

# Interactivity of Light Sources and People in Interior Design Subtitle as Needed

Jiahui Tian<sup>1, \*, †</sup>, Leshan Yu<sup>2, \*, †</sup>

<sup>1</sup>Design University of Canberra Canberra, Australia

<sup>2</sup>Wuhan Foreign Language School Meiga Academy Wuhan, China

\*Corresponding author: u3235365@uni.canberra.edu.au, rigelyu@yeah.net

†These authors contributed equally

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**Abstract:** Lighting is indispensable in design. a lack of lighting in a room leads to a lack of integrity in the room, while a lack of lighting in a design lead to a lack of body in the design. The relationship between lighting and design is therefore interdependent and complementary. Good lighting makes the design style more visible, as different types and colors of lighting have a direct impact on the atmosphere and overall style of a space. In the design world, most designers do not pay much attention to the use of light, so that the significance of interior lighting remains only in terms of use or decoration. This paper would like to address the issue of the impact of lighting on spaces and people, and therefore this paper wishes to discuss this issue through three aspects: color, brightness and position. In terms of color, this paper will examine the psychology of color and determine the place of color in lighting by analysing the effect of color on people's moods. In terms of luminance, this paper will test how different people respond to different luminance levels to determine what luminance is required by humans. This article is for people who are interested in design.

## 1. Introduction

From the dawn of the world, light has influenced the vast majority of the world's creatures, which depend on it for their survival, and the ancestors of mankind were no exception. The slang phrase "sun rises and sets" is not only an ancestral explanation of light but also reveals its importance. In the beginning, the only source of light available to people was the sun. With the collision of lightning and trees, flames were born, and only then could people see around them for the first time at night. Early man relied on torches for light, and later on candles and lamp oil, but the brightness of the flame was so small compared to the light of the sun that the brightness of the light source continued to plague mankind. It was only after the second industrial revolution that the invention of the electric light directly changed this situation. Since then, electric light has played a vital role in various fields. In modern interior design, electric lighting has a huge impact on the humans living in it while illuminating the entire interior space, as lighting is an important part of the design. Reasonable lighting can make the environment more in line with the core concept of the current design, while inappropriate lighting can make the design deviate from the original theme. This paper identifies the impact of light on people in an interior environment by studying the brightness, color and position of the light, respectively. Existing research on light is limited to the use of light and does not examine the changes that light can bring to a space. This paper, therefore, examines this topic in the hope that the study of light will improve the overall comfort of the human living environment and hopefully increase the overall position of the light in design.

## 2. Methodology

This paper expounds in the form of a literature review on the importance of lighting in interior design. This paper explores the importance of lighting in the interior by examining the brightness, position and colour of light, intending to enhance the position of the light in interior design. Taking a human-centred approach, the paper focuses on the effects on several areas such as the human body or

mind in different lighting environments. The three dominant factors in interior lighting are brightness, colour and position, so this article will provide specific analysis and interpretation of these three factors. As an important part of the interior space, interior lighting must not only meet the normal needs of the user but also maximise the comfort of the user. In this paper, the ideas in this paper will be validated through an analysis of existing articles and case studies.

### **3. Lighting**

#### **3.1 Preview**

Lighting is very important for us at home every day. Because of our work during the day, most of our time at home is at night, so the lighting Angle is very important for us. The brightness Angle of the light will constitute different irradiation feeling to the room, so whether it can meet people's inner needs, the arrangement of the light is an important role. Author think different lighting arrangements will make people have different feelings about a room and the illumination level will have different feelings for a room under the same lighting arrangement. Interior Design from many universities has planned a feeling of clarity, spaciousness, relaxation, privacy and pleasure.

