Environmental Colour and Well-Being

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Abstract
Significance of colour schemes in appraisal of the urban aesthetic has been traditionally recognised by design professionals. However, the proven psychological and emotional impacts of urban colour remain overlooked in design thinking. This paper argues that health-conscious approach to environmental colour design requires consideration of phenomenological human needs in addition to aesthetic and stylistic preferences of a designer. A body of knowledge accumulated in environmental colour psychology provides a foundation for a shift in the environmental colour design. Though, some architectural critics suggest that design professionals have little understanding of how different aspects of colour psychology can be integrated in design process. Lack of an explicit design methodology has been described as a main constraint to applicability of the related knowledge in design process. Understanding the notion of environmental colour is essential in developing health-conscious approach to environmental colour design. Therefore, this paper is primarily focused on conceptualisation of environmental colour and experiential environmental colour design. Additionally, a role of environmental colour design in the delivery of health-enhancing environments and balanced sensorial experiences is briefly discussed.

Key words: health-conscious environmental design, environmental colour, environmental colour design, balanced sensorial stimulation, psychological well-being.

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Introduction

According to the World Health Organisation (WHO), the world is currently undergoing the largest wave of urban growth (EEA, 2009). The number of urban dwellers is growing by 60 million every year. People move to cities for different reasons, but generally with the expectation of a better quality of life. However, contemporary cities can deliver both positive and negative experiences. Current studies have revealed that unfavorable environmental conditions can cause stress or psychological overloading. Urban environments that are visually crowded, or extremely heterogeneous from the point of view of their image, can directly affect the way people perceive and navigate the urban space resulting in sensory overload for some individuals. People’s experience of the urban environment directly influences their emotional attachment to a location and ultimately satisfaction with the living conditions. The challenge for contemporary designers is to understand how the psychological experience could be designed to positively influence people’s perception of urban space, and contribute to their well-being. This allows a reflection on what could be a health-conscious approach to environmental design.

Colour as an integral element of city design significantly influences perceptions of the urban environments. Mankhe (1998) argues that colour design in a city delivers unique quality that cannot be obtained through any other means. Satisfaction with the visual qualities of the urban places has positive impact on the psychological well-being of people who use or visit these places.

The significance of colour schemes in appraisal of the urban aesthetic has traditionally been recognised by design professionals, but proven physio-psychological effects of colour remain neglected in design consideration (Mankhe, 1998; Porter & Mikkelides, 2009). At the same time, studies in environmental colour psychology have confirmed that obscure visual patterns and disharmonious colour schemes can cause visual disturbances, disorientation, stress or bad mood. In opposite, colour scenarios tailored to phenomenological human needs can stimulate
positive emotions, eliminate visual disorder, enhance social engagements and offset some detrimental impacts of city design (Mankhe, 1998; Nazar 1992; Bell 2001). Accordance to Day (2014), the relationship between urban forms, spaces and colour can be “life sapping” or “life-filled”.

Acknowledgment the psycho-physiological and emotional impact of colour in the built environment leads to revision of objectives in colour design which are often prioritise stylistic and personal designers’ preferences over appropriateness to a particular context. This paper argues that health-conscious approach to colour design in the contemporary cities requires consideration of phenomenological human needs in addition to aesthetic and stylistic preferences of a designer.

Understanding the notion of environmental colour is essential in developing a health-conscious approach to environmental colour design. Therefore, this paper is primarily focused on conceptualisation of environmental colour and experiential environmental colour design. The paper aims: (1) to elaborate a definition of “environmental colour” in the contemporary urban context; (2) to propose an alternative concept of “Environmental Colour Event”; and (3) to explain how the proposed concept can be integrated in design thinking. Additionally, a role of the environmental colour design in the delivery of health-enhancing environments and balanced sensorial experiences is briefly discussed.

