

**Evaluation of the Perceptual Specifications of
Color in Interior Space by Color Therapy Attitude:
Patient Rooms in Healing Environments**

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ABSTRACT

Color is one of the design elements, which is discussed comprehensively from different viewpoints, from aesthetics to medical perspectives. Color has played crucial roles in changing people's condition in different places both physiologically and psychologically. Applying color potentials assist spaces to be more successful in their functional purposes. This study is a primary effort to investigate the effects of color on human, in both color therapy and interior architecture and to help propose the best color application of the interior architecture of patient rooms in healing environments. In this research, information about the Color therapy, color's fundamentals and effects on interior architecture are collected from credible architectural documents through library research. The investigated information is evaluated through a qualitative document analysis and presented via descriptive tables. Interior architectural references clarified the major role of color in human wellbeing, and present many explorations about color applications in interior spaces and patient rooms. Color therapy reveals the process of effecting color on human body and psyche based on chakras and their related colors. This information is combined in evaluation part by the researcher and some applications are proposed. Interior architectural sources proposed many color schemes in interior spaces, healing environment and patient rooms. In the evaluation part, after the analysis of the interior space and color therapy, there are some similarities in some cases with color therapy in aspect of physiological effects of color on special issues. In the cases that interior architectural sources suggest no color for special illness, color therapy can cover this absence for particular disease. Accordingly, Color therapy can aid interior architecture to employ color with new

criterion to achieve purposes of the space, especially healing environments to play positive role in user's condition and satisfaction in practice.

Keywords: Color Therapy, Chakra, Interior Space, Healing Environment, Patient Room

ÖZ

Renk, estetikten medical bakış açısına kadar, kapsamlı olarak farklı bakış açılarından incelenmiş, tasarımın önemli öğelerinden biridir. Renk, farklı yerlerde bulunan kişilerin, fiziksel ve psikolojik olarak durumlarını değiştiren etkili bir etkidir. Alanlara renk uygulamak, o alanın işlevsel olarak daha başarılı olmasına neden olmaktadır. Bu çalışmanın amacı, renk terapisi ve iç mimaride kullanılan renklerin ve iyileşme ortamlarında bulunan hasta odalarının iç mimarisinde kullanılan renklerin, insan üzerindeki etkisini araştırmaktır. Bu araştırmada, kütüphane araştırması sonucu bulunan dokümanlardaki bilgilerin ışığında, renk terapisi, renklerin temelleri ve renklerin iç mimari üzerindeki etkisi incelenmiştir. Araştırılan bilgiler, nitel bir doküman analizi ile değerlendirilmiş ve betimleyici tablolar ile gösterilmiştir. İç mimari ile ilgili kaynaklar, renklerin insan refahı üzerindeki etkisini daha açık bir hale getirmiş ve renk uygulamalarının iç mekanlar ve hasta odaları üzerine birçok bilgi sunmuştur. Renk terapisi, çakra ve çakra renkleri temelinde, renklerin insan bedeni ve ruhu üzerindeki etkisini ortaya çıkarmaktadır. Bu bilgiler, araştırmacının değerlendirme bölümünde bulunmaktadır ve bu bilgiler doğrultusunda çeşitli uygulamalar sunulmuştur. İç mimari ile ilgili kaynaklar, iç mekanlarda, iyileşme ortamlarında ve hasta odalarında kullanılacak renklerle ilgili bilgiler sunmaktadır. Değerlendirme kısmında da anlatıldığı gibi, iç mekanlar ve renk terapisinin analizi sonucunda, renk terapisinin bazı özel durumlarda benzer psikolojik etkileri olduğu gözlemlenmiştir. Özel hastalık içeren ve iç mimarinin renk önermediği durumlarda, renk terapisinin bu eksikliği doldurabileceği gözlemlenmiştir. Buna bağlı olarak, renk terapisi, özellikle iyileştirici ortamlarda, kullanıcının durumunu iyileştirme ve

memnuniyet sađlama aısından, alanın amacına ynelik olarak kullanılabilir ve bu şekilde i mimariye katkıda bulunabilir.

Anahtar Kelimeler: Renk Terapisi, akra, İ Mekan, Őifa evre, Hasta Odası

DEDICATION

This attempt is honorably dedicated to my lovely family and friends

ACKNOWLEDGMENT

Six years ago when I accompanied my mother to the orthopedics clinic for her backache, I found the waiting room visually soulless and cold. I thought, while patients are suffering from physical problems, then the atmosphere of the healing environment should be very helpful to enhance their healing process. My mind was deeply involved with this issue. At that time according to my healing activities, I had proper information about chakras, their related colors and illnesses. I tried to find if there is any way to supply specialists' offices with color to fulfill patients' requirements. This issue led me to approach the color field during my interior architecture study in master degree. That dream took the first step of becoming reality within this thesis by using academic facilities and academician advices.

I would like to thank my dear supervisor Assoc. Prof. Dr. Zehra Öngül and Jury members Prof. Dr. Uğur Dağlı, Assoc. Prof. Dr. Banu Çavuşoğlu and dear substitute jury member, Assist. Prof. Dr. Asu Tozan, who helped me to accomplish and finalize this study. Their guidance and supports during this reaserch helped me to portrrate the knowledge I have obtained during my master thesis attempt. Hopefully, I can return their favors and supports by substantiation of my study purpose in the practical world.

I am also very appreciative of all teachers and friends who accompanied me during my study and this attempt especially my precious teacher, dear Nilgün Hancioğlu that I never forget her widespread supports and sympathy during this study.

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Chapter 1

INTRODUCTION

1.1 Background to the Study

One of the essential visual design elements is “color” which is widely investigated in different fields of study. As color is a particular wavelength of light, they have measured various colors and studied the direct or indirect human perceptions and reactions. Although human perception of wellbeing and health is influenced by personal and social issues (Bluyssen et al., 2011), a large number of studies have shown that indoor variables like color have the similar effects on people surveyed. These elements characterize various atmospheres of the space, give different visual perceptions and effects people, physically and psychologically (Pile, 1997, p. 16). All kind of interiors can be supplemented by employing these significant potentials of color to play its spatial and functional role effectively. Interior architecture experts adopt light and color to touch users` moods and responses in detail, from shopping behavior to their physical and mental health.

Many researches in medical field have examined how and why colors play an influential role in health. Color is considered from the medical perspective as they are used in some different. The special frequencies of white light, which make colored light, are employed in another therapy called “Color therapy”. Color therapy is an additional or even alternative therapy on occasion, which can help patients in the cure and recovery period (Wills, 1993). This healing method, which stimulates the self-

healing power by balancing and easy transferring the energy in the energy centers of the creatures` body, employs color as the main tool because it believes in special effect of color on each of the energy centers in the body (Wills, 1993; Andrews, 2001; Judith, 2004). These energy centers or “Chakras” have special colors matched with the frequencies of the light that they catch during the healing process (Andrews, 2001, p. 44). Moreover, this method postulates that organs, glands, behaviors and thoughts are controlled by these Chakras. Therefore, diseases, misbehaviors and mental or emotional problems can be cured and healed by giving appropriate color to them (Judith, 2004).Therefore, color can balance the Chakras and control behavior and health. This equilibrium activates the inner healing power of patients and causes fast cure by less medicine and consequently fewer side effects. This process can provide effective cure and short term benefits that save time, energy and money for patients, health centers and the society that can be matched with the purposes of optimal healing environments.

1.2 Problem Statement

Color as one of the basic elements of interiors is examined from different viewpoints, from technology to psychology in different spaces broadly and comprehensively and many attitudes and theories are developed about the way they can be made, applied and matched in the space. The researchers study interior spaces comprehensively in aspects of function, design elements and so on. The interior spaces of healing environments as well as other interiors are extensively investigated to create some standards for constructing them and leading these places to become optimal healing environments, but the relationship between “interior architecture” of healing environments and “Color therapy”, is not widely considered by the researchers.

In practice as well as in literature, interior sections of some healing environments are designed with sets of the lighting, coloring and furnishing, but there are few spaces, which are designed based on effect of colors on Chakras. Interior architect, in addition to universal design principles, which explain the absolute necessities of health centers, applied their own methods for coloring these spaces. The awareness of the effect of design elements, ergonomics and human factor is seen as the striking feature that helps to achieve optimal design. In each method, colors are set to provide aesthetic, physical, and psychological comfort for the patients but the absence of Color therapy in interiors shows a gap between this therapy system and interior architecture although it can be highly beneficial to human health. Although color is investigated comprehensively as a design element, its therapeutic use for special disorders and illnesses or color therapy method is not considered by interior architects.

1.3 Aim of the Research

The therapeutic effect of color in Color therapy and the direct and indirect outcomes for the patients and healing environments beside the pale presence of Color therapy in healing environments motivated the researcher to investigate the related visual interior element. Color therapy considers the potential of color in direct healing. This capacity can give priority to healing-based color sets over the designer`s personal taste and preference to obtain the positive outcomes.

In this study, the research is conducted through information of years of color studies to gather the particulars of indoor coloring, especially in healing environments to propose the most suitable specifications for the interior space of patient room in healing environments in terms of “Color therapy”.

The following questions will guide the research:

1. What are the physiological and psychological effects of color on human, which are considered in current interior spaces?
2. What are the physiological and psychological effects of color on human, which are considered in interior space of patient rooms in healing environments according to interior architectural sources?
3. What are the physiological and psychological effects of color on human from the color therapy perspective?
4. What are the differences and similarities of the physiological and psychological effects of color in patient room between design and color therapy perspectives?
5. What are the best color applications for the patient room in healing environment for different chakras and related disorders and healing?

1.4 Methods and Approaches

This investigation have started by reviewing about 100 documents; books, articles, thesis, magazine articles, booklets and websites to achieve the comprehensive understanding of the general required concepts; color, color in interior spaces, color in patient room in healing environments and Color therapy (Figure 1).

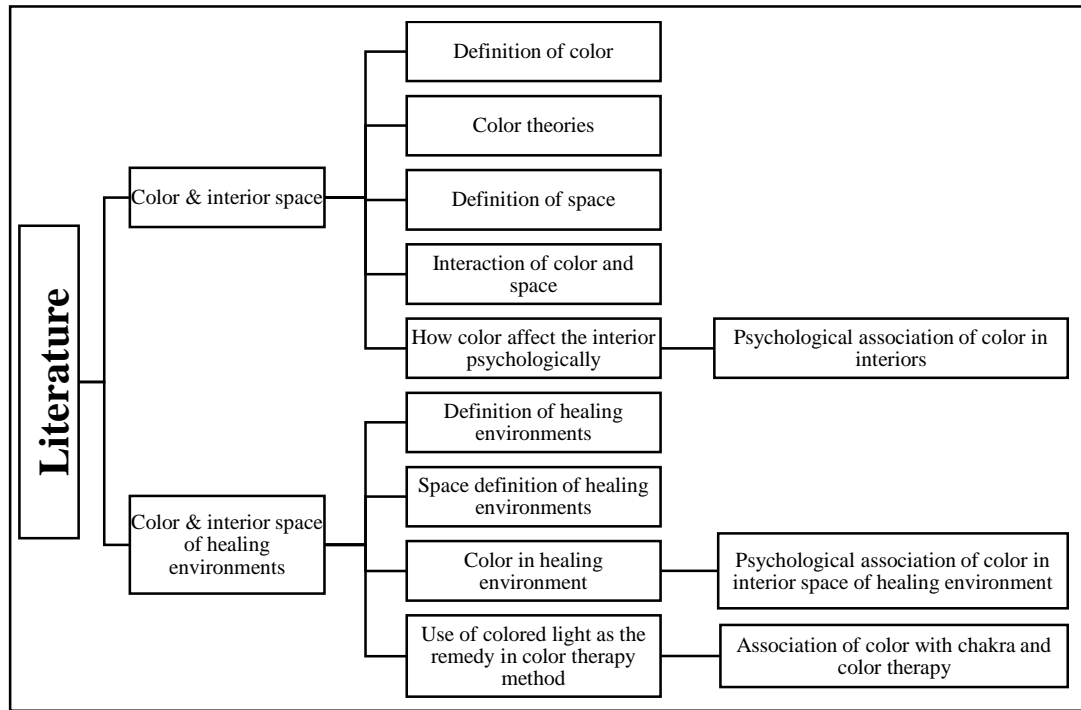


Figure 1. Summary of Literature Review

Color is studied in interior architectural and color therapy references. The specifics and effects of color on human in interior spaces especially patient rooms in healing environment is classified in two main categories of, physiological and psychological. Color therapy references have deepened due the effects of color on human and have explored it as the Chakra. Accordingly, the effects of color are evaluated by Color therapy attitude as a therapeutic utilization of color to find the differences and similarities between color therapy and interior architectural knowledge, and to propose the applications which are matched in both fields.

The derived information from these documents are evaluated through a qualitative approach to determine the quality of interior space in terms of color and it can be counted as a content analysis method as its process. This research includes collecting the data from the literature, categorizing, and evaluating one field with another.

The obtained information from the literature about chakras is summarized in seven tables, which are located in appendices section in appendix A, other information gotten from architectural sources, and their combination with color therapy is presented in six tables in appendix B to G.

1.5 Limitations of the Study

The information about color, its fundamentals, theories, physiological and psychological effects on human are derived from six basic main sources about color and interior. The references investigated to find the information about specifics of colors are: “*Color in interior architecture and architecture*” by Ladau, Smith, and Place (1989), “*Color and light in man-made environments*” by Mahnke and Mahnke (1993), “*Color for interior architecture*” by Miller (1997), “*color in interior design*” by Pile (1997), “*Interiors: An introduction*” by Nielson and Taylor (2011), “*Color – communication in architectural space*” by Meerwein, Rodeck and Mahnke, (2007).

Color therapy as the complementary healing methods has been focused here as a therapeutic method of utilizing color in health. Although color and light are both applied in some methods of Color therapy, this research is considering color and color of light but not the light specifications and fixtures. Moreover, among basics of color therapy, focus of this study is on Chakras and related parts of the body and hues. Therefore, the colors that are investigated are seven rainbow colors in aspect of hues, not other fundamentals of color in this study.

Color as the essential design element applied to exterior and interior of any kind of construction can assist the building to achieve not only the desired quality of space but also the better functional purpose of that space. As most people spend much time inside

the buildings, the quality of interior spaces can play significant role in their life. It becomes important when the major user is a patient and the function is hospitalization. In this respect, this research considered interior spaces of the patient rooms in the healing environments as an example in aspect of color.

1.6 Structure of the Study

After the introduction in chapter 1, chapter 2 of this research discusses color and its effects on human. Firstly, the chapter presents the general information of color to prepare a background for the readers to understand the way this design element works and affects human wellbeing, mental and physical health. Then space and interaction of color with the space and human are discussed. This part includes much detailed information about the physical and psychological effects of color in the interior spaces. Chapter 3 focuses on effects of color on human being, both physically and psychologically, inside the patient rooms in the healing environments after presenting primary definition of these environments. In the last part of Chapter 3, color is examined from different viewpoint, a therapeutic use of it, “Color therapy” and its basis, Chakra and related illnesses and colors. In chapter 4, evaluation part, the collected information about effects of color on human is evaluated by Color therapy attitude. The differences and similarities of Color therapy and architectural viewpoints are evaluated in this part. At the end in chapter five conclusion and recommendation of this research is presented.

Chapter 2

COLOR AND INTERIOR SPACE

Color is one of the important design elements that have a major effect on people. Different civilizations have been aware of the effect of color on human body and emotions, both unconsciously or consciously. Nowadays, there is more information about the color, from its aesthetic specifications, to its influences, as well as the scientific methods, through which it influences people. Thus, it is applied in various different ways effectively as a tool to achieve a purpose. While the effect of color is evident, employing sets of color and colored lights in every place, especially in healing environments, can be a wise logic to enhance an individual's physical or psychological conditions.

This chapter is a brief review of the basic knowledge of color and space, their interaction, color perception and color psychology in interior architecture to give better understand of the physiological and psychological role they play in human well-being. In the first three parts, color fundamentals, theories, and space and its elements are presented. In the fourth section, the interaction between color and space, and perception of color are studied. In the last part, psychological aspect of color and its effects are explored.

2.1 Definition of the Color

The terminology of color has been given many definitions. One of them, which is given by Nassau (1997), is a perception of our surrounding light, conveyed by various visible wavelengths perceived through the eyes and understood by the brain. Interactions of visible wavelengths with physical substances give an indication of what “color” actually is. Another definition of color is given as an explicit visual perception, produced by detectable wavelengths or “color stimulus” (Meerwein, Rodeck & Mahnke, 2007). Although there are many factors that influence a person’s perception of color, in interior spaces the combination of anatomy and the physics of light results in an understanding of color as the most sensitive and expressive element in interior design (Nielson & Taylor, 2006).