#### **3.2 Precedent**

In this experiment, 300 volunteers were invited to investigate their lighting needs in different situations in the house. For clarity, people preferred general lighting and wall washing. For bright and spacious, people preferred wall washing; For relaxation, people preferred Cove lighting; For privacy, people preferred Cove Lighting; For those who were more comfortable, they preferred Cove lighting and Wall washing [1]. It can be concluded from this test that General Lighting is the most widely used. The experimental results show whether Wallwashing and Cove lighting can improve the quality of visual effect space more effectively than general lighting, making the space appear clean, spacious, relaxed, private, pleasant and orderly [2]. Therefore, under the circumstance that people pay much attention to interior design at present, the angle of interior lighting is closely related to people's psychological needs. For example, when people feel more privacy space, may require less lighting light, or less lighting equipment installation, and in the light of illumination Angle also has certain requirements, however, if it is in the work of the office or classroom learning, designers may as far as possible let every corner will be directed to, on the other hand, If it is in the exhibition hall or hotel lobby, the designer may want to give a grand and grand situation, so the brightness of the light will be increased based on being able to illuminate every corner.

In addition, the research from National Research Council Canada which have a check test to give the best suitable lighting for the workers in office. These experiments were conducted in an office laboratory with a particular furniture type. a single type of ambient luminaire and two types of desktop task lights. The final conclusion was that workers have always concentrate on the computers, so that if the light on ceiling can provide enough brightness [3], there is no necessary to place a table lamp, as they exposure to conditions that without using internet was short. Moreover, in the first experiment researchers found that addition of a task light to a ceiling-recessed, deep-cell parabolic ambient lighting system had no significant effect on mood, satisfaction, or discomfort. However, the work place tended to favour the Ambient plus Task design over the Ambient Only design. The most remarkable illustration for improvement in typing speed is the provision of more light on the paper-based target text, leading to an improvement in visibility [3]. But there is still need more experiments to learn about other fields.

In the part of lighting arrangement, the more research on this field is quite needed, so some aspects of impact on people are necessary to be down.

## **4. Colour**

### **4.1 Preview**

According to the use of light in different places, people have different feelings about color. So, they feel the color of light has different influences on people. In the highly infectious indoor space, color is the embodiment of people's inner emotions. Accordingly, the color that one should choose to suit oneself will decorate a space when undertaking interior design. Since 1978, interior design has been applied to various fields, from hotel and guesthouse design at the beginning, to the design of each family house gradually [4]. With the continuous influx of talents for Our country, the economy is also developing, all walks of life have a rapid development, of course, the interior design industry is no exception. With the continuous development of interior design, it is no longer only used for national public buildings. With the popularization of interior design, everyone's living environment has changed greatly.

### **4.2 Psychological**

To design a color environment to meet people's living, activities and living needs in interior design, we must fully consider the various factors brought by color to the environment and the psychological characteristics of people. According to researchers from the University of Austin who conducted a quantitative experiment with their introductory psychology students, the darker the color. The experiment not only tested the effects of color on people but also found a correlation between saturation and gender to some extent, proving that men are more depressed when they are saturated and the opposite is true for women. At the same time, the results were consistent regardless of whether the colors were warm or cold. The aesthetic feeling that color brings people in interior design is obvious [5]. A simple example, a black house with no color ornament, the psychological impact on people will only bring depression, depression and irritability. If people get into a harmonious color, it will bring people a warm and comfortable feeling, people's brains receive stimulation and natural feedback in the heart of good or bad mood. Color can adjust the action of light and shade light to indoor space, colorific reflex action has a very big influence on the light of indoor strong or weak change [6]. Cool warm color is tonal to the person of different disposition, the easy level of its heart also is having a different effect. Warm color attunes of interior space design for some restaurant, banquet, etc. for the perfect, lively and enthusiastic people dwelling place will be more can reflect the characteristics of the indoor space design master and the space that cool color moves is more suitable for office and study atmosphere of the space design, for cool color to move, give a person a kind of elegant, quiet atmosphere.

### **4.3 Emotion**

Color is exactly a physical phenomenon, and the reason why we have color emotion is that the objective nature of color sends a signal to people, so that people receive this signal feedback to the brain into a psychological factor. Man's strongest sense is sight. Color can affect people's mood and state of mind because of its natural characteristics, which are naturally the most attractive, and this is also the initial influence [7].

