Colour and Light as Identity and Cultural Diversity: - deliberate applications of colour and light in varied environments and cultures

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ABSTRACT
The range of colours and the characteristic of light represent specific environments and cultures. They change the perception of each place and season, day of the year, hour of the day and moment. Colour and light in architecture illustrate a particular approach and an individual interpretation that benefit our experience, wellbeing, health, energy consumption and addresses ecological issues.
Psychological and physiological aspects of colour and light form the core of this study. Atmosphere created by the deliberate use of colour and light as well as adaptation to different situations and conditions distinguishes historical periods and contemporary trends. The study proves that evolution and innovation in applying light and colour in architecture are associated with artistic and scientific achievements.

Keywords: Culture, Environment, Identity, Interpretation, Perception.

1. PSYCHOLOGICAL AND PHYSIOLOGICAL ASPECTS OF COLOUR AND LIGHT
Although light can be measured in numbers and scaled the measurement is neither reliable nor fully comparative to our senses. Colour is inherent to life. It is a language which expresses our health, happiness and survival or extinction. Colour is used to attract, camouflage and ward off danger. We are affected by colour physically, mentally and emotionally. Colour works on a deeper level by changing our moods and perceptions. It has been employed in rituals since ancient times to represent birth, death and renewal the world over. Light turns places into a celebration of time, weather and seasons. Colour and light communicate with an extraordinary immediacy what words can never express (Figs.1-2).

Colour and light dominate our perception in all environments, but few realize this although this is what impacts our mind, bodies and spirit – what we absorb and feel. Our bodies are energized and stimulated by certain kinds of light and colours and relaxed or calmed by others. We are instinctively attracted to certain colours; sometimes the attraction is fleeting or the colour can remain a favourite for a long time. It can follow short time trends, specific styles, local limitations or integration and harmony with the environment or the opposite.

The colours of architecture are strongly linked to local colours and general influences. By introducing colours that do not harmonize with the surroundings we improve or detract from the energy of a place. Colour can be very effective in remedying imbalances by introducing complementary colour energies to restore contentment, stimulate or dampen
energy. The colour of light acts as a filter which allows the adjustment of our perception of architecture. Colours are linked to vibrations, materials and aromas. Our experiences of different smells and scents are associated with colours - a well-considered application of colour can certainly enhance the experience of architecture. The architectural application of colour creates a specific atmosphere that influences people’s behaviour. In stressful times, illness or depression they can help us to take care of physical, emotional and mental health and wellbeing.

Daylight connects occupants to the outdoors, saves energy and creates a more pleasant environment. Dramatic aesthetic effects are possible, but the basic need is to provide the maximum penetration of daylight into the building while ensuring that it will work avoiding undesirable heat gains, glare, veiling reflections and unwanted shadows. Research has proved that human behaviour and physiology are dominated by 24-hour light-dark cycles. The environmental time has a significant impact on our wellbeing and health as discussed by Patel [1]. Natural light lifts spirits, makes spaces appear larger and reveals our world in its true colours.

2. RITUALS AND SYMBOLS

Light and colour have significant meaning – in particular the colours of day and night in combination with the seasons. Our ancestors were able to hunt and protect themselves better during the day so the red earth and the yellow sun came to symbolize life. Darkness was frightening and dangerous so black was associated with death while the blue-black of night related to quiet and passivity. The four elements of Earth, Air, Fire and Water were given colours of yellow, black, red and white respectively.

In contemporary urban societies we have come to distinguish between many shades of grey, but for other societies certain colours acquired particular importance; the Inuit inhabiting the Arctic perceive many shades of white while the Maori inhabiting New Zealand distinguish between many hues of red as stated by Chiazzari [2]. Colour may symbolize peace, truth and cooperation (as can be seen in the flag of the United Nations and the European Union) or represent the local/regional fabric/materials such as the blue and turquoise glazes of the ceramics covering Islamic mosques.
Social status and respect were marked by colours. Purple was associated with spiritual authority and royalty (priests, emperors and kings) as in the past only the wealthiest could afford the expensive dyes. White is associated with innocence and purity. The ancient temple of Athena was built using white marble – white signifies virginity and was transferred to white dresses of brides, but is also the colour of death in Imperial Rome, China and India although black is traditionally associated with death. In Chinese and Japanese tradition orange is the colour of love and happiness but the orange of Buddhist monks is associated with modesty. Yellow represents life and truth in Christian and Hindu tradition.