**Environmental colour in the contemporary urban context**

The emergence of Environmental Colour Psychology and expansion of research in Environmental Design have offered a precedent for developing environmental colour design as a unique design paradigm based on the interdisciplinary knowledge. Nevertheless, a number of architectural critics (Caan, 2007; Minah, 2008; Porter & Mikkelides, 2009) notified that design professionals have little understanding of how different aspects of colour psychology can be integrated in design process. Lack of an explicit design methodology has been described as a main constraint to applicability of the relevant knowledge in environmental colour design process (Anter & Billger, 2008; Caivano, 2006; Tosca, 2001; Minah, 2008).

An agenda for “environmental design” had been set in 1960. Serge Chermayeff is one of the pioneers who articulated the importance of environmental approach to city design. In the talk “Design and the public good” given at the Chicago Institute of Design, Chermayeff (1960, p.65) referred to environmental design as “a more accurate description of the design problem of our time”. According to Chermayeff (1960, p.65), environmental approach explicitly extends the ethical and temporal considerations of design across generations and significantly altered sensitivity of contemporary design practices. To further development of this argument Day (2014, p.293) emphasises the architects’ responsibility to be sensitive not only to natural surroundings but also to “human individuals who will live in the designed environments and experience all spectrums of environmental impacts both positive and negative”.

During the last decades, different aspects of environmental design have become central to the discussions within design disciplines. Development of environmental design as a distinctive approach had significant impact on the use of colour in the built environment (Caivano, 2006). As a related aspect of environmental design, environmental colour design is generally concerns with improving relationship between human beings and physical environments they inhabit (Ronchi, 2002). Environmental colour design in the contemporary urban context aims to enhance the aesthetic and psychological experiences; to harmonize designed palette with natural colour represented in a particular setting.

A number of well-known designers become involved as colour consultants in designing colour schemes for new projects and restoration of historical districts. The most prominent contribution to practical knowledge on environmental colour design has been credited to Jean-Philippe
Lenclos, Shashi Caan, Eva Fay, Lourdes Legorreta, Giovanni Bruno, Michael Lancaster, Leo Oberascher and Werner Spillmann (Linton, 1990, Caivano, 2006). Significance of this contribution is underpinned by collaboration between colour science and design. However, inquiries related to use of colour in the design of urban environments are predominantly focused on cultural and symbolic meaning of colour; colour harmonies; appearance of colour in different context; colour perception and emotional impacts (Anter and Billger, 2008). A review of literature reveals a gap in explicit theoretical conceptualisation of environmental colour. Different authors relate such terms as “architectural colour”, “urban colour”, “environmental colour composition”, “colour scheme” and “colour palette” to appearance of colour in urban environments. Quite often the meaning of these terms not clarified, but could be understood from the contents of writing. The most relevant and effective definitions of “environmental colour” and “environmental colour design” in the urban context have been provided on the website of the Study Group on Environmental Colour Design1 (http://www.fadu.uba.ar/sitios/sicyt/color/glossary.htm, accessed on 4/05/2014). “Light and Colour in Environmental Design: Some Annotated Terms” document has been compiled by Ronchi in 2002. In this document, “environmental colour” has been defined as a total colour of a particular space which synthesises colour of the visual elements in a particular setting including natural elements, spatial pattern, colour of the built form, urban elements and also pattern of human activities (Ronchi, 2002). From this point of view, the notion of “environmental colour” expands boundaries the traditional architectural colour or a colour palette. Ronchi’s definition provides a valued point of departure, but a better understanding of the notion of environmental colour requires further inquiry into the constitutive entities of a contextual environmental colour. The core elements which have profound effect on appearance and perception of environmental colour can be classified as: nature, the built elements, and people actions (See Figure1).

![Figure 1. Core Elements of Environmental Colour (Authors)](image_url)

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1 The AIC Study Group on Environmental Colour Design (SGECD) of the International Colour Association (AIC) is an international group of scientists, urbanists, architects, artists, designers, historians, psychologists and other professionals with a specific interest in colour as a means of environmental design and its effects on human emotion, cognition and behaviour.
Complexity and combinations of the core elements substantially differ between urban settings and depend on multiply factors. A historical stage of a city development, cultural traditions, urban fabrics, and typology of built forms are few to mention.