Color has two main sources in our surroundings: colored lights and pigments or dyes. Spectral lights, known as the observable energy spectrum, is the colored light of nature. They are visible in a rainbow or white light spectrum, passing through a prism. The spectral colors appear in a specific order, from the longest wavelength to the shortest—red, orange, yellow, green, blue, and violet (Gordon, 2003). Beyond this range, there is infrared that is longer than red and ultraviolet but shorter than violet. Both of these energy waves are invisible to the human eye. Another source of color are pigments or dyestuffs that have two natural and artificial resources. Natural resources can be minerals, animals, and plants. Artificial ones are those that are chemically compounded (Holtzschue, 2002). These pigments are affected by light and appear differently, based on the type of light projecting them (Tregenza & Loe, 1998).

2.2 Color Theories

There have been many investigations done by scientist and artists on the nature of colors. Studies have been performed to explain how different colors are made and what their natures is, as well as how different colors are being used in nature and by people for different purposes. These investigations have led researchers to an extensive knowledge of how the colors can be combined or split to gain definite outcomes (e.g. to make attractive schemes). In the following paragraphs, few of the theorized viewpoints, which still are accredited to guide designers to a better understanding of colors employment in interior spaces, will be mentioned.

2.2.1 Historical Development of Color Order Systems

There were different incomprehensible and obscure attitudes about color before the 18th century. This began to change after the experimental science of colors initiated by Sir Isaac Newton (1642-1727). During Newton's experiments, he diverted a white light through a prism, which resulted in its dispersion to the colors spectrum. Then, a recombination of these lights was also done by a second prism (or lens) to regain the white light ray. Having done this experiment, Newton explicitly showed that white light is a mixture of various light rays that are the main seven colors, starting from red and orange to indigo and violet (Kuehni, 2003). These experimental facts clarified the identity of the color more than before.

However, and not surprisingly, Newton's clear explanation and discovery was not accepted immediately. His ideas were not in line with the then-accepted knowledge about colors theories. This prevented his theory from becoming widely accepted (Nassau, 1997). Goethe (1749-1832), had one of the opposing theories of color based on two of the primary colors, blue and yellow, as modifications of black and white.

Although he observed the product of those color's combination, green, he could not find any primary color that could produce red in any combination. He proposed the arrangement of six of the rainbow colors (excluding indigo). He is the inventor of the color circle, considered the base of most modern theories (Pile, 1997).

Further knowledge of color was acquired in later years, such as the opposition of green and blue with red and yellow (in addition to the black and white opposition considered by Shopenhauer (1788-1860)). Karl Ewald (1834-1918) formalized this attitude (1878) "opponent" theory of color perception. This intuition-based hypothesis explains that the main eyesight is controlled by the perception of opposite color pairs of red-green, yellow-blue, and light dark (Nassau, 1997).

Trichromacy theory is one of the accredited theories of color systems. The main idea of this theory is that basically all the existing colors can be produced using only three main additive colors. This theory was first proposed in the 18th century, by Le Blon and further developed by Thomas Young, Helmholtz and finally by James Clerk Maxwell (kuehni, 2003). Although being developed a lot earlier, the theory was approved completely in 1960s after observation of three types of cones in the eyes that have an extensive sensitivity to light, having the maximum responses in short, medium and high wavelengths at the colors of blue, green and red, respectively (Nassau, 1997).

Moreover, there are some modern theories that according to Nassau (1997) mix the opponent with trichromatic attitudes. The signals from the first step of the vision process, the trichromatic detecting cones in the eye, responding to the full range of Newton's spectral colors, are processed on their way to the brain and converted into three opponent signals, two Chromatic and one Achromatic. Yet modern

investigations into the process of vision show that even this is too simplistic (Nassau, 1997). One of the modern theories is invented by Edwin Land (1909-1991), and is called the "Retinex" theory. It is shown that photographing a single scene by two different filters of red and green is sufficient to produce the original scene in full colors. Older theories believe in wide range of color needed to observe a scene (Kaiser & Boynton, 1996). It is a fact that color theory is a combination of all the proposed theories so far, as well as the additional new approaches.

There are some other outstanding color theories developed by Wilhelm Ostwald, Johannes Itten, and Josef Albers. The Ostwald theory is plotted as triangular pages with hues varying not by Chroma, but by the amount of black and white (Pile, 1997). Johannes Itten (1888–1967), a teacher at the Bauhaus in Germany, did comprehensive work in color theory. Josef Albers (1888–1976), who also taught at the Bauhaus and at Yale University, has become famous for his studies in simultaneous and successive contrast (Nassau, 1997).

2.2.2 Munsell Theory

One of the most important theories that guides color designers is Munsell Theory. This theory describes the specifics of color within three attributes. Albert H. Munsell (1858–1918), an American colorist, published his studies in several books (Pile, 1997). One study published in 1905 and still in use today is his Color Notation (Kuehni, 2003). Munsell developed his accurate formulated theory to compose a specific color. His theory is actually a formulated color wheel that was further developed into the form of a 3D globe having pages of diverse colors (Figure 2). To develop his theory, three main features were allocated to each color; hue, value and Chroma (Intensity) (Nielson & Taylor, 2011).

Hue describes the color name, like the blue hue. Five different hues are presented in the Munsell method, which are red, green, purple, yellow and blue. Names of colors between the main ones are the binary combination of the colors (like yellow-green, etc.). Value defines the lightness or darkness of a color. The central column is designated, to determine the value, starting from zero for black (bottom), and goes up to 10, assigned to white (top). Gray colors are between these two values, growing in a step manner, as seen in Table 1. Intensity or Chroma describes the purity and brightness of the color, at certain usual level of value. Intensity is also labeled with numbers, likewise the value number, starting from 1 (less intensive) up to 16 (more intensive) (Pile, 1997; Nassau, 1997; Loe & Tregenza, 1998; Nielson & Taylor, 2011).

Table 1. Normal Values (Holtzschue, 2002)

Yellow	Light value	8
Green	Medium-Light value	6
Blue	Medium value	5
Red	Medium-Dark value	4
Purple	Dark value	3

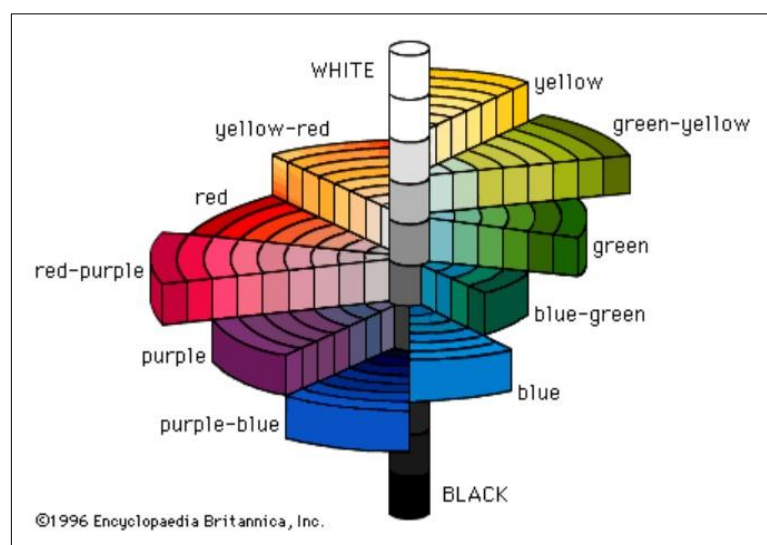


Figure 2. Munsell Color System (URL 1)

One of the systems that was developed to understand more about the colors is the standard color, or the wheel theory. Nassau (1997) states that color circles or wheels divide into four main groups based on proximity of the different colors. The last group is based more on visual perception. This wheel includes the Munsell System. It can be explained that the color wheel is primarily composed of three main hues: red, yellow, and blue, which are placed at an equal distance from each other. Between these main hues there are secondary hues which are the combinations of two of them. Further mixture of these colors consecutively (in this stage, primary and secondary colors) results in intermediate hues. Figure 3 shows a typical color wheel, with primary, secondary and intermediate colors (Itten, 1973).

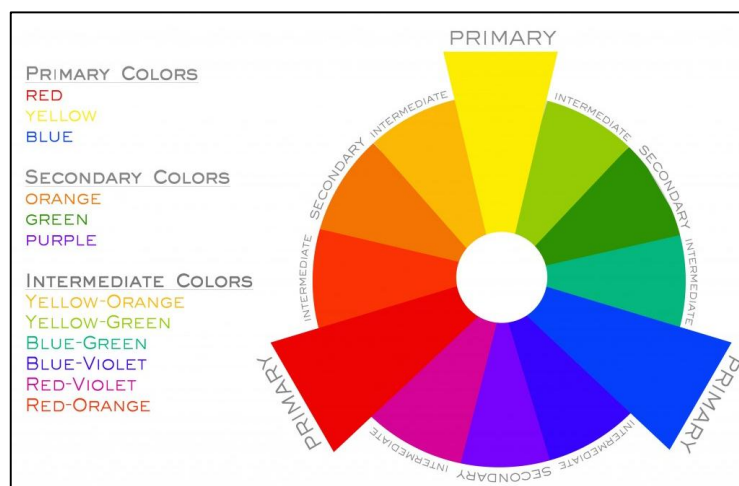


Figure 3. The Standard Color Wheel (URL 2)

Warmness and coolness are the specifications that are denoted to the colors, to describe the color temperature. The colors related to red and yellow are considered as warm colors (Pile, 1997). On the other hand, cool colors are more related to blue, such as blue-green, green, violet, etc. (Figure 4) (Itten, 1973; Holtzschue, 2002).

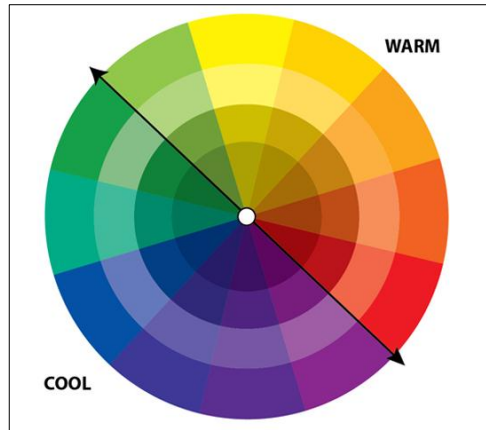


Figure 4. Color Temperature (URL 3)

Blackness or whiteness of a color may also be effective on its temperature. For examples, although yellow is considered as a warm color, light yellow is classified as a cool one, since it gives the feeling of light and distance (space) (Nielson & Taylor, 2011).

There are various definitions in the domain of color schemes. However, some of them like Monochromatic, Analogous, and Complementary (Figure 5) are the most famous practical schemes in interior spaces, which will be explained very briefly in the following paragraphs.



Figure 5. Basic Color Schemes (URL 4)

Monochromatic schemes are those based on one color, while analogous schemes are the neighboring colors in the color wheel (Whelan, 1994). Another classification is the complementary colors, referred to as the opposite colors on the color wheel. This category itself is divided into 6 sub-categories that are called: direct, split, triadic, double, tetrad and alternate complements. Direct complements colors are directly opposite to each other. Split complements comprise of a basic hue and two colors on either sides of direct complements. Triadic complements are those colors that are on the halfway point of the color wheel, having equal distances. Two combinations of direct complements that are next to or in the neighboring of each other are called double complements. Tetrad complements are the four colors on the color wheel at equal distance from each other. Finally, alternate complements are the triplet schemes, in which one of the hues has a direct complement (Whelan, 1994; Holtzschue, 2002; Nielson & Taylor, 2011).

2.3 Definition of the Space

Design has eight basic, quantifiable elements that embody the principles of design and transform theory into reality. These eight elements are Space, Shape, Form, Mass, Line, Texture, Pattern, Light and Color (Nielson & Taylor, 2011, p. 55). During history, artisans and designers applied design elements by their different methods and taste to present their desired concepts. In this order, some of the elements are ignored or utilized superficially. On the other hand, some of them are well investigated, subtly chosen and applied to the interior like texture and color. However, the profound effect of these elements necessitate vast comprehensive investigation of their nature and their relationships. In this part, the interaction of space with color is explored in addition to its definition.

Space can be defined as an endless and infinite quality that can be transformed to the defined and limited arena for the special function by the boundaries. These boundaries, which are walls, floors and ceilings in interior space along openings and furnishings, are the fundamentals of a building (Nielson & Taylor, 2011). These elements form an enclosed place to eat, read, rest, work, or in one word, live. Architectural elements of space and interior design elements can be presented in form of point, line, plane and volumes (Figure 6) (Meerwien et al., 2007).

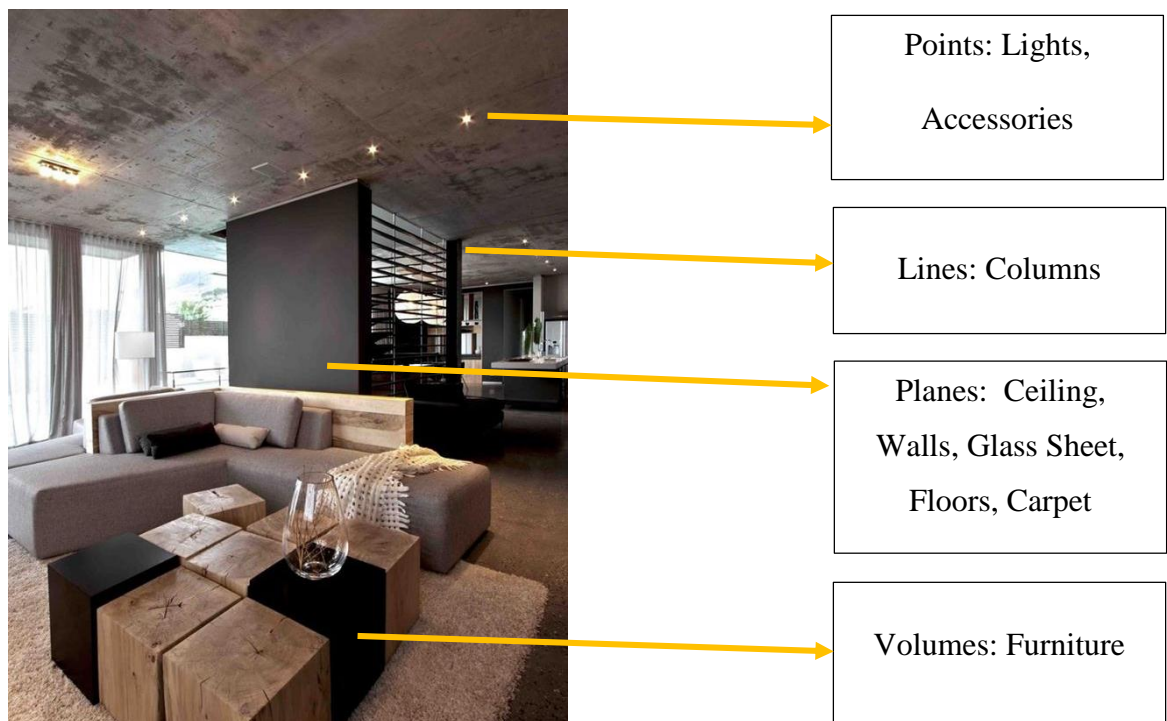


Figure 6. Interior elements (URL 5)

Planes are real boundaries that divide the space to exterior and interior. In buildings, planes exist in two main directions, vertical and horizontal; moreover, they can have angle like the slope roofs. Planar elements can approximate the interior space to its desired spatial quality, and affect human's perception as they are the largest amount of visual features that surround people and limit and link them to the outside of the building. The quality of wall, floor and ceiling surfaces (like their color, texture and

pattern) affect the visual perception of an interior space. In addition, lighting can have a prominent role in the understanding of a space and its interaction with the elements. All the elements and features find visibility by the light. Artificial sources and openings both provide light for the buildings (Grimley & Love, 2007).

Walls are architectural elements that define the space by separating, enclosing and leading role (Ching, 2007). These vertical spatial elements are the best places for the covering by colors to affect perception.

Floors are the non-omissible horizontal planes that not only enclose or separate the space but also to carry the load of every object in the space (Ching, 2005). In covering the floors (besides resistance, safety and structural preparation), beauty and harmony are the visual aspects that should be considered (Nielson & Taylor, 2011, p. 311). Designers can match the type, amount, and direction of the hard and soft floor covers with a hues pallet and functional material to achieve pleasure and comfort.

