THE ROLE OF COLOURS IN THE HEALTH AND WELLBEING OF THE BUILT ENVIRONMENT IN THE TROPICS

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ABSTRACT

Colour is an important component of our built environment and without its presence; our environment would be dull and depressing. It plays a vital role in our built environment, especially in relation to the partially blind, infants, hospital patients and people who are for some reason or the other feel trapped and unhappy with their way of life. Colour should therefore be included in the consideration of sustainable development of buildings as an important social and environmental factor. A built environment that is attractive and contributes to the "feel good" experience of people should also be an important economic consideration for sustainable development. The aim of this study is to know the role colour plays in the health and wellbeing of the built environment. In order to achieve this, it became necessary to study the colour theory, properties of colour, expressive qualities of colour and the optical and emotional effects of colour. The study has, however, identified the influence, symbol and, the effects of colour on the health and well-being of the built environment. Suggestions and recommendations of appropriate colours for use in our environment to make it conducive for living have been made.

**Keywords**: Role, Colours, Health and Wellbeing, Built Environment.

INTRODUCTION

None of the visual elements gives us so much pleasure as colour. Many people have a favorite colour to which they are drawn. They will buy a shirt in that colour just for the pleasure of clothing themselves in it, or paint the walls of their rooms that colour for the pleasure of being surrounded by it. Various studies have shown that colour affects a wide range of psychological and physiological responses. Restaurants are often decorated in red, which is believed to increase appetite and therefore food consumption. Blue surroundings will significantly lower a person's blood pressure, pulse, and respiratory rate (Holzman, 2010). In one experiment subjects were asked to identify, by taste, ordinary mashed potatoes coloured bright green. Because of the disorienting colour cues, they could not say what they were eating. And, in one California detention centre, violent children are routinely kept in a 2.4m by 1.2m cell painted bubble gum pink. The children relax, become calmer, and often fall asleep within ten minutes. This colour has been dubbed "passive pink". The mechanism involved in these colour responses is still unclear, but there can be no doubt that colour "works" on the human brain and body in powerful ways. The essence of this study is therefore to seek to know the role of colours on the health and wellbeing of our built environment.

Colour Theory

Colour is a function of light. Without light there can be no colour. The principles of colour theory explain why this effect occurs. Much of our present – day colour theory can be traced

back to the experiments made by Sir Isaac Newton, who is better known for his work with the laws of gravity. In 166 Newton passed a ray of sunlight through a prism, a transparent glass form with non-parallel sides. He observed that the ray of sunlight broke up or refracted into different colour of the rainbow (fig. 1). By setting up a second prism, Newton found he could recombine the rainbow colours into white light, like the original sunlight. These experiments proved that colours are actually components of light.
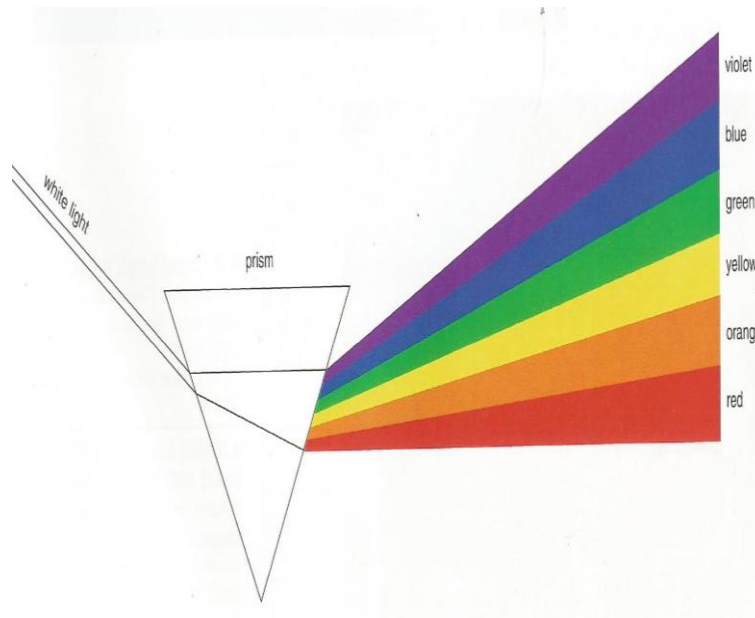
Figure 1: Separation of White Light

Figure 2: Colour Wheel

All colours are dependent on light, and no object possesses colour intrinsically. Someone may own a red shirt and a blue pen and a purple chair, but these items have no colour in and of themselves. What we perceive as colour is reflected light rays. When light strikes the red shirt, for example, the shirt absorbs all the colour rays except the red ones, which are reflected, so the person's eye perceive red. The purple chair reflects the purple rays and absorbs all the others, and so on. Both the physiological activity of the human eye and the science of electromagnetic wavelengths take part in this process.

If the colour separated out by Newton's Prism – red, orange yellow, green, blue and violet – are taken and the transitional colour red – violet (which does not exist in the rainbow) added, and arranged in a circle, a colour wheel (fig. 2) will be the result. Different theorists here constructed different colour wheels, but the one shown here is fairly standard.

