light hard light.
quality can more obviously reflect the characteristics of the object under the light off on the effect can be obvious to the details of the surface to be well reflected at the same time can form a vibrant visual effect. Soft light due to its diffuse scattering nature, its light is softer uniform intensity in computer-aided interior design to be able to supplement the main light to soften the sharp shadow effect brought about by the main light exposure; light form for the light form of lighting in computer-aided interior design can be divided into the main light, simulated light and so on [6].

5.2. Computer-aided interior design with light modeling

Computer-aided interior design, the purpose of light modeling is generally considered to have a sense of realism as well as aesthetic two aspects, which is also an important requirement of computer-aided interior design, for the sense of realism, there are two main methods of expression commonly used: first is the full use of light and shadow effects, through the front side light backlighting under direct lighting conditions, such as light and dark contrast to produce a sense of space; secondly, you can use the contrast of shadows, to near dark far light These are the important technical advantages of computer-aided design. Aesthetics is through the coordinated processing of light and dark projection and the reasonable use of the arrangement of shadows to produce a variety of line effects, the formation of interior design with the aesthetics of light modeling [7].

6. The effect of material and texture on light and shadow

Figure 3. The influence of material and texture on light and shadow

6.1. Material and texture of computer-aided interior design

Material and texture in computer-aided interior design have an important influence on the light and shadow effects of dry works. Therefore, the use of computer technology can clearly express the effect of light and shadow on the surface materials of products, which can more realistically show the spatial characteristics of different light and shadows and materials, and has a crucial role in the selection of materials and the realization of the final effect in interior design. The texture of objects in the physical world is mainly physical properties as well as surface characteristics, the nature of which determines the nature of transparency, reflection, highlighting, etc. in light and shadow design, and therefore, a realistic response to these properties is made in computer-aided design [8].

6.2. The influence of soft decoration on the performance of light and shadow effects
Soft decoration is an important factor affecting the effect of interior design. Although soft decoration can not be a more substantial change in the performance of interior design, but can be formed in some parts of the space to optimize the tone of the formation of the visual space of the extension of soft decoration on the environment of the richness of light and shadow levels, the adjustment of environmental color and space atmosphere has the role of the finishing touch. The performance of these complex effects, the traditional design program can not be implemented computer-aided design can be a perfect true embodiment [9].

7. Analysis of the performance of computer-aided interior design light and shadow effects
In the interior space, light and shadow play an extremely important role, and to some extent it determines the final effect of the interior design works and the level of development. Therefore, in order to better meet the needs of customers, designers should conduct a more in-depth study of the interior space environment and the corresponding light and shadow effects.

7.1. The specific application of computer-aided technology
The development of computer-aided software is mainly reflected in the operation and control of software such as 3DMAX. In the interior design, each stage of the need to render the existence of light to reach the design, only in the interior design into the light, so as to bring out the design effect of three-dimensional space feeling. For example, in interior design, to render the light of the fruit plate on the desk, so that it can highlight the orange and red of the apple, you need to use the 3DMAX model to make appropriate adjustments to the lighting of the study, when the whole picture is clearer and more distinct, in order to enhance the effectiveness of the design of the effect. In addition, in the later rendering process, not only should the appropriate light source reference be selected, but also the depth of the light source should be adjusted according to the parameters in the rendering to further ensure the quality of the interior effects. Finally, the designers also need to put the rendered pictures into Photoshop and perfect the color and brightness of the pictures through this software [10].

7.2. Performance of light and shadow effects
Excellent computer-aided interior design works should be adjusted and measured not only for its light and shade and texture, but also for the composition of its design in all aspects. In order to make the design effect of interior light and shadow more shocking, the designers also need to make significant contrast between the light and shadow degrees of the design works, to give more visual impact, to show the light and shadow effect better in front of people's eyes, to attract more viewers' eyes, and to bring the contrast of light and shadow of the interior design effect to a higher level.

In the process of computer-aided interior design light and shadow effects, the various functions that come with 3DMAX software are used to further strengthen the computer interior design light and shadow effects. For example, when rendering the interior space, the natural luminescence parameter of the material mapping in 3DMAX software was adjusted to 100, while the height reflection setting in the material was removed. In turn, the light and shadow degrees for various different materials such as tables, sofas, and curtains in the interior were adjusted, and the direction and angle of light source irradiation during the rendering process was recorded in detail, which is extremely helpful for enhancing the effectiveness of interior design development. However, it should be noted that if the designer does not know the rendering parameters of the interior effects very well in this process, he must download the latest version of the light and shadow package from websites such as self-study.com and buildlong.com, so as to have a more in-depth understanding of the light and shadow adjustment under modern computer-aided technology, and then carry out the light and shadow adjustment under computer-aided technology.

The more commonly used computer-aided design software in addition to 3DMAX, you can also use Photoshop software, designers can use such software in the form of keying adjustment and area adjustment, to change the adjustment mode of the whole picture. Targeted establishment of a central light source to attract people's visual attention, especially for some areas still need to deepen and darken, you can use the pen in Photoshop software to create a selection, and then use the deepening tool in its
software, the interior effect of the contrast between light and darkness, and then to show a dynamic, and realistic interior design effect works [11].

8. Conclusion
At the beginning of the night, the whole city starts to put on the colorful "light veil". The brilliance of the lights, the changing luster and colors have long been in the minds of interior designers and space experience. With the development of economic technology and the improvement of quality of life, we hope that our interior designers will take the human concept as the core, with the help of rich and diversified computer-aided design and presentation of interior light and shadow, to create design works that benefit the physical and mental experience of future interior users.

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