In respond to the articulated complexity of environmental colour, “environmental colour design” defined by Ronchi (2002) as “a holistic approach to the design of environmental colour composition on different spatial scales, which involves a parallel analysis of architectural, semiotic, illumination-related data as well as human-environment interaction” This definition underlines the fundamental procedural differences between “environmental colour design” and more traditional application of colour in form design. Additionally, it introduces “environmental colour composition” as a product of environmental colour design. Environmental colour composition represents a colour scheme that bonds architectural colour palette with existing surroundings.

Another important contribution to the theoretical knowledge on colour has been done by Paul Green-Armytage. The author (cited in Porter and Mikellides, 2009, p.64) defines seven “kind of colour” named: (1) conventional colour; (2) substance colour; (3) formula colour; (4) spectral profile colour; (5) psychological colour; (6) inherent colour; and (7) perceived colour. This concept aims to address physio-psychological properties of colour and provide a classification that would have a cross disciplinary acceptance. By relating the Ronchi’s definition of environmental colour to the Green-Armytage’s concept, it is possible to say that certain kinds of colour presented in urban environments can be understood as physical properties and could be measured. Others are correlated to visual experiences and could be defined through the viewers’ perceptions. Thus, environmental colour has both tangible and intangible properties.

The proposed conceptualisation on environmental colour as “Environmental Colour Event” is originated from conceptions articulated by Ronchi and Green-Armytage, but it puts an emphasis on importance of a temporal dimension of colour in urban environment. Initially, this way of thinking has been inspired by Cruz-Deiz’s philosophical discourse which claims that: “Colour reveals itself as a powerful means to stimulate the perception of reality. Our conception of reality today is not that of 12th century man for whom life was a step towards eternity. On contrary, we believe in the ephemeral, with no past and no future, and where everything changes and is transformed in an instant. The perception of colour reveals such notions. It highlights space ambiguousness and ephemeral and unstable conditions, whilst underpinning myths and affections” (Cruz-Deiz, 2009, p.11). Further in the discourse, Cruz-Deiz interprets colour as “an ephemeral and autonomous situation”. He argues that constantly changing colour creates autonomous realities which take place in space and time. The realities created by colour are autonomous because they are independent from “the anecdotes viewers are used to seeing in painting. “From this point on, not only can a different dialectical method between the viewers and the work be established, but different relationships in knowledge are also created” (Cruz-Deiz, 2009, p.56).

Cruz-Deiz’s concept is based on a personal reflective account and it is mostly intuitive. The author does not explain the essential properties of a colour event. However, universality of his philosophical assumption provides a foundation for inferring environmental colour as a dynamic and spatiotemporal event. In line with Ronchi’s (2002) definition, “Environmental Colour Event” can be related to the perceived environmental colour composition of a particular urban space in the different timeframe. Light and colour are inseparable factors in the process of environmental perception. Together with the perception of form, they become part of the overall picture. During the course of the day, the angle of light changes which effects appearance of the perceived colours. For example, an appearance of red in bright noon sunlight would be different from we would see in the evening. Weather and seasonal conditions are also altering environmental colour appearance. Accordance to Tosca, the cityscape of a contemporary city is significantly influenced by natural light and illumination. She defines two distinct images; “the cityscape of daylight and that of the artificial light; possible four: that of the in- between day
and artificial light, and the virtual as well (electronically produced reality)” (Tosca, 2001, p. 442). See Figure 2.

Built upon the adopted Cruez-Deiz’s assumption and knowledge in colour psychology, an Environmental Colour Event (ECE) has both static and dynamic properties. The static properties, including materials and colouration of the built forms, are representative to the inherited colour schemes and associate with a local character. The inherited colours can be considered as leitmotifs which bring all visual characteristics of a space together. The dynamic properties reflect changing conditions influenced by natural and coloured artificial light, moving colour images (such as digital advertising boards), and people activities. The dynamic and intangible properties of a single ECE could be modified to provide balanced visual stimulation and sustain harmony within changing conditions. Tosca (2001, p.442) also suggests that the illumination in contemporary cities make it possible to visually modify the appearance of objects and space independent of viewing angle, distance, and speed. She defines “continuity” as a main property of environmental colour design.