Lighting color will not only have an impact on work but also on other occasions such as restaurants. Therefore, the choice of lighting needs to be made through the room function. Therefore, the choice of lighting needs to be selected through the room function. The research team from the Graduate School of Engineering, Chiba University, Japan once held that the main function of a restaurant is to satisfy people's enjoyment in the process of eating. And this kind of demand is more appropriate to color stimulative people appetite, bring the color choice that people enjoy, the red-yellow department is best the choice that does not pass, this kind of color department can have a very good effect on the brightness of the space, it is to promote the appetite of people, on the one hand, it is how to raise the color and luster degree of food again. For example, in some office places, classrooms and so on, this kind of space needs a quiet and formal feeling [8]. If the place is also used in warm colors, this quiet and formal feeling will be weakened, so blue and grey are the most appropriate. The choice of color

plays a great role in promoting the functional use of interior space and making people get into the role soon.

It can be seen that under the continuous progress and development of society, interior design is of great importance to people. People's aesthetic concept is also improving along with the material and economic level. Color is very important when it is used in interior design. So, the use of proper color is an important method to adjust people's psychological effects. Color is the most beautiful product in the world. Make good use of color and explore progress in the process of interior design.

## **5. Brightness**

Electric lights have a more consistent light source and a longer lifespan than flames, but most importantly they have a brightness that flames cannot match. The importance of brightness cannot be overemphasized and how to adjust the brightness of a room to make it feel more comfortable is one of the main topics of this article. For me, comfort is always a subjective word, and subjective is different. Therefore, Author do not believe that there is such a thing as the most comfortable brightness. Over the last few decades, many scientists have conducted experiments in the hope of finding the most suitable brightness for lighting indoor spaces, the most famous of which is the step test [9]. In this experiment, a thousand volunteers from different countries and regions were selected as subjects. Five hundred of them were placed in rooms of varying brightness in which they were asked to live for two days, after which they were subjected to various investigations, both psychological and physical [10]. The results showed that the subjects had good feedback at 250 cd/m<sup>2</sup>, while at other brightness levels the subjects were affected both psychologically and physically. Not only that, but when the subjects were switched to the elderly and children, the optimal brightness was well below the previous 250 cd/m<sup>2</sup>, reaching 130 cd/m<sup>2</sup>, but although the optimal brightness was obtained, most of the volunteers found these brightnesses too bright in the morning and at night [11]. This experiment also proved my suspicion that there is no comfortable brightness, only the most appropriate one. Therefore, this paper concludes that comfortable light for people varies and needs to be adjusted according to the purpose of the space and the person using it.

## **6. Conclusion**

This paper suggests that different lighting elements in interior architecture can have an impact on people, with warm colors in interior spaces being more appropriate in restaurants and parties, while warm colors in homes reflect the warm personality traits of the homeowner. Cool colors are more appropriate for office and study spaces, while in residential spaces cool colors tend to reflect the seriousness and character of the homeowner. Brightness should not be divided according to the different spaces but should be chosen through an analysis of the users of the space. If the person is older or younger, then use low brightness lighting and try not to choose direct light, while older people can use brighter lights. Concerning the position of the light, it varies from person to person; high levels of light will make the room look very spacious and bright. Lower levels of light will give a more ambient feel. And as different experiments have confirmed that the brightness, color and placement of lights do affect people, designers need to choose their interior lighting carefully when carrying out interior design. However, there are some problems with this study. The height or weight of humans may influence their definition of lighting comfort, but the available data does not support this idea. Therefore, this study needs to be improved step by step. Author hope that in the future human can use big data to gather information and use it to analyse and compare it to calculate more accurate data to determine the right light for human life or use technology to develop light that is more conducive to human life.