3. HISTORY OF ARCHITECTURE AND PRINCIPLES OF LIGHT

Vitruvius [3] restricts comments on light to brief remarks on its functional value. Light remains an isolated entity in classical antiquity. Zevi [4] describes ancient Greek architecture as the play of light on volumes. In ancient Roman architecture light similarly plays on volumes and inside space is isolated – no relationship to exterior space is purposely established. The architecture of light articulates boundaries rather than viewing light as an architectural form. The definition of space relies on the articulation of volume, fabric and surface. Classical antiquity is described as the tradition of static and isolated space although the Pantheon in Rome – being part of the antiquity – has its own significance. The illumination of its dome – described by Fletcher [5] as the curved canopy of heaven – passes on one oculus at the top. This method of bringing light into the interior space produces the most impressive result of a single light source connecting the interior with the exterior. The hue/tint and density of light communicates the time of the day, the weather and seasonal changes. The natural light dematerializes mass and form exposing symbolic values. Van Rensburg [6] writes about the poetry of light. In Byzantine and Romanesque the internal and exterior spaces of Christian churches are separated. Light becomes the medium to achieve extraordinary effects of weightless and illusion. Mosaic surfaces catch the light and reflect it almost as if it emanates from inside them. Specifically in Byzantine architecture there is strong correlation between decoration and the application of light. The measurement of surface and volume and the study of optics were implemented and influenced the decoration of curved surfaces and lighting effects. The outstanding example of light in Byzantine-Romanesque architecture is the Hagia Sophia. Its interior is not lit by the sun but by the radiance generated within, soft reflections and the general impression that the dome is suspended. In the Byzantine period space was manipulated using light and shadow. The importance of light and its dynamics gave the highest priority to mosaics and overshadowed painting and frescoes. Mosaics could catch light and reflect light in a unique way. Light shimmered and moved across the mosaic surfaces creating a tectonic illusion with a divine dimension and metaphysical meaning. In Medieval times there were direct parallels between light and God who is perceived as light with divine character. The quality of the interior of the church refers to the ‘dematerialised’ walls that resulted from the invention of the flying buttress and is flooded with the coloured Gothic light of spiritual power. Gothic light is capable of exerting an influence equal to architectural form as well as connecting a visual and intellectual reality by bridging senses and the light of the mind. Gothic coloured stained glass (light) takes over from sculpture. The atmosphere becomes supernatural with a mysterious quality since light does not come from a single source, but affects every part of the interior.
In the Renaissance light was viewed as a scientific tool. Sources of natural light are positioned with a specific spatial intensity and architectural elements are illuminated with equal intensity that corresponds to the intellectual ideas of equality and liberty. Renaissance light can be interpreted through physical and rational principles capturing the naturalness and representing the understanding of illumination.

Baroque confidently interpreted and fused the previous theories of fissures between reason and sense, mind and world, and internal and external sources of light. A preoccupation with indirect light and the intentional effort to obscure or underplay the source distinguishes Baroque light from other kinds of light. It is manipulated to obtain a mystical dimension (instead of artificiality through colour like Gothic light) and illusionary effects. Light is not directed at walls and objects but into space. Its mystification and illusionary fusion does not rely only on the sensuous, but on a scientific approach proving that light can be quantified and controlled. It was used to anchor space geometrically, broke the static illumination, escaped from shadows and lit up the depth. The combination of solid light and diffused light resulted in vivid concepts.

4. EXPANDING VOCABULARY OF COLOUR AND LIGHT

‘The history of architecture is the history of man’s struggle for light - the history of the window’ (Mies van der Rohe). Currently, that struggle goes on in the new choices in technology and techniques that use direct, diffused or reflected daylight to provide general or supplemental lighting for interiors.

Moor [7] states that stained glass after reaching the pinnacle in the thirteenth century never again matched it. The much-loved but completely outdated technology became isolated and never really found support in Modernism despite F.L. Wright, C.R. Mackintosh and the Bauhaus. The architectural glass art technique has remained unchanged for more than a thousand years. Leaded glass (used for stained glass) evolved when glass could only be made in small panels. This required a structure to keep the stack erect. In the twentieth century a new architectural language of entire walls of glass - a seamless, frameless and weightless experience - was developed. Leaded glass has no place in this modern aesthetic. Float glass (a term for basically perfectly flat glass) was introduced in the late 1950s by which 90% of today’s perfectly flat glass is manufactured. The language of design and technology evolved and explorations of light and colour in architecture followed.

The transformation in architectural glass art that have been taking place over the past quarter century are new forms of expression that could start to rival renowned and iconic magical Medieval creations which can create an exciting world of colour and use glass as an extraordinary medium. New techniques, such as laminated, enamelled (screen printed) glass with film on it, reflect the changing spirit of the current time. Instead of using a simple matrix to reduce solar gain, photographs, drawings, graphics and varied images can be explored. Graduated tones can turn flat planes of a building into sinuous curves. Bands of coloured glass that reflect and transmit light may highlight skyscrapers.

Glass in architecture used to be applied to major external skin and in contemporary buildings is used for dividing walls, balustrades, elevators, desks and almost anything else. The enormous versatility of the medium is due to the easy addition of colour, patterns, textures, gradation of tones and other qualities. Glass, light and colour are a powerful combination that transforms interiors and has an impact on immediate surroundings through a feeling of weight-
less, modest and simple applications integrated into architecture. It is incredible how much can be achieved, how simply and at such relatively low cost in relation to impact by exploring light and colour and doing things to glass.

5. CONCLUSION

The principles of the use of light in an architectural period are similar to the guides of architectural space and form within that period. When analysing in visual terms it is fundamental to work on ratios regarding spatiality, atmosphere and visibility in relation to the function. The spatiality is defined by volume, distance, proportion and orientation. The presence of light changes perceptions of volume (huge/small or open/crowded). The atmosphere comprises the character related to the psychological mood created by light and influences our experience of space as private, public, cheerful or boring. Visibility is the possibility to see things when completing tasks – their shape/form, surface/texture, and colour. A typical classroom requires more visibility than a church where the atmosphere is the dominant factor consisting of the overall character related to the psychological mood that light creates. Lighting is dependent on its function. Strong contrast eases our interpretation and requires less detection from our brains (no room for ambiguity and doubt).

To describe light in space as a visual experience it is necessary to define the colour of light and colours, level of lightness and its spatial distribution of brightness, shadows and reflections as well as glare (Figs.3-4).

Science has been changing our perceptions and the aesthetic of colour and light in architecture. Colour and light play on intimacy, both aesthetically and emotionally, for the experience of the space and place. The colours of architectural materials behave according to their lighting. The reflection of light offers different visualizations. Emphasis must be placed on design in response to the local climate conditions, for reasons related to architectural expression, and the energy efficiency of light sources. The real challenge is to combine solid skills for incorporating colour and light into architectural experience with saving energy resources by stimulating our energy. Observing and
manipulating light in different contexts is necessary to possess a better understanding of physical characteristics and psychological aspects of light and colour in order to provide an appropriate environment for different users.

REFERENCES