Ceilings are the other horizontal planes in the top area of a space that enclose it from the overhead space. These planes, irrespective of being structural or decorative, are very essential visually in terms of color. Ceilings are large surfaces that are the place of artificial lighting and reflect the daylight that comes from openings. Therefore, ceiling covers are critical as they can cause visual irritation or make the place high or small by using dark colors.

Windows and doorways are the physical and visual openings of a building to the outside world. They invite the natural light to the insides and satisfy the human need

of being linked with the outside as well as harmonized with the daytime (Scuri, 1995, p. 115).

2.4 Interaction of the Color with Space

Color can be applied to a space for many different reasons. Sometimes it displays the power, glory, wealth and luxury of the civilization, like the Romans taste of choosing gold and bronze colors (Pile, 1997, p. 189). Sometimes it delivered the symbolic message of the reign or governor religion like the middle Ages. In the Renaissance, the time of rebirth, freedom and creativity, the typical role of color changed from a symbolic role to a more pleasant and ornamental role for the color in the space (Nielson & Taylor, 2011, p. 388). In some civilizations, like China, Egypt and India, color acted as a healing tool as well (Buckland, 2002). Many of these civilizations believed the effect of color without awareness of the way it influence human. Nowadays, by having experimental knowledge of color and its multilateral role of color in the space is accepted consciously.

2.4.1 Spatial Attribution of Color

According to Meerwein, et al., (2007) color is the element that provides aesthetics and influence people. It must be considered and analyzed before designing a space, and must incorporate context, function, as well as physiological and psychological factors (p. 70).

As Pile (1997), explored different hues with different values and intensities can present different feelings for human. Hues or colors like reds, oranges, and yellows, which are warm colors, are stimulating, friendly, cozy, and inviting; and cool colors; blues, greens, and violets are calming and suggest restraint, dignity, and formality. Color values can affect the space perception. For instance, a low value of the red is dark red,

burgundy and a high value of it is pink which light red is. Lighter colors recede, make a space larger, and give an airy appearance to the interior; in contrast, dark colors do advance, close in and give a cave like coziness (Nielson & Taylor, 2011). The proximity of the low and high values cause a high contrast which can be dramatic, whereas low contrast made by close values create a subtly blended, calming atmosphere. In aspect of color Intensity or Chroma, bright, bold, pure colors are exciting and happy. Often designers apply the bright and intense colors for the small areas and dull and neutral colors for the large areas (Nielson & Taylor, 2011, p. 69).

Colors differ from strong to dull and from light to dark and can be used either alone or combined with each other (Nielson & Taylor, 2011). They are affected by their placement within a space with respect to neighboring colors and are also influenced by light; therefore, it is necessary to consider their interaction with each other. Light and color are interwoven features and the quality of color vision is affected by light. A brief exploration of their relation seems necessary. Regardless of the light source, a light's color, amount, direction and intensity may affect the color as well as possibly change them.

The amount of natural light that enters a space is controllable by the window size and treatments. However, in non-transformative condition, colors (in Northern hemisphere) in Northern rooms can be brighter as the Intensity of color is less than the Southern part, and vice versa. Direction can be a challenge for designers to match the hues with the amount and temperature of natural light (Gordon, 2003). Northern windows provide cold light while warmer colors adjust the visual temperature and give energy to the environment. Based on the light direction, the value of the colors can be

varied to visually balance the atmosphere. Intensity of the colors can be less in the walls opposite the windows and more on the sidewalls and ceiling. Direction is influential on the darkness of the colors as well as their value and Intensity (Mahnke & Mahnke, 1993). Ceilings and walls opposite the side of the window have the most reflection during the day; therefore color in these surfaces can be lighter than the sidewalls and floor to make the room more spacious. A light color wall-to wall and neutral floor coverings can expand the room and help provide adequate light (Nielson & Taylor, 2011). Moreover, the color of light can affect the colors in the space. For example, the color red can be observed in different colors (from orange to violet) under different colors of light (Ladau, Smith & Place, 1989).

2.4.2 Perception of Color

No viewpoint can attest to its accuracy without accounting for people. Without people, no color can be seen (Pile, 1997) and perceived. People perceive the space using their five senses and perceive color not only by the eyes but also by the skin and the rest of the body. The effect of colors on blind people is empirical evidence of this perception (Gruson, 1982). There can be no doubt of the equivalence between energy and matter based on Einstein's famous equation $E=mc^2$. Regarding this idea, body as the matter is a kind of slow and vibrating, and light is the fast electromagnetic radiation. Therefore, as color is a special wavelength of the light, it has vibration as well. Azimi and Reza (2005) determined that color is the product of energy and matter interaction. Hence, for investigating the perception of color, along with visual perception, vibrational consideration seems logical.

2.4.2.1 Physiological Perception

Improving the well-being and comfort of people in a particular space is a goal that can be fulfilled by fulfilling a harmonized and balanced simulation of all human sensory

system's characteristics. Some specific aspects of an individual's sensing systems are especially influenced and must be considered when designing a space. For the sense of touch, there exists a broad range of materials with different surface textures that provide a sense of touch from very soft to extremely harsh. There are also different flooring systems that are very useful to deliver the feeling of stability for people. Light sources, with different colors, materials, and effects (energizing, etc.) can provide spaces that convey both psychological and physiological comforts (Meerwien et al., 2007, p. 76).

During physiological perception, the eyes scan and search the visual environment and input inverted images into the retina. These images stimulate retinal photoreceptors, rods, and cones, as well as make chains of interpretable electrical impulses for the brain and seeing happen (Cuttle, 2003; Gordon, 2003; Gallardo, 2000). Through the nerve pathways, these signals transfer to the body and stimulate an appropriate reaction (Mahnke & Mahnke, 1993; Pile, 1997). Light and color enter the body from the eyes and stimulate the pineal and pituitary glands and regulate the body's production by controlling the endocrine system (Mahnke & Mahnke, 1993).

By this knowledge, it is well-understood that the color systems of a space can cause weariness, disturbances and concentration problems to the people who are using the space. These syndromes are mainly the results of factors such as harsh lights, intense hues, and frustrating patterns. It is strongly suggested that these be avoided (Meerwien et al., 2007). After physiological perceiving, mental and emotional filters analyze the data. Internal and external factors like personal experiences, memories, culture act as filters and can alter a person's perception.

2.4.2.2 Psychological Perception

Designing a space is done by focusing on people, their requirements, and their characteristics. A desired color scheme is one without personal opinions, and takes into consideration both the light and material design, as well as fulfilling both physiological, psychological necessities (Meerwien et al., 2007). They explored that although making a unique model for the factors affect human understanding and reaction to the color is by no mean easy, six inter-reliant factors can be assumed that are to a color stimulus, the collective unconscious, conscious symbolism and association, cultural influence and mannerism, trends, fashion, style and personal factors (p. 20).

There is no doubt that the interaction and correlation of colors and the spatial arrangements influence human health, wellbeing and life. According to Scury (1997), nowadays, people generally spend about 80 percent of their time in closed spaces. Therefore, enhancing the quality of the space should be one of the priorities of a design. Color, with its different properties should accompany the architectural space and its elements in order to fulfil a user's needs and the spatial function. In this respect, the designers should consider some interrelated aspects like the relationship of the color with the people, building, and environment.

Considering a color's ability to symbolize functions, interpretations, and meanings, each color can be employed to give a purposeful character and atmosphere that is relevant to the functionalities of the space and building. In color symbolism, colors are specially employed to transmit signals and subconscious messages by connecting the impressions to the instinctive interpretations of colors (Meerwein et al., 2007).

2.4.2.3 Color Perception in Interior Space

There is a relevance between colors, space and space elements; colors can easily guide the space users to comprehend various functionalities of furniture and space elements, as it can be perfectly employed to distinguish space elements, as well as linking them together. Indeed, different tones and hues can prioritize elements, attract people's attentions and guide them (Meerwein et al., 2007). Colors can help users rapidly by coding and activating their intuition to find the ways through complex buildings and spaces better than signs and cues (Dalke et al., 2006).

The aesthetic quality of a space is the combination of atmospheric and functional qualities created through a balance between different spatial elements that include: form, materials, lights, structure, etc. There is also aesthetic color design that is created through the harmonic interaction of color elements, and through their relationships, proportions and contrasts. Preferably, all the design components must be designed by taking all the elements into consideration (Meerwein et al., 2007).

To achieve the goals of spatial color design, namely: user satisfaction, function, and specific situation, a designer should consider color interaction with spatial factors like size, shape, orientation of the room, lighting, furnishing, and material (Meerwein et al., 2007). In addition to light, other factors that influence our perception of color include texture and material, color placement, and value distribution contrast (Nielsen & Taylor, 2011). Texture and material are effective at reflecting or absorbing light. Smooth surfaces that reflect light improve lightness and increase the intensity of the color (Dalke et al. 2006). Ingrained wood and similar surfaces, for example, refract light which emits a darker light and tone. Therefore, it is common that chosen colors

conflict when applying all features to materials like carpet, curtains, laminates, etc. Moreover, color placement or putting colors and hues together makes colors affect each other. By way of illustration, when a color is put beside a green object, a greenish undertone may show up in that specific color (Nielsen & Taylor, 2011, p. 92). In the other words, colors, in association with each other, gain different characteristics that may be either pleasing or conflicting. Therefore, to enhance and improve the whole arrangement of color in space, employing an appropriate mixture of different values and undertones seems logical. It is well-seen that the value of a color, defined as a relative lightness or darkness of a hue as a result of adding white or black, can have an influence on a specific space. High values, which are light hues, usually expand spaces and make the space elements of walls, ceiling, etc. seem far away.

According to Meerwein et al. (2007), there is a principle of color perceptions in architectural space that categorize the colors by the spatial perception.

- Color which advance to the foreground can be Warm, highly saturated, and bright colors (orange, ocher, sand yellow).
- Colors that located in intermediate ground can be clearly neither cold nor warm (green, violet, purple).
- Colors which recede into the background can be Cool and bright colors (light blue, lime green), as well as dark, warm and dark, cool colors (dark brown, dark blue).

Colors can be employed to convey meanings, which is based on color perceptions. They affect the dimensions of a space making them wider, narrower, etc. Moreover, what is known to be light is perceived in specific situations. For example, a light blue

ceiling is not perceived light when the walls are white but when next to dark colors is perceived to be lighter (Meerwein et al., 2007). The influence of colors on the floor, wall, and ceiling, depends on the brightness and saturation of a color (p. 68). A summarization of their experiences with hues, their values, and intensity can be seen in Table 2.

Table 2. Color Perception (Meerwein et al., 2007)

	Floor	Wall	Ceiling
	Sandy, light	Warming, expanding	Light, closing
	Not resonant, motorically arousing	Arousing to irritating	Shining
	Resonant, earthy, sure-footed	Oppressive, restrictive	Burdensome
	Powdery, light, soft	Warming, stimulating	Light, closing
	Arousing to irritating, provocative, garish	Shining, warming to heated, aggressive	Exciting, irritating
	Supportive, secure, familiar	Stifling, restrictive	Enclosing, oppressive to burdensome
	Foreign, delicate, charming	Delicately scented, flowery	Oppressive, warm
	Festive, majestic	Dominant	Obscuring, burdensome
	Noble, enhancing, valuable	Decisive	Bombastic, interventional
	Bottomless, charming	Fragrant, flowery	Delicate, scented
	Valuable, majestic	Mystical, artificial	Mysterious
	Luxurious	Magical, mysterious	Reserved
	Floating, icy	Cool, retreating, calming	Sky-like, cool to airy
	Retreating, watery	Cold, foreign, distanced	Heavy, cramped
	Deepening, bottomless	Claustrophobic, distanced	Cooling, burdensome, powerful
	Floating	Expanding	Neutral, closing
	Natural, safe	Circumscribing	Closing, oppressive
	Sure-footed, solid	Decisive	Oppressive
	Bottomless, foreign, empty	Neutral, free	Open, wide, light
	Deepening, abstract	Restrictive	Oppressive, burdensome
	Sure-footed, neutral, solid	Claustrophobic, massive	Covering, oppressive

2.5. How Colors Affect the Interior Spaces Psychologically

Color psychology, which is used frequently with “the psychological impacts of colors” is mainly meant to assess behavioral, emotional, and mental reactions related to definite colors (O’Connor, 2010). The psychology of colors which can be referred as both a physiological and cultural issue is important and precious, especially to those dealing with designing the interior spaces of building. It provides the ability to design interiors more efficiently (Nielson & Taylor, 2011, p. 93).

Color-group moods are specific emotional moods and responses that are produced by grouping colors. Nielson and Taylor (2011) mentioned that Philip Thiel has done research on this topic and reported his findings in his book “Visual Awareness and Design”. In the following paragraphs, a few of his conclusions are listed.

- Bright colors and light values cause feelings of happiness and freedom.
- Peaceful and relaxation moods can be created by light, dull or neutralized colors.
- Neutralized or dull, and dark colors are found to be serious, and deep. Richness and power can also be conveyed by means of dark values, and bright intensities of colors (jewel tones) (p. 93)

On the other hand, warm and cool colors can also influence psychological effect of the colors. For example, warm colors give a warm temperature to a space, bringing a sense of optimism, invitation, comfort, and intimacy. They simplify combinations of objects, textures and forms while reducing the dimensions of space. Relying on the values and

intensity of colors, they can vary from very warm, to warm, to just slightly warm (Nielson & Taylor, 2011).

Conversely, there are also cool colors that are used mostly to relax and calm a person's mind. They address more correct and precise details, patterns, etc., and unlike warm colors, they tend to expand spaces and mollify the emotions and appetite. They also vary from very cool to cool to slightly cool, depending on the Chroma or intensity of colors (Nielson & Taylor, 2011). Some of the characteristics of color are presented in the Nielson and Taylor introduction to interiors which is categorized in the three tables below.

Table 3.1. Color Associations (Author; According to Nielson & Taylor, 2011)

	Red	Orange	Yellow	Green	Blue	Purple
Pure, Intense	Danger	Friendliness	Cheerful	Nature	Loyalty	Optimism
	Passion	Warmth	Optimism	Calmness	Honesty	Imagination
	Love	Celebration	Sunshine	Friendliness	Integrity	Royalty
	Excitement	Clarity	Springtime	Integrity	Royalty	Dignity
	Stimulus		Renewal	Practicality	Stimulation	Poise
	Conspicuousness		Intensity	Frankness	Restlessness	Renewal
			Demanding		Sincerity	Commitment
			Revealing		Conservatism	Drama
			Warmth		Safety	
			Hot (too much)		Peacefulness	
			Intellect		Kindness	
			Stimulation		Compassion	

Table 3.2. Color Associations (Author; According to Nielson & Taylor, 2011)

	Red	Orange	Yellow	Green	Blue	Purple
Dark, Neutralized	Wealth Power sometimes Evil	Wealth Success Fame	Golden yellow: Wealth Affluence	Solidity Wealth Anchored	Sincerity Conservatism Safety	Depth Richness Security
		Rich Depth	Status Distinction High esteem Brash (too much) Garish or Ostentatious	Tenacity Security	Peacefulness Kindness Compassion Honesty Loyalty Integrity Royalty Stimulation Restlessness	Sternness Soberness Sobriety Dullness

Table 3.3. Color Associations (Author; According to Nielson & Taylor, 2011)

	Red	Orange	Yellow	Green	Blue	Purple
Light, pastel	Pure Chroma pink: Cheerfulness Youth Festivity	Stimulation (to the appetites) Security Relaxed Euphoria Well-being	Middle to light value: Intelligence Wisdom Compassion Freshness Cheerfulness Cleanliness Optimism Clarity Goodness	Blue-green: Sea and sky Cleanliness Nostalgia Calmness	Time & Space Tentativeness Calm Expanded Insecurity Cleanliness	Kindness Imagination Sensitivity Springtime Flowers Femininity Freshness
	Light, pastel pink: Femininity Innocence Relaxation			Yellow- green: Youthfulness Freshness Happiness		

According to Lee and Kim (2013) who examined and measured brain waves to investigate the human body's response to each unique color wavelength, the brain was more activated with Red, Yellow-Red, Yellow, Green-Yellow, Blue-Green and Blue-Red compared with White, Blue and Green. Red, Blue and Green exploration by O'Connor (2009) presented in this paragraph. According to O'Connor (2009), Red is known to be a warm and bright color, but is also considered an intense color known for evoking emotions. It is a color that can generate feeling of enthusiasm and power. Blue is known mostly to be a peaceful, calm and secure color that evokes a calm and peaceful mind. It is used in office decorations as it has been discovered through

research that people are more creative in blue spaces. The color green is known for being cheerful, health-giving, calming and relaxing. It is also known as a symbol of fertility and is recognized as a stress reducer.