## References

- [1] ScienceDirect. 2006. *Impact of lighting arrangements and illuminances on different impressions of a room*. [online] Available at: <<https://doi.org/10.1016/j.buildenv.2006.10.048>> [Accessed 25 November 2021].
- [2] ResearchGate. 1999. *Effects of Different Lighting Arrangements on Space Perception*. [online] Available at: <[https://www.researchgate.net/publication/233374903\\_Effects\\_of\\_Di](https://www.researchgate.net/publication/233374903_Effects_of_Di)>.
- [3] ResearchGate. 2016. Task lighting effects on office worker satisfaction and performance, and energy efficiency. [online] Available at: <[https://www.researchgate.net/publication/44068639\\_Task\\_lighting\\_effects\\_on\\_office\\_worker\\_satisfaction\\_and\\_performance\\_and\\_energy\\_efficiency](https://www.researchgate.net/publication/44068639_Task_lighting_effects_on_office_worker_satisfaction_and_performance_and_energy_efficiency)> [Accessed 5 January 2022].
- [4] ResearchGate. 1996. *Effects of nine monochromatic office interior colors on clerical tasks and worker mood*. [online] Available at: <[https://www.researchgate.net/publication/229858506\\_Effects\\_of\\_nine\\_monochromatic\\_office\\_interior\\_colors\\_on\\_clerical\\_tasks\\_and\\_worker\\_mood](https://www.researchgate.net/publication/229858506_Effects_of_nine_monochromatic_office_interior_colors_on_clerical_tasks_and_worker_mood)> [Accessed 13 January 2022].
- [5] Gyi, D., 2004. *Design and Emotion*. [online] Available at: <[https://books.google.com.hk/books?hl=en&lr=&id=vBJqD22G2lkC&oi=fnd&pg=PA52&dq=light++emotion&ots=NqBlMFjiRa&sig=JGGcp5rkGfhorhkTcF48puDLQpg&redir\\_esc=y#v=onepage&q=light%20%20emotion&f=false](https://books.google.com.hk/books?hl=en&lr=&id=vBJqD22G2lkC&oi=fnd&pg=PA52&dq=light++emotion&ots=NqBlMFjiRa&sig=JGGcp5rkGfhorhkTcF48puDLQpg&redir_esc=y#v=onepage&q=light%20%20emotion&f=false)> [Accessed 16 January 2022].
- [6] Yeh, N. 2009 *High-brightness LEDs—Energy efficient lighting sources and their potential in indoor plant cultivation* Available at: <https://www.sciencedirect.com/science/article/abs/pii/S1364032109000471>
- [7] Eberhard, A. 2004 *High brightness LEDs for general lighting applications Using the new ThinGaN™-Technology* Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1002/pssa.200405119>
- [8] Walker, M. 1997 *The effects of urban lighting on the brightness of the night sky*. Available at: <https://iopscience.iop.org/article/10.1086/130142/meta>
- [9] *fferent\_Lighting\_Arrangements\_on\_Space\_Perception*> [Accessed 25 November 2021].
- [10] ResearchGate. 2015. *The impact of light and colour on psychological mood: A cross-cultural study of indoor work environments*. [online] Available at: <[https://www.researchgate.net/publication/6746144\\_The\\_impact\\_of\\_light\\_and\\_colour\\_on\\_psychological\\_mood\\_A\\_cross-cultural\\_study\\_of\\_indoor\\_work\\_environments](https://www.researchgate.net/publication/6746144_The_impact_of_light_and_colour_on_psychological_mood_A_cross-cultural_study_of_indoor_work_environments)> [Accessed 25 November 2021].
- [11] ResearchGate. 2019. *Color and Light in Architecture and its Effects on Spirits of Space Users in a Psychological View*. [online] Available at: <[https://www.researchgate.net/publication/317554818\\_Color\\_and\\_Light\\_in\\_Architecture\\_and\\_its\\_Effects\\_on\\_Spirits\\_of\\_Space\\_Users\\_in\\_a\\_Psychological\\_View](https://www.researchgate.net/publication/317554818_Color_and_Light_in_Architecture_and_its_Effects_on_Spirits_of_Space_Users_in_a_Psychological_View)> [Accessed 13 January 2022]. M. Young, *The Technical Writer's Handbook*. Mill Valley, CA: University Science, 1989.