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Learning a Colourful Language: Investigating colour in architectural education

Keywords: Colour, City colourscape, Architectural Education

Introduction

Colour connects the realms of architecture, history and culture through its impact on feelings, interpretations and perceptions. In contemporary life, colour plays a key role in determining the visual hierarchy of urban space, as well as emphasizing a sense of unity and continuity (Boeri. C 2010). Today, as in the past, colour can be interpreted as representative of recognition, belonging and readability; qualities of the city now thought of in terms of place-identity (Boeri. C 2010). However, the development of new architectural materials and IT technology has transformed the face of cities. Together with the advent of globalisation, this transformation has caused a gradual elimination of vernacular historic colour use, which had reflected native culture, ethnicity and identity.

Mumford believes that to enrich our cities, there is a need to retain such links with the past (Mumford. L, 1989). In this sense, the colour selections of designers of the built environment can be seen to have a significant impact on urban colourscapes. Yet colour is rarely a subject of serious inquiry in design practice and education, where it is considered as secondary to form, line and structure (Minah. G, 2013). This research aims to investigate the use of colour in the built environment by focusing on the knowledge of architects in relation to their educational training about colour.

Due to the complexity of colour and its multidimensional properties, it has been reviewed and studied in a broad range of disciplines: from anthropology, to physics, (Lüscher. M, 1971), and health (Goldstein. K, 1942). Yet very few studies have focused on architecture, where writings on colour are mostly restricted to the point of view of perception, colour theory and measuring methods. There is even less research on colour in architectural education.

This position paper discusses the early stages and findings of a wider doctoral study that aims to throw light on the following three questions:

1. How much do architects know about colour?
2. How do architects make colour choices for their designs?
3. What is the role of education in architects' understanding of colour?

As part of the research, a survey has been developed to determine to what extent personal and educational experiences have informed the knowledge and use of colour by architectural students and professionals. At the time of this conference presentation, data on current practices will be reported that has been collected and analysed from students and architects in Victoria, Australia.

This research ultimately aims to raise the importance of colour discussion in the contemporary world, improve education around the use of colour in the built environment, and nurture greater knowledge and colour sensitivity in architects.

Context and background

Before discussing the current state of colour learning in architectural education, it will be necessary to summarise the history of colour in architecture (Figure 1).