There are other symbolic characteristics of colors interrelate both physiological and psychological responses. For example, red is a symbol of power, courage, and a revolutionary soul, but is also seen as a symbol of cruelty, anger and violence. Green on the other hand conveys harmony, calm, and balance and is helpful for relieving stress (O'Connor, 2009). Some of the physiological and psychological impacts of color is presented in Table 4 according to O'Connor (2009)

Table 4. Color Associations (O'Connor, 2009)

Color Association	Red	Blue	Green
Psychology	Evoke emotion Intense Anger Excitement Courage Strength Pioneering Spirit Violence Brutality	Calmness Serenity Peaceful Tranquil Secure Orderly Productivity motivator Relaxing Healing Sadness Aloofness	Restfulness Soothing Cheerfulness Reducing stress Helping Healing Balance Harmony
Physiology	-	-	Health-Giving Lessen stomachaches Fertility

It is generally accepted that warm colored lights are welcoming, uplifting and inspiring. However, lights that are intensely colored such as bright red, yellow, etc., are known to generate eyestrain that can lead to physical tiredness since the mind is trying to avoid dealing with Intensity. Cool-colored lights on the other hand generate peacefulness and produce calm environments. After time however they may become unfriendly and induce coldness and depression (Nielson & Taylor, 2011). These four

references to color and the interior agree that warm colors can provide excitement and energy to an individual while cold colors can be calming and relaxing (Ladau, et al., 1989; Mahnke & Mahnke, 1993; Miller, 1997; pile, 1997). Some other characteristics of color are presented below in tables 5 thru 8. For the colors presented in this thesis, there are seven rainbow colors attributed to the Color Therapy association and only these colors derived from these books are presented. Other colors like black and brown have been omitted.

In Table 5, the psychological association of the color is presented based on information inferred from “Color in interior architecture and architecture”. This book was written by Ladau, Smith and Place, in 1989. The physiological association of the color has not been mentioned in this reference.

Table 5. Color Associations (Author; according to Ladau, Smith and Place, 1989)

Color Psychological Association	Red	Yellow	Green	Blue
Positive specifications	Excitement Richness Royalty Love Sex	Expansive Cheerful Sun Serenity Warmth	Restful Nature Tranquility Fertility Freshness	Calming Sky Water Eye
Negative specifications	Blushing Adultery Prostitution Revolution Devil Blood	Cowardice Fever Shame Contempt	Witchcraft Illness jealousy	Blue mood Depression Illness

“Color and light in man-made environments” is a book written by Mahnke and Mahnke in 1993. This book is one of the important references for students, teachers and designers. In this book, writers have presented some psychological and psychological associations, also discussed on medical environments and advised some color application. The information derived from this book is presented in Table 6.

Table 6. Color Associations (Author; according to Mahnke & Mahnke, 1993)

Color Association	Red	Orange	Yellow	Green	Blue	Violet
Physiological	Raise blood pressure	-	-	Blood healer	Blood pressure Nervous disorder Headache Bleeding Open wound	-
Psychological	Energy Passion	Emotion Expression Warmth Verbal emotion expression Encourage	Optimism Clarity Intellect (Bright) Mood enhancing	Nurturing Healing Unconditional love	Relaxing Serenity Loyalty	Spirituality Stress reducer Inner calm

Another book available for interior learners and designers is “Color for interior architecture” written by Miller in 1997. This book includes some information about the effect of color on human body and psych (Table 7). Blue and red are discussed as the colors that have physiological effects on the circulatory and respiration system.

Table 7. Color Associations (Author; according to Miller, 1997)

Color Association	Red	Yellow	Green	Blue	Purple
Physiological	Speed up: Heart rate Respiration rate Blood pressure	-	-	Reduce: Pulse Respiration rate Blood pressure	-
Psychological	Stimulating Exciting Strength Passion	Sunny Cheerful High spirited Happy Expansive	Relaxing Retiring Refreshing Tranquil Quiet Natural	Calming Restful Cool Comfortable Sober Contemplative Dignity Poise Reserve	Delicacy Richness Unsettling Degenerate Dignified Exclusive Lonely Mournful Pompous

John Pile's book, "color in interior design", written in 1997, is one of the reference books useful for introducing different aspects of color in interiors. The color association derived from this book is presented in Table 8.

Table 8. Color Associations (Author; according to Pile, 1997)

Color Association	Red	Orange	Green	Yellow	Blue
Physiological	-	-	-	-	-
Psychological	Excitement Heat Intensity Force Fire Danger	Excitement Intensity Happiness	Pleasant Calming Natural Restful Cheerful Stability	Happy Cheer Light Mild stimulation Sunlight Activity	Calming Relaxing

John Pile (1997) believed that secondary colors (like orange) have the characteristics of two primary colors (p. 143).

All the knowledge about physiological effects of color on human derived from the considered interior architectural books, in this thesis are summarized in the table, which is located in Appendix B. The psychological characteristics and effects of color are investigated in studied architectural documents and classified in the table, which is placed in Appendix D.

Chapter 3

COLOR IN INTERIOR SPACE OF THE HEALING ENVIRONMENT

Color as one of the important design elements is applied in different fields to fulfil not only aesthetic quality of space but also psychological and physiological needs of users. The positive outcomes of medical use of color that have recognized by contemporary researches, have resulted in a great interest in using this element in health care centers as the complementary attempts to enhance their performance. In designing a healing environment, functions, users, hospitalization period can identify the plan, design, technical and aesthetical specifications. To encompass all different requirements of healing environments, design procedure is very sensitive and difficult and requires deep and comprehensive research in each aspect.

This chapter is allocated to the healing environment, selected context among different functional spaces, as its function is matched with Color therapy. Its spatial definition is accompanied by the color specifics collected from literature and special use of color known Color therapy that can be a proper color order for therapeutic facilities.

3.1 Definition of the Space of Healing Environments

Healing environment is the place to hospitalize the patients respectfully and properly. In general, these places can help patients` body, mind and soul to be healed and recovered (McCullough, 2009, p. 45). Meerwein et al. (2007) use the phrase “therapeutic facilities” to explore the healing environments that embrace hospitals,

rehabilitation clinics, psychiatric clinics, residential care for people with disabilities, nursing homes, etc. (p. 115). They consider hospitalization, cure and care as the function of these centers over the short or long term for people who have physical, psychological or psychophysical problems, handicaps or disabilities (Ibid).

In their classification, Nielson and Taylor (2011) postulate different sections in a common healing environment such as Reception, Patient Waiting Zone, Checkout area, Patient Exam rooms for doctors or non-Western healers, In-office Lab space; general Weigh-in area, Rest Rooms, Doctors' personal office space, Surgery area and so on. Each section needs special color system due to the function it serves. For example green is well-accepted for Surgery rooms to help surgeons' eyes rest after staring to the bloody tissues (Fehrman & Fehrman, 2004).

Dellinger categorizes the interior space of healing environments to two main groups; Off-stage spaces that used by staff and on-stage spaces that are accessible sections for patient, families and visitors (McCullough, 2009, p. 20). In another categorization based on the length of stay, Meerwein et al. (2007) postulate healing environments to short-term (like hospitals, rehab clinics) and long-term (like disables or psychiatric clinics) environments regarding to the period of time that their patients will be staying. They declare that Short-term healing amenities are the facilities and environments, that patients undergo the healing treatments, and are aimed to recover and return to their ordinary life as soon as possible (Meerwein et al., 2007). Long-term healing amenities are the residential facilities that are provided in order to service people, with permanent disabilities, mental problem or long-term diseases. Patient requirements can be complied by different factors of an operative spatial space.

People who use the healing environments can be grouped into two main categories; the visitors and patients (Dalke et al. 2004). Moreover, Meerwein et al. (2007) consider staffs as well as the users. In fact, users are from different categories; gender, race, age, who all need every day assistance, to fulfill their daily life needs. Patients have various types of problems, treatments and stages of recovery, along with having different social backgrounds, characteristics, ages etc. (Ibid). These differences are causing different expectations from the hospital atmosphere. However, varying psychological problems and malfunctions can be improved by means of design. Design of these architectural space must be done in order to improve the healing processes and must be welcoming and comfortable (Meerwein et al., 2007).

Care area inside healing environments can include private rooms or semi-private or public unities (Dalke et al., 2004). Private areas or Patient rooms are the areas in healing environments that are occupied by people to be recovered and healed. These spaces embrace patients in sensitive times; therefore, their atmospheric and spatial condition like visual factors especially color schemes can be critical. This research considered patient room in aspect of color and color applications.

3.2 Color in Healing Environments

It is well-accepted that color is one of the important elements that influences, the brain and body, and people's thought and spirit. Therefore, it can be employed as healers or at least, as improvers of senses of health and well-being (Meerwein et al., 2007).

Employment of color as a therapy, in healing environments, is reported to be dating back to ancient Egyptian, Indian and Greek civilizations (Rubert, Long & Hutchinson, 2007). Ancient Islamic hospitals were consisting of colorful tile murals in their design

(Yanni, 2007). According to Rubert et al. (2007) Florence Nightingale is the pioneer in hospital conditions consideration as the palaces that can be harmful or healer themselves (p. 28). She considered environmental factors like visual factors, color, natural light, silence and fresh air to patients` recovery. To add some colors to healing spaces she used colorful flowers (Rubert, et al., 2007, p. 31). White was suggested by Nightingale, and was employed, to color the nursing area, because it easily shows the dirt and so it is easier for the staff to notice them, and clean them (Verderber, 2010).



Figure 7. White color in Ward at St Elizabeths Hospital, early 20th century, Boston (URL 6)

By expansion of healing concept, many positive changes occurred in health centers (McCullough, 2009). Unlike previous trends in designing healing environments, which were more based on performance, recently patients and visitors are considered seriously. Although following function is the best strategy for the designers, aesthetics and comfort deserve serious consideration as well (Ibid, p. 22).

Some items in a healing environment can help people to release their anxiety and stress by different methods. Positive distraction, lighting, color, finish material and way finding are the key design elements that define various effects of comfort and

aesthetics (McCullough, 2009, p. 23). Among these, color is investigated in next parts as the tool of enhancing the health level.

Color is the most subjective element of design that depends on human gender, age, origin, culture and many other variables (McCullough, 2009). Due to lack of strong evidences, most of the researchers are not sure about the effect of coloring the space on special human diseases. This complexity is the reason that the Center for Health Care Design considered color as a significant environmental feature in the design of hospitals with crucial needs of advance investigation (McCullough, 2009).

The study and use of colors in space systems is required to provide the positive feelings for users and overcome dullness and boredom, to enhance the volume of space and other spatial qualities. The color systems of a space and their organizations are planned based on these desires (Ibid, p. 120). Hosking & Haggard (1999) explore that NASA has done some of the most trustworthy experiments on effect of color on human in the houses and hospitals that people are limited by the boundaries but they should stay in good mood. Their investigations concluded that there is a general linkage between colors employment, the mental states, and feelings. Moreover, the individual interpretation is recognized as the role-playing factor (Ibid).

In another investigation has been conducted by Peter Kaiser (1984), some human body signals, including the blood pressure, respiration, heart beat rate, eye blink frequency and some others were studied and it was reported that basically the subjects, could be generally divided into two categories of visualizers and non-visualizers. Visualizers are those, who frequently use a clear image (to respond) and the other category (non-visualizers) are those, who are dependent on other detecting factors. Based on this

classification, there are two significantly different responses, to the colors (Hosking & Haggard, 1999). Therefore, many factors even human visual types influence the perception and influence of color and it makes the color choosing so complicated or the sensitive contexts like healing environments.

Even though there are agreements on diverse responses of individuals to colors, influence of color in healing environments, and the necessity of its applications is well-accepted based on some general common human responses. Hence, dramatic changes has been seen in recent years, in the employment of colors in places, such as outpatient areas and doctor's offices (Nielson & Taylor, 2011). For example, what are known as the "warm" colors, which are specifically beneficial to enhance social interaction and conversely, "cool" colors, which are known to meditate and relax, are applied in different healing environments (McCullough, 2010; Verderber, 2010).

For a long time, medical facilities and objects were white, to show the hygienist and sterile condition. Yet it also can be boring, emotionless, which is creating a dull environment, which may influence on and intensify patients fear and nervousness (Mahnke & Mahnke, 1993). Nowadays, it is known from the researches that soft and neutralized colors, with different values can improve the healing process. Having the possibility of incorporating carpeting, warm wooden surfaces and wall covering, has enabled the designers to incorporate more colors in their designs, which will eventually result in more caring atmosphere, and benefits the people and patients, especially in frightening and complex situations (Nielson & Taylor, 2011). Function and users condition should be considered in coloring the patient rooms. For example, maternity rooms can have a warm cheerful color like pink with light green ceiling and moss

green floor (Mahnke and Mahnke, 1993) or it can have energetic orange tune (Dalke et al. 2004).

Some color employment suggestions are as follows. Some of the colors like gray, yellow-green, blue, purple are not accepted in healing areas, especially hospitals, and instead, pale warm yellow, maroon, rose, pink and blue-green are among the color recommendations, for these areas (Mahnke and Mahnke, 1993). Employment of green, white and tan, is also found to be depressive, for many observers (Pile, 1997). It is suggested that neutralized hue and white form a desirable background for colorful goods, and also provide flexibility (Nielson & Taylor, 2011). The color should be soft and moderate because saturated hues reflect on patients' skin and interfere medical diagnosis (Mahnke & Mahnke, 1993).

For the walls, Mahnke and Mahnke (1993) propose some schemes. They suggest rose, peach, soft yellow, pale gold, light green for all the walls accompanied by 50% tinted ceiling color. They suggest another scheme include three walls colored by same hue and front wall by harmonized color (p. 88). Totally, there should be a balance between warm and cool schemes in a healing environment (Mahnke & Mahnke, 1993).

Floorings' colors of a healing area, is also interesting for designers. They should give a feeling of security and confidence. It is indeed not suitable to make a patient walk on a bright, sparkly floor, which induces irritation and disturbance (Meerwein et al., 2007). Green, blue and rose are favorite colors of carpets for psychological lift and mask stains or soil (Marberry, 1997, p. 141). Carpet as a floor covering should provide visual comfort; give actual and visual warmth for the place (Ibid, p. 139). Mahnke and

Mahnke (1993) advice simple and uniform flooring cover not too much diversity of color (p. 95).

Ceiling is another space element, whose color design, should be done carefully, especially in healing spaces. As a matter of fact, in these spaces, bedridden patients are mostly having a focal eyesight to the ceiling. Therefore, ceilings should be designed efficiently, with some colors, lighter than the walls' one. It is important to consider the colors and light reflections, on the patient's skin (Dalke et al., 2006). This point becomes more serious, when the effect of reflected lights and colors are considered on the visual diagnosis, implemented at the patients beside (Meerwein et al., 2007).

Three of the studied interior architectural sources have no consideration of different contexts. Derived information of color in interior space of patient room is compacted in Table 9.

Table 9. Color Association with Space Organization (Author)

Color association with space organization						
Space elements	Ladau, Smith & Place 1989	Mahnke & Mahnke 1993	Miller 1997	Pile 1997	Meerwein, Rodeck & Mahnke 2007	Nielson & Taylor 2011
Floor	-	Simple Uniform	-	-	-	-
Wall	-	Pale warm yellow Maroon Rose Pink Blue green Peach Pale gold Light green	-	Warm colors	-	Neutralized colors White
Ceiling	-	50% tinted color	-	Warm colors	-	-

3.3 Use of Color as the Remedy in Color Therapy

In this research, Color therapy is considered to become a complementary principle of the coloring, in healing environments, to improve the healing process. This healing method can be viewed as a sub-category of “Light Therapy”, because it encompasses a special range of visible light frequencies, which present colors (Ford-Martin & Frey, 2009). In medicine, different frequencies of lights are examined in different periods on variety of physiological and psychological issues, such as depression, seasonal affective disorder (Ibid), insomnia (Duffy & Wright, 2005), circadian rhythm of the body (O'Connor, 2011), even certain types of skin cancer (Lieberman, 1991) and some positive effects are reported. Color therapy also is employed for various range of mental and physical issues. In this method, colored light can be glared to the special parts of body, in form of focused beam or covering the whole body (Ford-Martin & Frey 2009).

Meanwhile, the effect of colored light on blind people or other creatures, like plants that never have color perception by the eyes, can show that this method of using color differs from psychological effect of color. Pleasonton in 1876 revealed the positive role of blue light on the growth of the plants as well as maturation of the animals. A research on the students of a handicapped children school in United States showed that light had the same physiological effect on blind and normal vision students (Gruson, 1982). These outcomes can be strong evidences of the fact that the healing process of Color therapy is vibration-based. According to the Color therapy viewpoint, body has vibrations, then, colors as the electromagnetic waves with different frequencies can affect the vibration of the body (Azeemi & Raza, 2005).