The idea of continuity in experience of urban areas was initially presented by Lynch. In particularly, he states that “most often, our perceptions of the city is not sustained, but rather partial, fragmentary, mixed with other concerns. Nearly every sense is in operation, and the image is the composite of them all (Lynch, 1960, p.1). A concept of “continuity” is reflected in the proposed interpretation of “Environmental Colour Scenario”. A theoretical conception of Environmental Color Scenario is based on the authors’ definition of Environmental Colour Event. Thus, an Environmental Colour Scenario is seen as a unique set of reoccurring Environmental Colour Events linked by a thread of identifiable colour leitmotifs. It is assumed, that a designed colour scenario would contribute to harmonious and balanced relationships between different kinds of color presented within a particular urban setting. The variations of ECEs within a designed scenario would enrich experience of environmental colour and contribute to the place identity.

An inference of Environmental Colour Scenario as a holistic design approach is ontologically rooted in the “primary design” theory invented by Castelli. This theory shifts focus in colour design towards non-material, so called “soft” aspects that generally remain secondary in design thinking and often underestimated by architects (Thackara,1985, p.28). The soft aspects include colour, light, microclimate, decoration and even odor and background sound. Castelli (cited in Mitchell, 1993) claims that his design approach intentionally eliminates forms and considers colour, light, texture and sound as means of design. He also emphasised limitation of the traditional two-dimensional presentation of architectural design product. In accordance to Castelli, the two-dimensional architectural drawings “tend to stress the objective properties of a product and neglect the subjective aspects, including sensual qualities”. Mitchell (1993) has positioned “primary design” within the contextual design trend. Contextual design recently undertakes a wide application among the different design fields including architecture.
Mitchell (1993) suggests that contextual design in architecture can be done as a catalyst to user’s perceived experience, usually aesthetic experiences.

Environmental colour schemes are tangible variables of a city image and they can be designed in accordance to a certain methodology, but intangible experiences of environmental colour can only be understood through perception and feelings. As Thackara (1985, 28) explains: “The way in which light, colour, and texture affect our perceptions, our deepest feelings about an object or a place, do belong to province of design, but are unchartered territory”. Emotional responses to environmental colour are complex and hardly assessable, but the positive emotions can be delivered from sense of belonging, unity of natural and designed elements, and balanced sensorial stimulation. Motloch (2001) advocates importance of visual and emotional connection between urban habitats and people. Lynch (1960) also admits that without emotional connection people usually do not attached to a particular urban area or a whole city. Loss of emotional attachment and sense of belonging contribute to an overall life dissatisfaction and stress. Environmental colour can enhance significance of an urban place above its practical use and position it within the intangible realm of cultural identity (Doherty, 2010).

Following the contextual design traditions, the proposed model of Environmental Colour Scenario is principally concerned with experiences of colour in urban environments. This design method aims to create “a context, a situation” (Jones, 1950) in which an Environmental Colour Event will be perceived. Understanding a phenomenon of Environmental Colour Event can assistance with more accurately prediction of:

- how environmental colour schemes would appear in changing conditions;
- how these colour schemes will be perceived by the users of environments;
- how Environmental Colour Events may enhance positive responses and contribute to well-being of cities inhabitants.

**Environmental colour design and well-being**

Analysis of the diverse positions discussed in literature reveals that inputs from different realms of knowledge, such as environmental colour psychology and experiential design have made a substantial contribution to the theoretical development of an environmental colour design theory. The specific knowledge in environmental colour psychology has broadened an understanding of the role of colour in design of urban environments.

Traditionally, the pragmatic roles of colour in the built environment have been seen in establishing the visual unity of the city; articulation the structure of a city; navigating people within an urban area by establishing the hierarchy of its elements, and creating the sense of places. However, Tosca (2001, p.441) argues that colour in the built environment has “additionally served higher level purposes, such as identification, symbolism, semiotics, emotional control, psychosomatic comfort, and communication”. The recent development in environmental colour psychology suggests that environmental colour has a role to play in delivery of health-enhancing environments. Doherty (2010, p.2) suggests that carefully coordinated colour contribute to city’s identity “beyond the buildings, people, spaces, and artefacts that make up the city: not alone does colour give meaning to cities but cities give meaning to colour”. For example, such historical cities as Marrakech the Red City or Jodhpur the Blue City show examples of identity expressed through a certain colour palette.