Properties of Colour

Any colour has three properties. They are called hue, value and intensity. Hue is the name of the colour according to the categories of the colour wheel – green or red or violet blue. Value refers to the relative lightness or darkness of an object, which is a function of the amount of light reflected from its surface. Gray is darker in value than white, but lighter in value than black. Most colours are recognizable in a full range of values; for instance, everything from palest pink to darkest maroon is identified as "red." In addition, all hues have what is known as a normal value the value at which that hue is expected to be found. Yellow is thought of as a "light" colour and violet as a "dark" colour even though each has a full range of values.

A colour lighter than the hue's normal value is known as a tint; for example, pink is a tint of red. A colour darker than the hue's normal value is called a shade; maroon is a shade of red. Intensity, also called chroma or saturation, refers to the relative brightness or dullness of a colour. Colours may be pure and saturated, as they appear on the colour wheel, or they may be grayed and softened to some degree. The purest colours are said to have high intensity; grayer colours, lower intensity. There are four methods of changing the intensity of colours. The first is to add white. Adding white to pure red creates light red or pink, which is lighter than in value   and less intense. If black is added, the result is darker in value and less intense. If gray of the same value as the red is added the result is less intense but retains the same value. The fourth way of changing a colour's intensity is to add its complementary hue. For example, when green (a secondary colour composed of the primaries yellow and blue) is added to red gray is produced as a consequence of the balance between the three primaries. If red is the dominant colour in the mixture, the result is a grayish red; if green is dominant, the product is a grayish green. In any event, the result is a colour less intense and more neutral than the original.

Light and Pigment

Colours behave differently depending on whether an artist is working with light or pigment (Getlein, 2002). In light, as Newton's experiments showed, white is the sum of all colours. Artists who work directly with light – as lighting designers who illuminate settings for film, theater, or video productions - learn to mix colour by an additive process, in which colours of light mix to produce still lighter colours. For example, red and green light mix to produce yellow light. If blue light is added to the mix the result is white. Thus red, green, and blue form the lighting designer's primary triad.

Pigments, like any other object in the world, have the colour that they reflect. A red pigment, for example, absorbs all the colours in the spectrum except red. When pigments of different hues are mixed, the resulting colour is darker and duller, because together they absorb still more colours from the spectrum. Mixing pigments is thus known as a **subtractive process**. The closer two pigments are to being complementary colours on the colour wheel, the duller their mixture will appear, for the more they will subtract each other from the mix. For example, while red and green light mix to produce yellow light, red and green pigment mix to produce a greyish brown or brownish grey pigment.

Expressive Qualities of Colour

Just as lines and shape have expressive qualities, so too do colours. Artists select colours for their effect. Certain ones appear to have intrinsic qualities. Bright or warm colours convey a feeling of gaiety and happiness. Red, orange and yellow are generally considered warm, perhaps because of their associations with fire and the sun, (Adams, 1999). It has been verified by psychological tests that the colour red tends to produce feeling of happiness. Blue and any other hue containing blue – green, violet, and blue – green – are considered cool, possibly because of their association with the sky and water. They produce feelings of sadness and pessimism.

Colours also have symbolic significance and suggest abstract qualities. A single colour, such as red, can have multiple meanings. It can symbolize danger, as when one waves a red flag in front of a bull or traffic light showing red. But, to "roll out the red carpet" means to welcome someone in an extravagant way, and we speak of a "red letter day" when something particularly exciting has occurred. Yellow can be associated with cowardice, white with purity, and purple with luzury, wealth and royalty. We might call people "green with envy," "purple with rage," or "in a brown study" if they are quietly gloomy (Adams, 1999).

Colour and the Built Environment

Both indoor and outdoor of buildings in any community, school, place of work, sports arena, transport and in urban and rural areas are very important factors, contributing to how people feel about their health and wellbeing. It is recognized as an important mark of quality in the Code for Sustainable Homes in the UK. The US building environment assessment method – Leadership in Energy and Environmental Design (LEED) encompasses the issues in the environmental criteria that would contribute to the health and wellbeing of people working and living in their building environment. One of the factors that can contribute to how people feel about their environment – contributing to the perception of health and wellbeing is colour, and this has not been easily addressed in any of the national environmental assessment methods for buildings.

Colour is a vital perceptual property, and plays in important role in the environment within which we live, work and play. It can cause a dramatic effect in changing and improving the aesthetic appeal of particular areas (Porter, 1976). The building surface affects how the building is perceived, whether colour is used in school classrooms, hospital wards and waiting rooms, children's play areas, sports and entertainment arena, danger / emergency zones, storage sheds in our garden or for making our space boundary such as in fencing. The colours used in the design décor can affect our perceptions of the environment that surrounds us. The colours chosen in these areas can have an inspirational uplifting effect or conversely,

they can create drab unwelcoming situations. Colour is also used to mark our identity in many situations: as in business, a company's brand or to reflect our own personalities.