The unfamiliar way of healing in Color therapy, demands a prior knowledge about the related beliefs and viewpoints, about body and illnesses, to understand the healing process. In this section, the topics relevant to the Color therapy, are explained, to clarify the nature of this treatment and to achieve a better perception of the logic behind applying different colors in interior spaces, based on Color therapy. In addition, Chi or life force, the components of the nonphysical or etheric body; Aura, Meridian and, Chakra as the targets of the glinting are declared. The methods of effecting colors are explored.

3.4.1 History of the Color Therapy

Use of color for healing purpose dates back to ancient civilizations such as Atlanteans (Buckland, 2002, p. 102), China, India and Egypt (Buckland, 2002; Leven, 2000). Many ancient civilizations like Egyptians were aware of the healing power of the light and color and benefited from it. They had some rooms specially designated to healing by rainbow colors, prepared by sun dispersion (Brewer, 2013). Atlanteans treated people by the color glittered through crystals. They had a healing shrine with a special meaningful architecture, a crystal dome, which reflected spectrum colors (Wills, 1993). However, it is found that they just were aware of the treating effect but not the biological effect of color (Azeemi & Raza, 2005). Avicenna (AD 980) was one of the pioneers of using colors for healing purposes. He clarified the importance of color in diagnosis, as well as treatment, and could recognize the illnesses by the patients' body color and also the color they needed to be treated. For example, he considered cooling effect for blue and white, or muscular reducer effect for yellow (Ibid). There are not many information about this method for a long time and most of the documents believe that it rebirth in 19th century and revived in the last century, especially in Far East and Europe (Buckland, 2002, p. 102).

In 19th Century, some new researches, conducted by Pleasanton (1876), showed the therapeutic impact of blue color on plants, animals and humans. He consider blue as the first remedy of injuries, burns and aches (Heinrich, 2012). Edwin Babbitt (1942), who is another leading role of using color for healing, presented a comprehensive theory in this regard, and made different devices and methods. He identified the colors abilities (like encouragement capability of red), and detailed that due to the connection between all vital organs and skin(through arteries, blood vessels and capillaries), the entire blood stream can be influenced by colors` rays (Azeemi & Raza, 2005).

20th Century was the prospering scientific knowledge about Color therapy. Ghadiali (1927) was one of the pioneers of this era that published his “Spectro-Chrome Encyclopaedia” to clarify why and how color rays have various therapeutic effects on the body and actually (Anderson, 1975).

3.4.2 Basics in Color Therapy

Color therapy, also named as Chromotherapy, Colorology and Cromatherapy, is a complementary healing method, which employs color to harmonize the body. In this regard, it is explained that the body has vibration, as well as the lights’ frequencies; therefore, light vibrations can affect the body. Color therapy, which acts like light therapy, associates the ranges, clarities and strengths of the colors, as a healing tool (Wells & Frey, 2009).

Color therapy, like the other healing methods, has diagnosing and different healing stages. People can be scanned by the practitioners and physician, or by electronic aura scanners (like Kirlian camera), besides replying special relevant questions, to find their problematic chakra. External symptoms are the reflection of inner body, and the etheric

body problems. Problematic chakras show themselves by physical, emotional and mental disorders. Moreover, these issues are not always as before, even for the same chakra. Based on the problem of flowing the energy in chakras, under-activeness and over-activeness occur. Inactivity of energy leads chakra to under activeness, and overflow of energy causes over activeness. Excess energy can flow inside and outside a chakra and intensify the particular disorder and the chakra irritation (Andrews, 2001, p. 55).

Meanwhile, Color therapy method, employs different forms of using light that classifies this therapy to two main categories; direct and indirect methods (Wölfflin, 2012). In direct ways, therapists glint the light on the body directly. In this method the colored light or the white light with colored filters are used. In indirect method, gemstone, silks, clothes and different colorful objects, or the place coloring, are the techniques of therapy (Wells & Frey, 2009).

Single colors or series of them can be employed to rebalance the chakra, and consequently the systems, glands and organs of the body, which are mediated with that chakra. The color vibrations interact with the electromagnetic radiation of the body. After transmitting to the spines, the color frequencies transfer along the nerve pathways in whole body, to rebalance it not only physically but also emotionally and mentally (Andrews, 2001, p. 44). The eyes, skin and ‘magnetic energy field’ or aura, absorb color and its energy flows to the body and affects all its levels, physics, spirit and emotions. Every single cell in the body needs lights’ energy, thus, color energy has broad effects on the whole body (Wills, 1993).

Choosing an appropriate color for the issues is one of the challenges for therapists that can overcome it by well-understanding chakras and experiences (Andrews, 2001, p. 45). Moreover, there are some tables and pre-suggestions for different illnesses and imbalances, befitting the therapists. However, since the reasons of issues and illnesses are different, depending on people`s personalities and body reactions, it is advised to use the personal inspirations, during the therapy sessions (Wills, 1993). The method that therapists adopt depends on the healer, the patient and the results they achieve, and as Andrews (2001) explained, after all, the illnesses treating methods.

According to Andrews (2001), a common instruction for harmonizing the Aura and chakra is using color of the chakra intensely, to help the underactive center and using complementary color, to treat the overactive one. In indefinite diagnosis, different amounts of chakra`s color and its opposite are utilized to balance specifically. Furthermore, this mode is used as the complementary part of healing procedure (p. 55). The colors, which are used for each chakra can be reinforced with voices and sounds, especially intonations of the mantras, and aroma either (Nanak & Naib, 2003).

Colors is lights with various wavelengths, therefore a particular wavelength and energy, is assigned to each color. Therefore, different colors are a set of vibration therapy means. Vibrational Energy Therapies create healthy resonant patterns, using frequency and vibration, having specific energy pathways, in order to create balance and health.

Chi is the first feature plays role in this therapy method. Based on various researches, it is known that health is related to a concept, which is known as Chi in China, Prana in India, Qi in Japan and Korea and Lung in Tibet, is identical to the World Spirit in

Western thoughts. This concept is the “life force” that is explained as the vital energy of the universe (Smith, 1996). It attends the bodies, until death and humans’ life affect its movements in the body, and it affects bodies’ conditions. The modern sciences try to understand existence, essence, possibilities and effects of Chi by different tools, such as scanning devices, blood tests and so on. It is stated that scholars define Chi as a “complex multidimensional energy”, which is a combination of different forms of energy such as “electrical, magnetic, electromagnetic, photonic, optical, thermal and mental (Saraswati, 2009). Therefore, color as the electromagnetic wave can affect its vibration.

During Color therapy, energy flows through the specific paths and get to the energy centers in etheric body, stays there and rotates. Smooth flow of energy organizes all the aspects of life and generates harmony in the body, in which every imbalance circulation of energy causes mental and physical disorders (Jang & Lee, 2004).

Etheric body is the important part of human that basically Color therapy procedure occurs in it. According to the basic beliefs of Theosophy, a human body is comprised of seven planes (Figure 8) that first and lowest one is physical body (Lansdowne, 1986). Physical plane, is divided into two parts, which are entitled as “the etheric body” (vital body) and “the dense physical body”. The etheric body energizes the dense cells, catches the forces and transfers to the components of the body, by its seven main energy centers, named chakras and energy pathways or Meridians (Ibid, 1986).

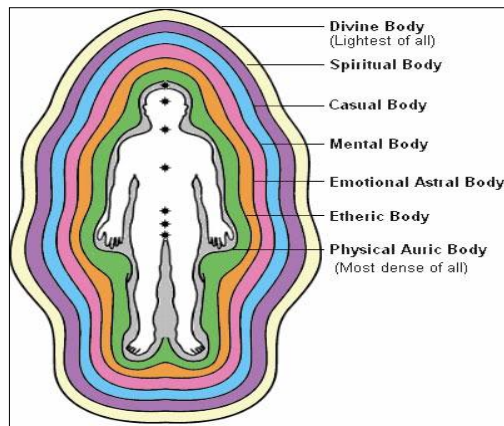


Figure 8. Seven Planes (URL 7)

Aura is the part of body that contains multifaceted spheres of energy; drawing positive energy and protecting from negative ones (Eden, 1998). It has seven bands, matching with the seven chakras. A healthy aura is clear with rainbow colors, hence these colors can harmonize aura. Collapse of aura happens due to illnesses and aging (Wills, 1993). However, the quality of it changes, due to positive and negative experiences, injuries, and treatments. Sealing, massaging or weaving, by hand or by a mindful intention, can be used to improve and correct the imbalances of aura (Wells & Frey, 2009, p. 182).

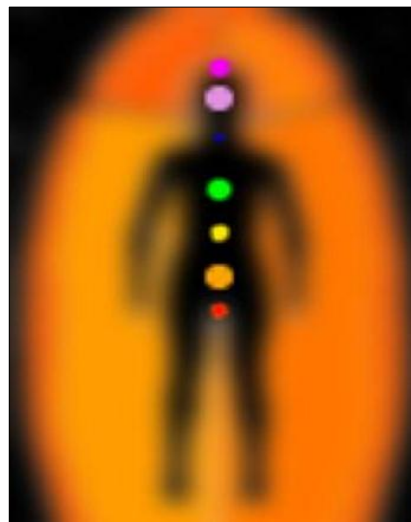


Figure 9. Human Aura (URL 8)

Meridian, the Chinese word, and Nadi, the Sanskrit word are the terms used for energy pathways or force lines in human`s etheric body. It is stated that the etheric body is full of force pathways and points, where they come across each other and form centers of energy or Chakras in these crossings and the nervous system are externalization of Meridians (Lansdowne, 1986). Each channel connect chakras to the glands and organs in the body, hence, blockages problems can cause physical and psychological issues. (Gulmen, 2004). Energy can move easily by clearing Meridians in different ways, such as energy healing methods, yoga etc. (Saraswati, 2009).

3.4.3 Chakra

It is believe that the chakra system was an Indian notion and govern four human activity dimensions; physiological, mental, emotional and spiritual, which has been lately introduced to western societies (Cohen, 2006).

Physically chakras energize the body by the energy they enter and transfer in the body. Every chakra is connected to specific nervous plexus, parts of body, organs and glands, through Meridians. Thus, the condition of every center, influence the situation, activity and function of these parts of body (Brennan, 1987). Consequently, every problem in the chakra creates physical issues that can cause further psychological issues.

In emotional realm, human`s unpleasant experiments also can affect chakras and consecutively, body will have some energy blockages and psychological or physical problems (Brennan, 1987). Chakras are like databank, they record emotional experiments relevant to themselves (Eden, 1998).

In mental realm, essential programs are held in chakras, like floppy disks and govern human decisions and behaviors (Judith, 1996). The three lower chakras contain bodily

decorations of consciousness-belief systems, like survival, sexuality and action and the other centers are more related to spirit of life (Judith, 1999). Healthy chakras make the optimistic, practical and realistic beliefs and decisions.

Considering the spirituality, chakra system acts as the map of human`s evolitional experiences (Ballentine, 1999). Each chakra is a stage of human maturation. Every chakra contains a particular spiritual lesson, to improve human awareness and consciousness by seven steps (Myss, 1996a).

Chakras are called the energy disks, plates, wheels or vortexes. They are parapsychology centers of the body, which make the suitable background for turning the life force or energy in the body (Feuerstein, 1997). These disks form vortices that are the points, which the physical body is connected with invisible “etheric double” (Leadbeater, 1994). They are considered as the energy stations for the energy that is transferred by meridians (Eden, 1998). Andrews claims that recent researches have revealed higher electromagnetic emanations in chakra locations (Andrews, 2001). The upper body chakras, which are related to the spirituality, spine faster than lower chakras and have green, blue, indigo and violet colors. Lower and slower chakras are red, orange and yellow as slower-moving light waves display warm hues of color.

For harmonizing Chakras suitable vibration is required, and this frequency can be strengthened with other vibrations of the sound, especially intonation of the mantras, aroma either and meditation (Eden, 1998; Nanak & Naib, 2003). In Color therapy, it is believed that to become balanced, the underactive chakra needs its color, while the overactive chakra needs complementary color of its own color (Andrews, 2001).

3.4.3.1 Importance of Chakra in Color Therapy

Foregoing information can prove the reality that chakras make thoughtful system of physical and psychological improvement of human. It not only governs bodily issues but also mental, emotional and spiritual aspects of individuals` life. This system can aid humans to return to their nature and to know and understand themselves. Knowing this system can help a person to know and find the reasons of their problems and heal them easier. In physical realm, the body sensation and the psychological moods can reveal the problematical chakra, related body part and physiological issues. In this way, the main point that the energy is stuck will be revealed and the healing process can be focused and more beneficial. As Cohen (2006) explore psychotherapy, procedure can get benefit from the chakra system, as identification tool for growth obstructions and opportunities for healing.

Chakras are like clocks cogs. They should work correctly with the same defined speed and direction for the proper work of the body. All the vibrations affect theses energy centers` vibration. As the spectrum colors are various wavelength of light, they can resonate the chakras with their own particular energy. Thus, any wavelength of light can help the similar color chakras to vibrate properly by balancing the energy. Color therapy plays prominent role in balancing the energy of chakras and consequently body by projecting different wavelengths to the patients` bodies.

3.4.3.2 The Seven Major Chakras

Most of the healing systems agree on the existence of 7 major chakras and 21 secondary chakras, as the place, where 14 energy pathways meet each other (Dale, 2004). Major chakras are the product of increase of these overpasses (Lansdowne, 1986). Furthermore, in occasion, eyes, hands and the needing parts of the body can act

as the chakras to absorb the energy. Seven main chakras are known as Root (or Base), Sacral (or navel), Solar Plexus, Heart, Throat, Brow (or third eye) and Crown chakras (Figure 10). The information about each chakra is summarized in seven separate tables (11-17), which are available in seven parts in appendix A and specialized for physiological and psychological association for seven chakra in appendix C and E.

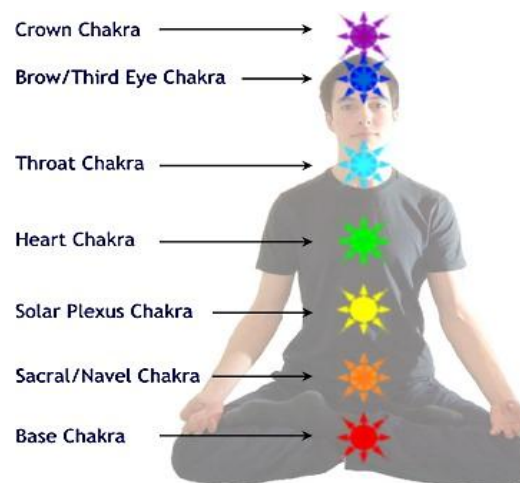


Figure 10. Seven Chakras (URL 9)

3.4.3.2.1 The First Chakra

The lowest and first chakra is “Root” chakra and it is located on the base of the spine. This chakra is related to red. According to Andrews (2001), that categorized treating colors in respect of over or under activity of chakra, red is suitable for under activeness and green by small dose of red for over activeness.

This chakra is human foundation and it connects human to earth and earthly things; stability, solidity, body and matter, health and survival. First chakra function as a root and ground human to the physical plane of existence (Judith, 1999) and this connection made by legs and feet to absorb the energy (Eden, 1998). Other related parts of body with this chakra are spinal column, kidneys, rectum (Brennan, 1987) and circulatory

system, reproductive system (Andrews, 2001). If energy stuck in this chakra, the Physical problems may emerge are; Hemorrhoids, colitis, constipation, sciatica, varicose veins and tight hamstrings (Ballentine, 1999).

Myss (1996a) called this chakra “Tribal Chakra” as it connect person to the family, groups and beliefs. This connection and belonging will give safety and security to individuals and it is why this chakra is related to survival. Every breaking in connections and belongings as Cohen (2006) explores can cause fear, unsafety, and self-preservation that prevent the easy flow of energy in this chakra and even pass to the second one. These people can be followers as they are influenced by the tribal beliefs (Myss, 1996a). Underactive Base Chakra cause manipulative, overly cautious, power conscious, possessive, needing approval, craving excitement and change but refusing to act upon it, overly tired, no energy to do what you want (Andrews, 2001). These experiments may cause aggression, cruelty and violence to people as well (Johari, 2000). These reactions show the overactive Base Chakra. Over activity in this chakra may causes physically aggressive, belligerent, impulsive, inability to recognize limits, obsessively sexual, hyperactive and reckless (Andrews, 2001).