A number of authors have notified that the contemporary architectural colour palette often prioritise stylistic and personal designers’ preferences over appropriateness to a particular context (Day, 2014). Smith (2002) and McLachlan (2012) both highlight impacts of fashion trends and personal designers’ preferences on selection of colour in architecture and place design.
Researchers in environmental colour psychology criticise the subjective approach to environmental colour design. For example, Nazar (1992) argues that reliance on a professional intuition is acceptable only if designers act in response to the aesthetic values of public. Day (2014, p. 10) suggests that “forcing ideas on people doesn’t make them healthy – it’s likely to embitter them and make them ill. Likewise, imposed architecture won’t be health-giving”. Mankhe (1998), Mitchel (1993) and Caan (2011) point out that health giving design requires consideration of phenomenological human need in addition to artistic and physical properties of space.

The energy of light is another aspect that needs to be considered in order to understand the physio-psychological impact of environmental colour on people’s well-being. The sun gives off a vibrating energy that we perceive as light. Colours are created by different rates of light vibrations. Thus, colour is a form of energy, and this energy affects our body, mind and emotions. Mankhe (1996) provides an explicit overview of colour impacts in urban environments. He states that “colour affects cortical activation (brainwaves), functions of the autonomic nervous system (which regulates the body’s internal environment), and hormonal activity, and it arouses definite emotional and aesthetic association” (Mankhe, 1996, p.1). As a powerful visual stimulus, colour and especially the combination of colours affect the ascending reticular activation system (ARAS). As Kuller (1981) has explained, the ARAS is responsible for all stimulation ranging from sensory deprivation at one extreme to sensory overload at the other.

Balanced visual stimulation in urban spaces is one of the fundamental aspects of a health-giving environment. To provide a healthy sensorial experience in the contemporary urban settings, designers should pay attention to negative impacts of both uniformity and complexity of the visual patterns (Mankhe, 1996). In particular, monotony or lack of living colour can cause under stimulation related health issues such as restlessness, excessive emotional response, bad concentration, and irritation. On the contrary, ongoing exposure to complicated, aggressive and disharmonious colour schemes would lead to overstimulation, increasing in pulse rate, blood pressure and psychiatric reactions. Therefore, context related, harmonious colour scenarios in combination with balanced visual stimulation would deliver psychologically appropriate environments.

As a healing tool, colour has been used throughout the ages. However, healing aspects of colour at the city scale is less understood. A number of researchers have linked the satisfaction with aesthetic qualities and emotional place attachment with the psychological well-being of cities dwellers. Though, some current publications indicate a growing awareness of the intangible realms of energies that have a profound effect on urban environments. For example, Azzopardy (2012, loc.101 of 1532) proposes: “An architectural expression, which not only emits its own personal energy while absorbing energy emitted by its inhabitant, but also the energies and passion that it absorbed from its creators during its conception and through its construction. Energies that not only effect the usage of this architectural structures for as long as it lives, but will also enable the structure to endure, thrive, persevere and continue evolving long after its creators are gone”. Perhaps, it can explain why some historical cities designed with appreciation of nature and local character have attracted both inhabitants and visitors over the centuries. The combined energies emanated by artefacts, nature and people create a constantly changing energy field which could be considered as a city’s aura. The majority of people can’t see city auras, but they can feel them. To some extend people are able to sense when a place is psychologically healthy and when it is not. Vibrations of colour are powerful enough to generate inspiration, increase motivation and deliver positive emotions. Therefore, environmental colour design has potential to restore energetic fields in cities and enhance well-being of city’s inhabitants. The new design paradigm can emerge through expanding an awareness of environmental colour vibrations on people well-being in the contemporary cities.
References