The wide application of colour may make it seem a complex phenomenon (Albers, 1963). Its presence in the physical environment generates sensations and excitement. There is a relationship between man, the environment and colour: the human society would look uninteresting and formless if the physical environment and everything in it was colourless. Our built environment should not be experienced as a lifeless achromatic environment. Instead, it should be transformed and enhanced by colour and light, with various degrees of shadows, such that we are engaged, comforted, enchanted or simply supported by an unconscious backdrop of the environment which we occupy. People interact with the built environment via various aspects, as a viewer (the person looking at an environment) and the participant (the person entering the environment (Mahnke, 1996). Colour can accentuate particular aspects or act as a pleasing background to greet and comfort the participant and can be an important part of a child's / person's development throughout life (Birven, 1978).

Colour can influence how people interpret and experience space or recognize particular places. A careful use of colour could help minimize energy use for lighting. The designers and architects can affect occupants' perception of containment, space ownership, mood, expansion and emotion as part of their design by using suitable colour deco. Colour is also important for the beautification of urban areas (Ojo and Kayode, 2006).

Lighting and colour can have an effect on people's mood and health. Research in the past decade has confirmed that the blue light can have an effect on human circadian rhythm and that an out – of – phase circadian rhythms would be a health hazard (Holzman, 2010). A growing body of evidence suggests that a de – synchronization of circadian rhythms may play a role in various tumoral diseases, diabetes, obesity and depression. In 2007, the World Health Organization (WHO) announced that female shift workers may be at risk to breast cancer, and on that basis, in 2009, the Danish government compensated some female shift workers suffering from breast cancer. Also, bright white light was repeated being shown to have the power to mitigate depression and other maladies of mood, whereas blue light may be particularly potent for such applications. Blue also proved to be powerful in elevating body temperature and heart beat rate and in reducing sleepiness. However, increasing the blue portion of artificial light may improve performance and learning ability in school children and employees working indoors, and improve the health of patients staying at nursing homes or hospitals.

Optical Effects of Colour

Certain uses and combinations of colours can "play tricks" on our eyes or, more accurately, on the way we perceive colours registered by our eyes. There is the phenomenon known as **simultaneous contrast.** If two complementary colours are placed next to each other, both of them will seem more brilliant: red seems redder, green greener; and so forth. Every painter quickly discovers that colour is relative, and that our perception of any one colour is influenced by the colours around it.

Some colours seem to "advance", others "recede". If a bright red chair is placed in a room, it will seem larger and farther forward than the same chair upholstered in beige or pale blue. Thus, colour can dramatically influence our perceptions of space and size. Generality, colours that create the illusion of large size and advancing are those with the warmer hues

(red, orange, yellow), high intensity, and dark value; small size and receding are suggested by colours with cooler hues (blue, green), low intensity, and light value.

Colours can be mixed in light or pigment, but they can also be mixed by the eyes. When small patches of different colours are close together, the eye may blend them to produce a new colour: This is called **optical colour mixture.** . Most artists blend their colours, either on a palette or on the canvas itself, to produce gradations of hue.

Emotional Effects of Colour

Colour affects us on such a basic level that few would argue that there is a direct emotional response to it. The problem comes when one tries to find universal principles, for it will be quickly discovered that emotional responses to colour are both culturally conditioned and intensely personal. For most people brought up in America, red and green have strong cultural associations with Christmas. Van Gogh once made a painting of a café interior that juxtaposed red and green in order to suggest an environment so tense that men might go mad or be driven to commit a crime (Getlein, 2002).

Most colours could elicit a similar variety of response. For the German painter, Franz Marc, blue was the colour of male spirituality. As the colour of the sky and the ocean, blue is often associated with freedom. It is a "cool" colour and has been shown to have a calming effect. In the English language, blue is linked with sadness. In India, blue is the colour of the god Vishnu, the god of order and stability, but it is also associated with the dark and disturbing power of the goddess Kali (Getlein, 2002).

CONCLUSION

Choosing appropriate colours is an important issue in everyday life. It may be a commonly held belief that selection of colour is a matter of personal taste and that colours do not directly affect our lives. Thus, when colour for a public space is chosen it is done as a matter of individual taste end preference of the designer and not the basis of professional knowledge. However, colour has a profound effect on our visual, emotional and mental conditions which means colour is important to our quality of life, mental health and to product marketing strategies.

Using colour in environments can create happiness only when colour is used correctly with a due regard to the role or function for that particular environment. For example, strong colours should be used only when they are to be observed for very brief periods; in lager spaces, softer and more subdued colour should be used, so that the background would not be too obtrusive to the observers and the occupants.

Our houses, schools and workplaces too often utilize colours which do not provide sufficient or adequate stimulations for the intended occupants. On the other hand, in urban environment, too many colours in neon sign and advertising hoardings would destroy unification and harmony for those who use the space for shopping, leisure enjoyment or meeting friends.

Colour should therefore be included in the consideration of sustainable development of buildings as an important social and environmental factor. A built environment that is attractive and contributes to the "feel good" experience of people should also be an important

economic consideration for sustainable development. More research is recommended on the subject, but also noting the import of colour pollution, our perception of wellbeing as well as the positive role of colour in our built environment.

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