3.4.3.2.2 The Second Chakra

“Sacral” chakra is the second chakra, which has orange color. It is located in the lower abdomen, the area between the navel and the genitals (Ballentine, 1999; Myss, 1996a) and known as the sexual chakra. Water is this chakra`s element and connected to the regulation of body`s liquids like blood, saliva, mucous, urine, lymph, beside sexuality, reproduction (Judith, 1999; Johari, 2000), adrenal glands and the entire muscular system (Andrews, 2001). The second chakra connects energy to bladder, large intestines, sexual organs, pelvis and quadriceps (Myss 1996a), eliminative system,

pancreas, kidneys, the spleen (Andrews, 2001). According to Ballantine (1999), blocking energy in first and second chakra and having survival and creativity issues can result Sexuality transmitted disease (STD's), menstrual pain, cystitis, infertility, and/or impotence.

Cohen (2006) states that the second chakra relates to all aspects of creation, procreation and regeneration from creating babies to creative art project, innovative problem solution, making income (Myss, 1996a). This chakra is called "Partnership chakra" by Myss (1996a) as it concerned with one-to-one relationship with others. This center in related to Survival of the species, creation and productivity desire and human need to control the external world beside tendency to sensual pleasure are the functions of this chakra (Myss, 1996a).

In general, every chakra is influenced by the chakra below it because the needed energy for balancing each chakra comes from previous one. In this case, if energy block in first chakra, self-preservation problem and fears influence second chakra. Consequently, sexuality will be a tool for controlling another person to gain security (Ballentine, 1992). Unfulfilled sexual desire can shifted to another pleasure like overeating (Ballentine, 1992) to calm the person and give him safety.

Imbalance in this chakra can be observed in form of abuse. All kind of abuses, like premature toilet training, shaming of the body and /or sexuality, abortion, or sexual abuse are documented in this chakra (Prendergast, 2000; Judith, 1996). Perceiving no love from the person`s origin can cause sexual promiscuity. These kind of experiences can lead to body image issues, hatred of sexuality, and guiltiness (Prendergast, 2000).

In case of over activity, the person can become selfish, arrogant, lustful, overly proud or conceited; high-strung emotionally, constant power-seeking. Over activity can be treated by the blue color and a small dose of orange. Underactivity in this chakra can cause mistrust of others, introversion, inability to show emotions, worrying what others think, being anti-social, following the crowd (Andrews, 2001).

3.4.3.2.3 The Third Chakra

The third chakra is called “Solar Plexus”, as it is located there and its color is Yellow. It is known as the “Personal Power” chakra (Myss, 1996a, p. 167). This chakra’s element is fire, which is created by the combination of the matter and movement, first and second chakras qualities stimulate individual’s power to join to the external world (Judith, 1999; Rama, et al., 1976).

The body parts, which are related to this chakra, are stomach, pancreas, upper intestines, liver, and adrenals (Myss, 1996a) digestive system, the adrenals, gall bladder, left hemisphere of the brain (Andrews, 2001). Therefore, the blockage in this chakra can cause disorders like indigestion, diabetes, and peptic ulcer. Andrews clarified that balancing this chakra can heal many crippling diseases, ulcers, intestinal problems and psychosomatic diseases. Third chakra is related to adrenals to ignite its energy flames (Ballentine, tape #8, 1992). Additionally, Cohen (2006) determined the solar plexus as a transformative center. It transforms food and matter as the fuel to the flesh or to energy for action to the world. Psychologically, this theme manifest human reaction to the challenges and needs.

This chakra relates individuals to their identity, personal ego, uniqueness, strength, power, self-assertion, accomplishment, and self-esteem (Kilham, 1994; Hover-

Kramer, 2002) and consequently self-understanding, acceptance and making correct decision and (Myss, 1996a). When people give the responsibility of their decision to the others because of lack sense of value, they de-energizing themselves. Emotionally, violence and empower feeling can make people distrustful, senseless, hypersensitive to disapproval without reaction or too much reaction, (Prendergast, 2000, p. 53). In Rama`s perspective (1976) problematic third center can change human meaning of power and make them submissive or controller or alternating between these two position.

Families and groups individuals belonged to and their partner have an important impact on the lack of self-value. If someone can have their own idea and way to live, they are not stick to the tribal standards anymore and they can achieve their own honor, this chakra`s spiritual manifestation (Myss, 1996c). This sense of honor ignites person`s power and will base of self-esteem, self-respect, self-responsibility, ambition, assertiveness, and initiative (Myss, 1996a). Lack of self-confidence, self-responsibility, and oversensitivity to rejection or criticism can stuck the energy in this chakra (Myss, 1996a).

From Andrews (2001) perspective overactivity in this chakra can make person Hypercritical, mentally bullying, stubborn in attitude, always planning and never manifesting, needing constant change/variety. Underactivity of this chakra cause Feeling deprived of recognition, afraid to learn the new, feeling isolated, aloof, psychosomatic problems. He mentions that if this chakra is underactive, applying center`s color, yellow can be the appropriate treatment method and if is overactive, violet or purple, with a small dose of yellow can be useful (Andrews, 2001).

3.4.3.2.4 The Fourth Chakra

The fourth chakra is located in the center of the chest and called “Heart” chakra. This chakra has the color green. According to Judith (1999), this center is associated by element Air and its specifics, lightness, openness, freshness, spaciousness, and breath. In physical realm, the fourth chakra encompassed heart, lungs, breasts, thymus gland, and circulatory system (Ballentine, 1999; Myss, 1996a). These parts of body function feeding (Rama et al., 1976), giving and nurturing (Cohen, 2006). Therefore, this chakra is related to these functions and if it becomes unbalance can cause Heart disease, asthma, bronchitis and breast cancers (Myss, 1996b).

When energy enter the body from the first chakra it flow through the lower instinctual chakras to the forth one, its quality shift to consciousness (Cohen, 2006) and love, sympathy, generosity, forgiveness, wisdom, intuition, and Divinity connection (Ballentine, 1998; Rama et al., 1976). Emotions, heart feelings, unconditional love are this chakra`s specifics. Family love and partner love and self-love come to this center and change to unconditional love to all people. Emotional experiences that related to lower chakras like fears, sexual and personal issues, have impact on this chakra`s function and can make a person emotionless or cruel (Rama et al., 1976).

According to Andrews (2001), overactivity of this chakra can cause person Angry, jealous, blaming others, miserly and stingy, overconfident, allowing oneself to be walked on and taken advantage of. That can treated by its complementary color, red. If this chakra become underactive, needing constant confirmation of self-worth, uncertain, unable to enforce will, possessive, self-doubting, feeling unloved, lacking

compassion. This chakra is nature center and it is green, thus in case of underactivity it can be treated by its color, green (Andrews, 2001).

3.4.3.2.5 The Fifth Chakra

The fifth chakra is identified “throat” chakra as the location it is placed. Its associated element is ether or Akasha, which is emptiness that encompasses all existence (Johari, 2000) and sound transfers in (Ballentine, 1999).

Throat, thyroid, pharynx, larynx, mouth, and jaw are the parts of body, which this center connects to the life force. If this chakra becomes problematic, thyroid issues, TMJ (Temporomandibular Joint), laryngitis, goiter, and stiffness in the neck (Myss 1996a, Ballentine, 1999).

Expression is one of the most important functions of this chakra. This chakra keeps all the previous chakra's information and as Eden (1998) states metabolize them. It means that the information and energy disintegrate in the body, and then reintegrate a new expression within speaking as the thyroid function in this part. Problems in this center can influence all aspects of speaking from voice tone to fluency and accuracy.

The psychological issues that can happen by the problematic fifth chakra are reluctance to talk, to share warm beliefs, feelings (Cohen, 2006). Expansive, safe and non-judgmental place can benefit people to make themselves free from their criticizer inside and have their own self-expression (Hover-Kramer, 2002).

Being in alignment with divine is the spiritual lesson of this chakra that leads humans to make conscious decisions, aware of their social or even environmental consequences. Awareness of the personal to global results of the beliefs and behaviors

may leads human to honesty and integrity with divinity and universe. Honesty will be the important specific help people achieve the healing and balance in this chakra (Myss, 1996).

In Andrews (2001) perspective, Overactive Throat Chakra can cause Domineering, dogmatic, fanatical, and overreacting, speaks negatively/harshly, and clings to tradition, hyperactive. Vice versa Underactive Throat Chakra can cause Surrenders to others, resists change, melancholy, slow to respond, stubborn (Andrews, 2001). If this chakra become underactive, blue can balance it and if overactive, orange followed by a small dose of blue can balance it.

3.4.3.2.6 The Sixth Chakra

The sixth center is called “Third eye” chakra or “Brow” Chakra due to its location, which is slightly above the bridge of the nose, between the eyebrows (Eden, 1998). The parts are related to this chakra are the brain, neurological system, eyes, ears, and sinuses, pineal gland (Myss, 1996a; Ballentine, 1999). Andrews (2001) consider this center affective on the pituitary and the entire endocrine system, immune system and the synapses of the brain, hemispheres and sinuses, eyes, ears, and the face in general.

This center is the place that donates human consciousness, deeper vision, wisdom, intuition and inner knowledge (Rama, et al., 1976, Myss, 1996a), creative imagination and visualization (Andrews, 2001). If human restrict to have and accept just external knowledge, the energy will block in this chakra and cause migraines, visual problems, insomnia, and sinusitis (Ballentine, 1999).

All beliefs, thoughts, subtle knowledge with inner-based perceptions, produce intellect in this chakra (Eden, 1998). This center govern both beliefs and the psychological

ability of evaluation of beliefs. Finding the truth is spiritual lesson of this chakra and balancing this chakra result distinguish truth from illusion (Myss, 1996a, p. 239).

Underactive Sixth chakra can cause doubting, envious of other's talents, forgetful, superstitious, fearful, worrying and indigo is the color can balance it. Worrying, fearful, oversensitive, impatient, belittling the behaviors of others, Spaced out are the senses which appear in over activity case and can heal by soft orange or peach followed by a small dose of indigo (Andrews, 2001).

3.4.3.2.7 The Seventh Chakra

Last main center is the “crown chakra” that located on the top of the head and contact human to the universal life force. This chakra is violet. The central nervous system, the muscular system, the skin (Myss, 1996a), body skeleton, pineal gland, all nerve pathways, the electrical synapses within the body and the medulla oblongata are influenced by this chakra (Andrews, 2001).

This center can be mentioned as the “door of the enlightenment” (Rama, et al., 1976, p. 271) or “transpersonal center” due to the connection with higher power beyond self (Hover-Kramer, 2002). This chakra is the center of cosmic consciousness (Kilham, 1994) and the energy of this chakra stimulates human to search the divinity of their life and connect and integral to their spiritual origin (Myss, 1996). This chakra bring the energy into the present to obtain the holy truth of the seventh chakra, “*Live in the Present Moment*” (p. 267). This energy by no mean should waste for keeping memories. However, according to Prendergast (2000), function of the crown chakra, is beyond beliefs and in this stage human is integrated with its nature and divine and reach the level of “I am” (p. 55).

Unbalancing in this chakra in form of underactivity, make Feeling misunderstood, shame, self-denial, negative self-image, lacking tenderness and it will treat by Violet. In opposite side, over activity can cause intensely erotic imagination, needing to feel popular and indispensable, needing sympathy that can be healed by yellow followed by a small dose of violet (Andrews, 2001). Cataract, Brain disorder, Sciatica, meningitis, Neurology pain, Meningitis are the physiological problems can occur by unbalancing this chakra (wills, 1993).

Chapter 4

COLOR USAGE IN INTERIOR OF PATIENT ROOMS VERSUS COLOR THERAPY

This research has studied color, color therapy, space and healing environments. By having knowledge about these fields, a connection parades to the mind and links the therapeutic aspect of color to the context that applied it. This study shows that color, as one of the basic elements of space plays an important role in both fields of design and healing. It affects the atmosphere of interior space and interior space of a healing environment by different applications in design. In color therapy attitude, color as the basic healing tool influences the human well-being by affecting chakras.

In this thesis, there are six main sources as the basic important references for color applications in interiors. These references are the basic books that explore color and its fundamentals, theories and schemes. The major information of color associations is derived from these six references: “*Color in interior architecture and architecture*” written by Ladau, Smith, and Place (1989), “*Color and light in man-made environments*” by Mahnke and Mahnke (1993), “*Color for interior architecture*” by Miller (1997), “*color in interior design*” by Pile (1997), “*Interiors: An introduction*” by Nielson and Taylor (2011), “*Color – communication in architectural space*” by Meerwein, Rodeck and Mahnke (2007). With the light of these books, color specifications in interior spaces are studied and within descriptive tables are connected to the color specifications derived from color therapy sources. These tables are

available in Appendices section. Finally, some color application are proposed for the patient rooms in healing environments.

It is understood from the derived information that color specifications plays crucial role in any application. Knowing different hues and their temperature can help designers to create the spaces with various atmospheres. For instance, coziness and friendliness can be donated to the space by the warm hues like red, orange and yellow and peace and calm by the cool hues like green and blue. In addition, designers can play with these specifics for expanding or closing the spaces by applying cool or warm colors. Other specifics that can be employed by designers to create effective space are, value and intensity of the hues. Dark hues with low value advance and close the space in contrast with light hues with high values that recede, expand the space, and donate happiness and freedom. Intensity is employed to affect the dimension of the space as well. Intense, bright and pure hues enlarge the space and donate the excitement and happiness to it in contrast with dull and neutral hues. Colors are combined in different schemes to prepare a space with visual balance. Colors can be combined in Monochromatic, Analogous and Complementary schemes to create a desired atmosphere. Direct complementary scheme is the one that uses exact complementary colors in color wheel like red and green, orange and blue, yellow and violet.

In color therapy, colors and their complements are utilized for healing. Colors related to the chakras applied to heal them in case of under activity and their complements for healing their over activity. Table 10 reminds readers about the colors, related chakras and the treatment of chakras in case of over or under activity are presented according

to Ted Andrews color application for problematic chakras. This is the basic color application considered in this thesis.

Table 10. Chakras and their colors and complements (Author; according to Andrews, 2001)

Chakra	Under activity treatment: Chakras color	Over activity treatment: Complementary color
First chakra: Root	Red	Green
Second chakra: Sacral	Orange	Blue
Third chakra: Solar plexus	Yellow	Violet
Fourth chakra: Heart	Green	Red
Fifth chakra: Throat	Blue	Orange
Sixth chakra: Brow	Indigo	Soft orange
Seventh chakra: Crown	Violet	Yellow

As it explored in Munsell theory, color has three fundamentals, which are hue, value and Chroma or Intensity. Hues are used in Color therapy are seven rainbow colors. Therefore, just these colors are inferred from the interior architectural references.

The physiological and psychological knowledge derived from both architectural and color therapy literature is presented in two descriptive tables based on psychological and physiological color association (Appendix F-G).

4.1 Color Red and First Chakra

The first hue is evaluated by Color therapy attitude is red as it is the first chakra's color. Color red is one of the warmest colors in color wheel. This color is a primary color that is directly opposite of the color green. Red like other colors can influence human body and mood. Physiologically it can be a stimulus. Ladau et al. (1989) and Mahnke & Mahnke (1993) mentioned the specific of color red that can lead to a rise in blood pressure and consequently respiration rate. In addition, Mahnke & Mahnke (1993) considered its complementary color, green, as a healer for the blood problems.

In Color therapy attitude, first chakra is red and it needs red hue for rebalancing in case of under activity and green hue in case of over activity. This chakra coordinates Circulatory System. The underactive chakra can cause slow blood circulation and lack of blood pressure and color red can help this system to speed up the circulation. In this case, there are some agreements in these two fields. Moreover, Color therapy considers the problems related to spinal column, pelvis and legs like sciatica as well as rectum and hemorrhoid, colitis and Constipation that can be healed with this color. Thus, it can sum up that the problems with lower body can heal with color red.

In aspect of psychology, most of the studied interior references agreed that hue red is stimulating and exciting specific of the hue red. Aggression, force being a sign of burdensome are another aspect of this color that Mahnke and Mahnke (1993), Pile (1997) and Meerwein et al. (2007) have mentioned. Moreover, this color can be related to love and passion (Miller 1997 and Nielson and Taylor, 2011) in positive and negative sides as Ladau et al. (1989) declare in their categorization. In color therapy, this color heals underactive first chakra. It means that the issues like lack of energy, tiredness, fears, obsession and all problems caused by under activity of this chakra can be resolved by hue red. In the opposite side, some of the issues like aggression, impulsiveness and hyperactivity that are caused by over activity of the chakra can be healed by the complementary color of the chakra, green.

Regarding to the specifications postulated to this color in the studied interior architectural sources, this color that can cause stress, belligerence and affect blood pressure, by no means would it be suitable for a place, which is specialized for hospitalizing people to cure and heal. Therefore, for the patient room, which needs

calm atmosphere to release stress from the patients, it can be risky. It is why Mahnke and Mahnke (1993) in their book categorize this color in the rejected color categories. To fulfill this requirement, green hue as the opposite of red can be useful to relax the patients and release the stress. They suggest some colors like light green and blue green color for the walls can be useful in these cases. As Meerwein et al. (2007) explain, color in different parts of room can play different roles. For example, although same green can donate the sense of safety on the wall, it can cause the sense of restricting and limiting on the ceiling. While if it tinted, it can expand the room. Especially as ceiling is a focal point for bedridden patients, receding ceiling can be desired. It is why Mahnke and Mahnke (1993) suggest 50% tinted of the wall colors to expand the place. For the flooring, they insist on simplicity and uniformity of the pattern of this part of the room to prevent visual disturbance and boredom.

4.2 Color Orange and Second Chakra

Orange color is a secondary color made by red and yellow. Its complementary color in the color wheel is blue. In the sixth studied interior architectural references, no physiological information is found about this color. Nevertheless, in color therapy color orange is the color of second chakra that coordinates liquids of body like blood, lymph and urine, eliminating system and adrenal glands that are important parts of body. This color can heal the relative problems with these parts of body like muscular spasm, feminine problems by harmonizing an underactive second chakra. In case of over activity, color blue can be helpful.

Psychologically, this color is known as the warm exciting color that can give positive emotion and friendliness to the space by Mahnke and Mahnke (1993), Pile (1997), Nielson, and Taylor (2011) among the studied references. Meerwein et al. (2007)

consider the potential of becoming heating, irritating and aggressive color in some situations. Regarding to color therapy attitude, under activity of this chakra shown by antisocialism, being introvert and mistrust that can heal by the color orange. Over activity of this chakra causes selfishness, power desire and too proud that can be balanced by the complementary color of the chakra, blue.

Orange is the color that can create happy and energetic atmosphere. This color is suitable for the maternity and children wards. However, Mahnke and Mahnke (2007) accept tinted orange, peach and pale gold can be useful for the patient rooms. Peach can be used in four walls or three walls accompanied by harmonized front wall (the wall front the bed) and lighter ceiling. According to Meerwein et al. (2007) this color powdery, light, soft on the floor and warming, stimulating on the walls and light, closing on the ceiling. To sum up, in addition to maternity and pediatric wards, this color can be applied to some patient rooms that specialized for the underactive second and over active fifth chakras` problems; furthermore, it can be applied in soft and pale condition for the problematic overactive sixth chakra. It can be used to different elements of space in respect of interior design necessities to cover both attitudes; color therapy and interior architecture.

4.3 Color Yellow and Third Chakra

The color yellow is one of the three primary colors in the color wheel. The complement of this color is violet. No physiological effect is considered for the interior architectural references. While this color plays important role in human wellbeing. This color is the color of chakra three. It is related to solar plexus area and all parts of body inside this area like liver, gall-bladder upper intestine, digestion system and adrenals. Color

yellow can harmonize the underactive of third chakra and intensify these parts and systems.

Interior architectural references agreed on warmth, cheer and stimulation of this color. Generally, they estimate this color as a color with positive effects on humans` mood and viewpoint. However, a high saturated or large amount of yellow can cause irritation and aggression. This color is the stimulating color that can have positive influence on sense of aloofness, isolation and distrustful. It can revive the emotionless person and give positive sense about self-related issues.

Yellow is a cheerful color that can enhance the mood of users of the spaces. However, saturated yellow is the most aggressive based on Miller (1997). This color by no mean is accepted for infant wards because its reflection can cause the misleading of jaundice diagnosis (Dalke et al, 2004). This color has strong reflection on the surrounding objects. It is why in healing environments using yellow is not desired unless it is pale warm or very soft. This color on the floor can be sandy and light, warming, expanding on the walls and light and closing on the ceiling. In short, yellow can be applied to the specialized areas for the patients with problematic third or seventh chakra with respect to mentioned interior architecture considerations.

4.4 Color Green and Forth Chakra

Color green is the product of mixing color blue and yellow. This color has the happiness and energy of the yellow and calmness of the blue. Its complementary in color wheel is red. In aspect of physiological effect of green on human, Ladau et al. (1989) postulate the positive effect of fertility. Moreover, Mahnke and Mahnke (1993) declare that this color is the blood healer and it affects nurturing activity as well. This

color is the color of fourth chakra and the complementary of chakra one. This color influences the parts of body inside the chest. Heart, lungs, breasts and their activities can be coordinated by fourth chakra. Circulatory, respiration and immune systems are related to this chakra and its color green. Green can reduce the blood pressure, respiration rate and pulses.

Green is known as a tranquilizer healing color. It is used in different spaces to denote the sense of quiet, safety, relaxing and refreshing. It can lead the individual to be practical, stable, frank and even oppressive. Ladau et al. (1989) consider jealousy and illness as two negative qualities for green, and Mahnke and Mahnke (1993) add tiresome and feel of guilt. In color therapy, green is the color of heart chakra that is the middle of the chakras and it harmonizes them. This color can heal the problems like lack of love, compassion and self-worth that are the underactive chakra issues. The complement of this color as mentioned before is red which can be useful for resolving the over active chakra.

All studied references agreed that this color is a receding cool, like other colors, it can be warmer by adding black and cooler by adding white. This color have been used in healing environments for decades and in some cases can give the sense of institutional atmosphere, hence, in recent years designers tried to change or substitute it, by the way, this color is one of the safest and most reliable colors for designers to apply to the healing environments. Although this color can be depressive in some schemes, it can be applied to a spaces with appropriate shades and values to make a space calm. For patient`s rooms as well, it can be used in different conditions to make the space to aid patients in their hospitality period. Applying light green, blue-green, lime green to

the walls can be suitable for obtaining this purpose. Moss green can be a good color for the floor covering and light tinted color for the ceilings. To summarize, this color can be applied to all the patient rooms according to the knowledge acquired in the interior architecture field. Green can present natural and safe floor, be circumscribing on the walls and closing and oppressive on the ceiling and can be expanding in pale form. In addition, green can be used for the specialized areas for the patients who have underactive fourth or overactive first chakra.

4.5 Color Blue and Fifth Chakra

Blue is one of the primary colors in the color wheel. It is complement of orange. This color is considered as the calm and peaceful color that can release the stress and pain. Blue can reduce the pulse, blood pressure and respiration rate according to Ladau et al. (1989). Mahnke and Mahnke believe on the positive role of blue it reduces bleeding and heal the wounds. Other studied interior architectural references have no information about the physiological effects of this color. According to color therapy, attitude color blue is the color of throat chakra and can heal the problems that occur in throat, mouth, pharynx, bronchia, neck, parathyroid glands, and respiratory system. It can release the spasm in the neck and resolve the goiter and laryngitis.

According to investigated interior architectural references, psychologically blue have various specifics and it can play a different roles in atmosphere and on users. Most references have agreement on positive effect of blue to make atmosphere relax and calm. This color can display the serenity, loyalty and honesty as well. Blue have some negative effects like the blue mood, depression and illness in case of using too much amount of dark hue. In color therapy, this color is known as the healer of the throat chakra. Loyalty and honesty are the specifics can be encouraged and melancholy,

answer and change resistance can be healed by this color. If this chakra is overactive, individual can become dogmatic, over-reactive that blue complement, orange can heal it.

This color classified in cool hues. It can be very cool, cool and slightly cool. This color is not suggested for the healing environment in dark form or too much amount, because it can be depressive in long-time proximity. However, it is the color that reduce the pain and stress; thus, it can be used if tested in proper schemes. This color can use in light form to present the sense of floating and icy on the floors, cool, retreating and calming on the walls, sky-like and cool to airy on the ceilings. In addition to design considerations, it can be used for the areas specified for the patients with fifth or second chakra`s problems.

4.6 Color Indigo and Sixth Chakra

Indigo is one of the cold colors from the blue family. None of the interior architectural references gives information about physiological effects of indigo. In color therapy, this color is related to the Brow or third eye chakra. This chakra governs the face and head and some important systems of the body like Endocrine System, Immune System, Neurological System. Hence, the problems occur in this part of body like migraines and visual problems can be influenced by indigo.

Among the six studied interior architectural books, Mahnke and Mahnke (1993) introduce indigo as the cold color that can cause melancholic, depressing, frightening atmosphere and Meerwein et al. (2007) determine this color deep, closing and powerful color that can present the sense of burdensome sometimes. In color therapy viewpoint, this color can aid brow chakra to achieve intellect, wisdom and

consciousness and heal the doubt, envy, forgetting, the issues related to under activity of the brow chakra. According to Andrews, the complement color of the indigo is soft orange that applied to heal the over active chakra and its issues; fears, over sensitivity, impatience and belittling others.

Indigo can be retreating, watery on the floors, cold, foreign and distanced on the walls, and heavy and cramped on the ceiling. This color is nowhere suggested by the interior architectural references for the healing environments, as it is a dark and deep color. However, this color can be useful for the sixth chakra`s problems. Therefore, it can be used in small amounts, for floor covering of some spaces to heal sixth chakra`s related problems with respect of design considerations.

4.7 Color Violet and Seven Chakra

This color is the secondary color in the color wheel, which is a complement of yellow. This color is not mentioned in interior architectural references in aspect of physiological effects on human. Although, while color therapy references considers this color as the color of the last chakra, crown chakra and its relative parts of body. This chakra governs body skeleton, Central nervous system and problems in this chakra can cause Cataract, Brain disorder, Meningitis, Neurology pain. Violet can be a helpful color for these problems.

Psychologically, interior architectural references consider symbolic meaning for this color like majesty. Mahnke and Mahnke (1993) know this color as indicator of the loneliness, degenerating and mourning. Color therapy knows this color as the healer for the sense of negative self-image, shame and lack of tenderness. This color encourages people to live in present time and integrate with the universe. If this chakra

become over active it can cause needing sympathy and popularity that can be healed by complement color yellow.

Violet is avoided in healing environments as it is related to loneliness and fear. This color can be valuable and majestic on the floor, mystical, artificial on the walls, and mysterious on the ceiling. However, light violet can play different role on the surfaces and change the atmosphere. On the floor, it can be bottomless, charming. On the walls, fragrant and flowery and on the ceiling delicate and scented. Therefore, it can be applied in this shade. Furthermore, violet is the color of seventh chakra and can heal the underactivity of this chakra. Moreover, it can be helpful for the overactive third chakra. In this regard, it can be applied to the spaces that specialized for the patients with these issues.

The main rule in color therapy is adding color of chakra for underactive ones and its complement for overactive ones. Colors can be applied to the space elements of patient rooms based on diagnosing the problem of the chakra. For example, warm colors such as red, orange and yellow, as the colors of three lower chakras should be applied in the case of under activity and as the complements of three upper chakras should be applied to overactive upper chakras. Some patient's room in the healing environments can be designed by these schemes to specialize for the patients with underactive lower chakras problems or overactive upper chakras. In addition, some patient's rooms can be designed by green, blue, indigo and violet for the patients, which have over active lower chakras or under active upper chakras as these colors are the colors of four upper chakras.

According to the achieved results during this thesis, colors can be a useful treatment for various disorders and illnesses. Although some of the healing specifications of the color is known and employed by interior architects, it seems that some potential are still unknown for them. During this research, other potentials of color are derived from the color therapy documents. Based on knowledge of color therapy and evaluation throughout this research, it is understood that the therapeutic specification of color can join the interior space elements to improve human health and wellbeing properly. Walls, ceiling and floor are the elements that can be covered by needed color for the human disorders and diseases.

Chapter 5

CONCLUSION AND RECOMMENDATION

Throughout current investigation, based on derived information from design and color therapy documents it is found that color has powerful influences on human not only visual effect but also vibrational. It can improve their health or exacerbate their physical and psychological disorders regarding to the body needs. Based on color therapy knowledge Chakras as the basic elements of color therapy have their own particular colors. Therefore, surrounding colors can affect the chakras and consequently human body and psyche. In this perspective, each physical or psychological issue can be a symptom of the unbalance chakras and it explores the need for one or more colors. In this way, it can be a clue to color selection for the coloring system of interior spaces.

Due to the long time humans spend in indoor spaces, color can affect them strongly; therefore, interiors should be supplied carefully and based on user's physical and psychological requirements.

Architectural documents have studied color as the design element and made many schemes for different interiors. However, they ignored many problems and illnesses that can be healed by colors. Interior architectural documents have less consideration about the therapeutic role of color in environments. In the other hand, color therapy considers this specifications and mentioned different hues matched with those colors.

Colors are used for different surfaces in the interior space as the vast amount of colors surrounding human thus can act as the healer or problem maker. Hence, unconscious use of color in interior spaces can create some problem for the users of any kind of spaces. Interior architects and designers should be aware of different effects of color and apply it consciously. Due to the findings of this research, applying colors based on color therapy can cover some of the missing parts of information about related illnesses. Accordingly, the logical conclusion can be applying colors based on both attitudes; Color therapy and interior architecture to coordinate the space.

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APPENDICES

Appendix A: Seven Chakra's Association

Table 11. First Chakra's Associations (Author)

Associated body parts	Spinal column Legs & Feet Testis Pelvis Rectum Kidneys
Associated system & glands	Circulatory system Reproductive system
Positive qualities	Acceptance Compassion Connection
Physiological issues	Constipation Colitis Sciatica Hemorrhoids Tight hamstrings
Psychological issues Overactive chakra	Physically Aggressive & Belligerent impulsive Inability to recognize limits Obsessively sexual Hyperactive Reckless
Psychological issues Underactive chakra	Fear Unsafety Self-Preservation Manipulative Overly cautious Power conscious Possessive Needing approval Craving excitement change but refusing to act upon it Overly tired No energy to do what you want. Reactiveness Aggression & belligerence

Table 12. Second Chakra`s Associations (Author)

Associated body parts	Sexual organs Large intestines Bladder Pelvis Quadriceps
Associated system & glands	Adrenal glands Reproductive system and sexuality The entire muscular system Blood, saliva, urine, mucous, lymph
Positive quality	Center influences sensation and emotion Desire Pleasure Sexuality
Physiological issues	Sexuality transmitted disease Menstrual pain Cystitis Infertility and/or impotence
Psychological issues Overactive chakra	Violations Including premature toilet training Improper use of enemas Shaming of the body and /or sexuality Abortion, rape, incest, or sexual abuse Selfish Arrogant Lustful Overly proud or conceited High-strung emotionally Constant power-seeking.
Psychological issues Underactive chakra	Mistrust of others Introversion Inability to show emotions Worrying what others think, Being anti-social Following the crowd

Table 13. Third Chakra`s Associations (Author)

Associated body parts	The solar plexus area The stomach The liver The gall bladder Of the left hemisphere of the brain Pancreas Upper intestines
Associated system & glands	The digestive system The adrenals
Positive quality	Physical strength Energy Endurance Personal power Self-understanding to self-acceptance
Physiological issues	Crippling diseases Ulcers Intestinal problems Psychosomatic diseases
Psychological issues Overactive chakra	Judgmental and critical Mentally bullying Absolutist in attitude Always planning and never manifesting, Stubborn Needing constant change/variety Hypersensitive to disapproval without reaction or too much reaction
Psychological issues Underactive chakra	Feeling deprived of recognition Aloof Feeling isolated Afraid to learn the new Psychosomatic problems Distrustful Senseless

Table 14. Forth Chakra`s Associations (Author)

Associated body parts	Heart Lungs Breasts
Associated system & glands	Thymus gland The entire immune system Pulmonary activities Circulatory system
Positive quality	Mediates and balances the activities of the other chakras Ability to see the deeper forces in plants and animals Knowledge of the sentiments and true dispositions of others
Physiological issues	The assimilation of nutrients Childhood diseases and related immune system Activities of tissue regeneration
Psychological issues Overactive chakra	Angry Jealous Blaming others Miserly and stingy Overconfident Allowing oneself to be walked on and taken advantage of
Psychological issues Underactive chakra	Needing constant confirmation of self-worth, uncertain Unable to enforce will Possessive Self-doubting Feeling unloved Lacking compassion

Table 15. Fifth Chakra`s Associations (Author)

Associated body parts	Throat Esophagus Mouth & jaw Teeth The thyroid Pharynx Larynx The functions of the bronchia The entire vocal apparatus The functions of the right hemisphere of the brain
Associated glands & systems	The parathyroid glands Respiratory system
Positive quality	The creative functions of the mind Clairaudience & manifesting greater abundance, Survey the thoughts of others (telepathy) Inner consciousness
Physiological issues	Thyroid issues TMJ (temporomandibular joint) Laryngitis Goiter Stiffness in the neck
Psychological issues Overactive chakra	Domineering, dogmatic Fanatical Over-reacting Speaks negatively/harshly Clings to tradition Hyperactive
Psychological issues Underactive chakra	Surrenders to others Resists change Melancholy Slow to respond Stubborn

Table 16. Sixth Chakra's Associations (Author)

Associated body parts	Eyes Ears The face in general
Associated glands & systems	Brain Neurological system Pineal gland Sinuses Pituitary Endocrine system Immune system Synapses of the brain Hemispheres of the brain
Positive quality	Consciousness Deeper vision Wisdom Intuition and inner knowledge Intellect
Physiological issues	Migraines Visual problems Insomnia Sinusitis
Psychological issues Overactive chakra	Worrying Fearful Oversensitive Impatient Belittling the behaviors of others Spaced out
Psychological issues Underactive chakra	Doubting Envious of other's talents Forgetful Superstitious Fearful Worrying

Table 17. Seventh Chakra`s Associations (Author)

Associated body parts	The skin Body skeleton All nerve pathways The electrical synapses within the body The medulla oblongata
Associated system & glands	Central nervous system Pineal gland The muscular system
Positive quality	Living in present Integrated by divinity and creator
Physiological issues	Cataract Brain disorder Sciatica Meningitis Neurology pain
Psychological issues Overactive chakra	Intensely erotic imagination Needing to feel popular and indispensable Needing sympathy
Psychological issues Underactive chakra	Misunderstood Shame Self-denial Negative self-image Lacking tenderness

Appendix B: Color Physiological Associations

Table 18. Color Physiological Associations (Author)

Colors	Physiological association					
	Ladau, Smith & Place 1989	Mahnke & Mahnke 1993	Miller 1997	Pile 1997	Meerwein, Rodeck & Mahnke 2007	Nielson & Taylor 2011
Red	Speed up: Heart rate Respiration rate Blood pressure	Raise blood pressure	-	-	-	-
Orange	-	-	-	-	-	-
Yellow	-	-	-	-	-	-
Green	Fertility	Blood healer Nurturing	-	-	-	-
Blue	Reduce: Pulse Respiration rate Blood pressure	Blood pressure Nervous disorder Headache Bleeding Open wound	-	-	-	-
Indigo	-	-	-	-	-	-
Violet	-	-	-	-	-	-

Appendix C: Chakras Physiological Associations

Table 19. Chakras` Physiological Associations (Author)

Chakras	Parts of body	Physiological problems
Chakra 1: Root; Red	Spinal column Legs & Feet Testis Pelvis Rectum Circulatory system Reproductive system	Constipation Colitis Sciatica Hemorrhoids Tight hamstrings
Chakra 2: Sacral; Orange	Sexual organs Large intestines Bladder The muscular system Lymph Urine Eliminating system Kidneys Pancreas Spleen	Sexuality transmitted disease (STD's) Menstrual pain Infertility and/or impotence Cystitis
Chakra 3: Solar plexus; Yellow	The solar plexus area The stomach The liver The gall bladder The left hemisphere of the brain Pancreas Upper intestines The digestive system The adrenals	Crippling diseases Ulcers Intestinal problems Psychosomatic diseases
Chakra 4: Hearth; Green	Heart, Longs, Breasts Thymus gland The entire immune system Pulmonary activities Circulatory system	The assimilation of nutrients Childhood diseases and related immune system Activities of tissue regeneration
Chakra 5: Throat; Blue	Throat, The thyroid, Vocal apparatus Esophagus Mouth, Jaw & Teeth Pharynx Larynx Bronchia The right hemisphere of the brain The parathyroid glands Respiratory system	Thyroid issues Goiter TMJ: (Temporomandibular Joint) Laryngitis Stiffness in the neck
Chakra 6: Brow; Indigo	Eyes, Ears & The Face In General Neurological System, Synapses Of The Brain, Hemispheres Of The Brain Pineal Gland Sinuses Pituitary Endocrine System Immune System	Migraines Visual problems Insomnia Sinusitis
Chakra 7: Crown; Violet	The skin Body skeleton All nerve pathways The electrical synapses within the body The medulla oblongata Central nervous system Pineal gland The muscular system	Cataract Brain disorder Sciatica Meningitis Neurology pain

Appendix D: Color Psychological Associations

Table 20. Color Psychological Associations (Author)

Colors	Psychological association						
	Ladau, Smith & Place 1989		Mahnke & Mahnke 1993	Miller 1997	Pile 1997	Meerwein, Rodeck & Mahnke 2007	Nielson & Taylor 2011
	Positive	Negative					
Red	Excitement Richness Royalty Love Sex	Blushing Adultery Prostitution Revolution Devil Blood	Aggressive Advancing color Blood reminder	Stimulating Exciting Strength Passion	Excitement Heat Intensity Force Fire Danger	Festive Majestic Dominant Obscuring Burdensome	Danger Passion Love Excitement Stimulus Consciousness
Orange	-	-	Emotion expression Warmth Verbal emotion expression Encourage	-	Excitement Intensity Happiness	Arousing to Irritating Provocative Garish Shining Warming to Heated Aggressive Exciting	Friendliness Warmth Celebration Clarity
Yellow	Expansive Cheerful Sun Serenity Warmth	Cowardice Fever Shame Contempt	Optimism Clarity Intellect (Bright)Mood enhancing	Sunny Cheerful High spirited Happy Expansive (Saturated) Most aggressive	Happy Cheer Light Mild stimulation Sunlight Activity	Not resonant Motorically arousing Arousing to Irritating Shining	Cheerful Optimism Sunshine Springtime Renewal Intensity Demanding Revealing Warmth Intellect Stimulation
Green	Relaxing Retiring Refreshing Tranquil Natural	Quiet Restful Nature Tranquility Freshness	Healing Retiring Relaxing Tranquil Refreshing Quiet Natural Tiresome Guilt	Witchcraft Illness Jealousy	Pleasant Calming Natural Restful Cheerful Stability	Natural Safe Circumscribing Closing Oppressive	Nature Calmness Friendliness Integrity Practicality Frankness
Blue	Calming Sky Water Eye	Blue mood Depression Illness	Relaxing Serenity Loyalty	Calming Restful Cool Comfortable Sober Contemplative Dignity Poise Reserve	Calming Relaxing	Retreating Watery Cold Foreign Distanced Heavy Carped	Loyalty Honesty Integrity Royalty Sincerity Conservatism Safety Peacefulness Kindness Compassion
Indigo	-	-	Cold Frightening Depressing Melancholy	-	-	Deeping Bottomless Claustrophobic Distanced Cooling Burdensome Powerful	-
Violet	-	-	Delicacy Richness Unsettling Degenerating Disconcerting Subduing Mourning	Wealth Majesty Dignified Exclusive Lonely Mournful Pompous	-	Valuable Majestic Mystical Artificial Mysterious	-

Appendix E: Chakras` Psychological Associations

Table 21. Chakras Psychological Associations (Author)

Chakras	Positive quality	Overactive Psychological chakra issues	Underactive Psychological chakra association
Chakra 1: Root; Red	Acceptance Compassion Connection	Physically aggressive Belligerent Impulsive Inability to recognize limits Obsessively sexual Hyperactive	Fear & Unsafety Self-Preservation Manipulative Overly cautious Possessive Needing approval Craving excitement change but refusing to act upon it Overly tired, without energy Reactiveness
Chakra 2: Sacral; Orange	Sensation Emotion Desire Pleasure Sexuality	Selfish Arrogant Lustful Overly proud or conceited High-strung emotionally Constant power-seeking	Mistrustful of others Introverted Unable to show emotions Worrying what others think Anti-social Follows the crowd
Chakra 3: Solar plexus; Yellow	Physical strength Energy Endurance Personal power Self-understanding To Self-acceptance	Judgmental and critical Mentally bullying Absolutist in attitude stubborn Always planning and never manifesting Needing constant change/variety Hypersensitive to disapproval without reaction or too much reaction	Feeling deprived of recognition Aloof Feeling isolated Afraid to learn new things Psychosomatic problems Distrustful Senseless
Chakra 4: Hearth; Green	Mediates and balances the activities of the other chakras Ability to see the deeper forces in plants and animals Knowledge of the sentiments and true dispositions of others	Angry Jealous Blaming others Miserly and stingy Overconfident Allowing oneself to be walked on and taken advantage of.	Needing constant confirmation of self-worth Uncertain Unable to enforce will Possessive Self-doubting Feeling unloved Lacking compassion
Chakra 5: Throat; Blue	The creative functions of the mind Clairaudience Telepathy Inner consciousness	Domineering Dogmatic Fanatical Over-reacting Speaks negatively/harshly Clings to tradition Hyperactive	Surrenders to others Resists change Melancholy Slow to respond Stubborn
Chakra 6: Brow; Indigo	Consciousness Deeper vision Wisdom Intuition and inner knowledge Intellect	Worrying Fearful Oversensitive Impatient Belittling the behaviors of others Spaced out	Doubting, envious of other's talents Forgetful Superstitious Fearful Worrying
Chakra 7: Crown; Violet	Living in present Integrated by divinity and creator	Intensely erotic imagination Needing to feel popular and indispensable Needing sympathy	Misunderstood Shame Self-denial Negative self-image Lacking tenderness

Appendix F: Psychological Color Associations in Color Therapy and Interior Architecture

Table 22. Psychological Color Associations in Color Therapy and Interior Architecture (Author)

Color & Chakra	Physiological association of color in interior architectural documents						Physiological association of color in Color Therapy documents	
	Ladau, Smith & Place 1989	Mahnke & Mahnke 1993	Miller 1997	Pile 1997	Meerwein, Rodck & mahnke 2007	Nielson & Taylor 2011	Parts of body	Physiological problems
Red First chakra: Root	Speed up: Heart rate Respiration rate Blood pressure	Raise Blood pressure	-	-	-	-	Spinal column, Legs & Feet Pelvis Testis Rectum Kidneys Circulatory system Reproductive system	Sciatica Tight hamstrings Constipation Colitis Hemorrhoids
Orange Second Chakra: Sacral	-	-	-	-	-	-	Sexual organs Large intestines Kidneys, Bladder Lymph, Urine, Eliminating system The muscular system Pancreas Spleen	Sexuality transmitted disease (STD's) Menstrual pain Infertility and/or impotence Cystitis
Yellow Third Chakra: Solar poleaxe	-	-	-	-	-	-	The solar plexus area The stomach The liver The gall-bladder The left hemisphere of the brain Pancreas Upper intestines The digestive system The adrenals	Crippling diseases Ulcers Intestinal problems Psychosomatic diseases
Green Chakra 4: Hearth	Fertility	Blood healer Nurturing	-	-	-	-	Heart, Longs , Breasts Circulatory system Pulmonary activities Thymus gland The entire immune system	The assimilation of nutrients Activities of tissue regeneration Childhood diseases and related immune system
Blue Fifth chakra: Throat	Reduce: Pulse Blood pressure Respiration rate	Blood pressure Nervous disorder Headache Bleeding Open wound	-	-	-	-	Throat, The thyroid, Vocal apparatus Esophagus Mouth, Jaw & Teeth Pharynx Larynx Bronchia The right hemisphere of the brain The parathyroid glands Respiratory system	Thyroid issues Goiter TMJ: (Temporomandibular Joint) Stiffness in the neck Laryngitis
Indigo Sixth Chakra: Third eye	-	-	-	-	-	-	Eyes, Ears & The Face In General Sinuses Endocrine System ,Pineal Gland, Pituitary Immune System Neurological System Synapses Of The Brain Hemispheres Of The Brain	Migraines Visual problems Insomnia Sinusitis
Violet Seventh chakra: Crown	-	-	-	-	-	-	The skin Body skeleton All nerve pathways The electrical synapses within the body The medulla oblongata Central nervous system Pineal gland The muscular system	Cataract Brain disorder Sciatica Neurology pain Meningitis

Appendix G: Psychological Color Associations in Color Therapy and Interior Architecture

Table 23. Psychological Color Associations in Color Therapy and Interior Architecture (Author)

Color & Chakra	Psychological association In interior architectural documents							Psychological association In color therapy documents		
	Ladau, Smith, Place 1989		Mahnke & Mahnke 1993	Miller 1997	Pile 1997	Meerwein, Rodeck & Mahnke 2007	Nielson & Taylor 2011	Positive quality	Underactivity treatment: Chakras color	Over activity treatment: Complementary color
	Positive	Negative								
Red First chakra: Root	Excitement Richness Royalty Love Sex	Blushing Adultery Prostitution Revolution Devil Blood	Aggressive Advancing color Blood	Stimulating Exciting Strength Passion	Excitement Heat Intensity Force Fire Danger	Festive Majestic Dominant Obscuring Burdensome	Danger Passion Love Excitement Stimulus Consciousness	Acceptance Compassion Connection	Fear & Unsafety Self-Preservation Manipulative Overly cautious Possessive Needing approval Craving excitement change but refusing to act upon it Overly tired & No energy to do desires Reactivity	Physically aggressive Belligerent Impulsive Inability to recognize limits Obsessively sexual Hyperactive
Orange Second Chakra: Sacral	-	-	Emotion expression Warmth Verbal emotion expression Encourage	-	Excitement Intensity Happiness	Arousing to irritating Exciting Aggressive Provocative Garish Shining Warming to heated	Friendliness Warmth Celebration Clarity	Sensation Emotion Desire Pleasure Sexuality	Mistrustful of others Introverted Anti-social Unable to show emotions Worrying what others Think Follows the crowd	Selfish Arrogant Overly proud or conceited High-strung emotionally Constant power-seeking Lustful
Yellow Third Chakra: Solar poleaxe	Sun Warmth Cheerful Serenity Expansive	Cowardice Fever Shame Contempt	Optimism Clarity Intellect (Bright) mood enhancing	Sunny Cheerful High spirited Happy Expansive (Saturated) Most aggressive	Happy Cheer Light Mild stimulus Sunlight Activity	Not resonant Motorically arousing Arousing to irritating Shining	Cheerful Optimism Sunshine Springtime Renewal Intensity Demanding Revealing Warmth Intellect Stimulation	Physical strength Energy Endurance Personal power Self-understanding to Self-acceptance	Feeling deprived of recognition Aloof Feeling isolated Afraid to learn new things Psychosomatic problems Distrustful Senseless	Judgmental and critical Mentally bullying Absolutist in attitude stubborn Always planning and never manifesting Needing constant change/variety Hypersensitive to disapproval Without reaction or too much reaction
Green Chakra 4: Hearth	Restful Nature Tranquility Freshness	Witchcraft Illness Jealousy	Nurturing Healing Tiresome Guilt	Quiet Relaxing Retiring Refreshing Tranquil Natural	Pleasant Calming Natural Restful Cheerful Stability	Natural Safe Circumscribing Closing Oppressive	Nature Calmness Friendliness Integrity Practicality Frankness	Mediates and balances the activities of the other chakras Ability to see the deeper forces in plants and animals Knowledge of the sentiments and true dispositions of others	Needing constant confirmation of self-worth Uncertain Unable to enforce will Possessive Self-doubting Feeling unloved Lacking compassion	Angry Jealous Blaming others Miserly and stingy Overconfident Allowing oneself to be walked on and taken advantage of.
Blue Fifth chakra Throat	Calming Sky Water Eye	Blue mood Depression Illness	Relaxing Serenity Loyalty	Calming Restful Cool Comfortable Sober Contemplative Dignity Poise Reserve	Calming Relaxing	Retreating Watery Cold Foreign Distanced Heavy Carped	Loyalty Honesty Integrity Royalty Stimulation Sincerity Conservatism Safety Peacefulness Kindness Compassion	The creative functions of the mind Honesty Loyalty Clairaudience Telepathy Inner consciousness	Surrenders to others Resists change Melancholy Slow to respond Stubborn	Domineering Dogmatic Fanatical Over-reacting Speaks negatively/ harshly Clings to tradition Hyperactive
Indigo Sixth Chakra Third eye	-	-	Cold Frightening Depressing Melancholy	-	-	Deeping Bottomless Claustrophobic Distanced Cooling Burdensome Powerful	-	Consciousness Deeper vision Wisdom Intuition and inner knowledge Intellect	Doubting Envious of other's talents Forgetful Superstitious Fearful Worrying	Worrying Fearful Oversensitive Impatient Belittling the behaviors of others "spaced out "
Violet Seventh chakra Crown	-	-	Delicacy Richness Unsettling Degenerating Disconcerting Subduing Mourning	Wealth Majesty Dignified Pompous Exclusive Lonely Mournful	-	Valuable Majestic Mystical Artificial Mysterious	-	Living in present Integrated by divinity and creator	Misunderstood Shame Self-denial Negative self-image Lacking tenderness	Intensely erotic imagination Needing to feel popular and indispensable Needing sympathy