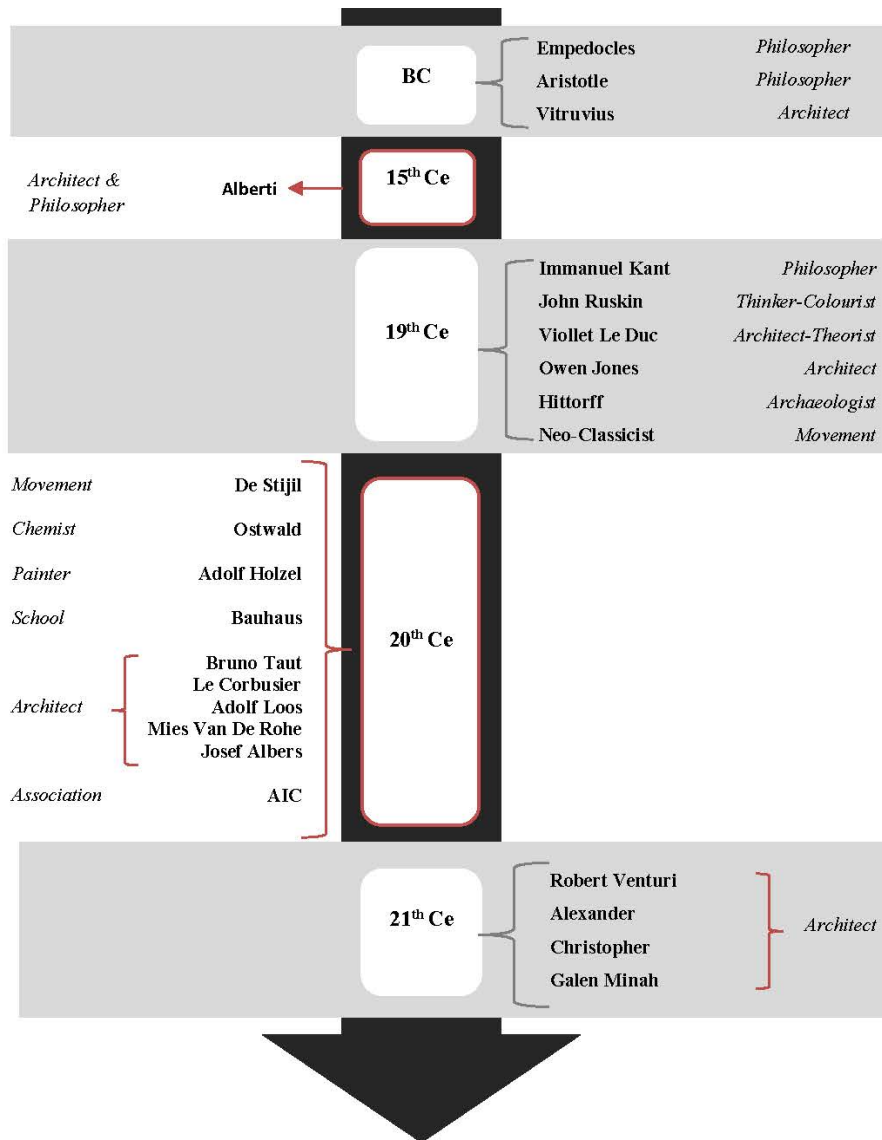


Figure 1: Summary of Colour history in Architecture

Colour use in the decoration of “architecture” has been used since early cave paintings, such as those found in Lascaux and Altamira (Porter. T & Mikellides. B, 1976). Yet despite the importance of colour since such ancient periods, it has remained largely subservient to line for representing meaning and thus was normally treated as an unnecessary adjustment to form and object. This detachment in theory of line from colour continued to the Renaissance (Minah. G, 2008), and was then reflected in a separation of the ‘fine arts’ from architecture. Consequently, from the

Renaissance the rich use of rich colour in architecture, commonplace in the Middle Ages, decreased. This was reflected in particular by the polemic between colourists and designers in sixteenth century Venice brought about by scholarship into the “science” of colour theory (Porter. T & Mikellides. B, 1976).

Until the mid-nineteenth century, the misconception of a monochrome ancient Greek architecture was reflected by a lack of colour use in classical facades. However, when the archaeologist Jacques-Ignace Hittorff discovered that Greek’s facades were coated with bright pigment layers, a long-held view of a monochrome antique world of architecture was changed; heralding, it has been argued, a new chapter in the history of colour use in art and architecture. (Porter.T, 1982, Caivano.J.L, 2005, Porter. T & Mikellides. B, 1976). Although the acceptance of this paradigm shift in the architectural world was far from immediate, its early effect can be seen in the polychromatic architecture of Owen Jones – the colourist of the Crystal Palace (Fagerström.K, 2005). Soon, the writings of John Ruskin on colour in nature came to have a potent influence on artists and the pioneers of modern architecture (Caivano.J.L, 2005).

After the industrial revolution, criticism of the monotony of industrial cities, resulted in greater attention to the impact of colour, and inspired the invention of numerous colour systems, such as those of Munsell and then Ostwald in the late 19th and early 20th centuries.

Appearance of a few short-lived movements such as De Stijl, Expressionism and Neo-Plasticism, promoted colour as a symbol of powerful emotive and subjective essences (Minah. G, 1996). Moreover, the teachings of Johannes Itten, Josef Albers,

Wassily Kandinsky and Paul Klee, in the German Bauhaus school, promoted the importance of the study of colour in art and design education (Caivano.J.L, 2005, Kwallek. N & Stovall. L, 2010). Whilst modernism was to soon inspire a much more austere aesthetic, denouncing ornament as a criminal affectation, the post modernism movement of the seventies and eighties encouraged a much more playful interpretation of history that inspired a new wave of interest in colour use in architecture.

This renewed use of colour in architecture has continued through to the 21st century, catalysed by the advent of new technologies and building materials. Although most contemporary architects still insist on colourless or transparent materials, our cities reflect the influence of a growing generation of architects much more willing to use bright and bold colours in their designs. However, as shall be touched upon now, a lack of colour study in architectural curricula would seem to still be holding many practitioners back from a freer and certainly better informed use of colour.

Colour study in architectural education

Due to the importance of colour, its subjective nature and its impact on quality of life, colour education has been described as necessary for designers to make a positive impact on human lives (Bergström.B, 2001), and adding colour knowledge to architecture curriculum is seen as an important step toward this goal (Minah. G, 2013).

To investigate the place of colour studies and understanding in architectural education, the curriculum standard and accreditation requirements of Australian and British architectural education has been examined through the lens of research

carried out by Kramer (Kramer. K, 2012) that aimed to determine the state of social responsibility training in architectural education. But instead of the four aspects of social responsibility discussed by Kramer ((1) sustainability, (2) responsibility to consider the needs of communities and the wider public, (3) ethics and (4) civic engagement through public service) – the current research proposes six contexts of social responsibility in architectural practice that can relate to an understanding of colour theory and use: (1) *Sustainability*, (2) *Community needs*, (3) *Ethics*, (4) *Communicative Design*, (5) *Cultural Context*, and (6) *Responsibility to consider laws and regulations*.

Whilst learning in relation to the majority of these six contexts is clearly required for Australian and British accreditation (Table 1), none of the accreditation documents of these three bodies names colour as a required area of study. Furthermore, a detailed study of Australian curricula reveals an almost total absence of adequate colour training in the majority of built environment degree programs.

Organization or Institute	Sustainability*	Community Needs	Ethics*	Communicative Design	Cultural Context	Responsibility to Laws and Regulations
AIA	✓	✓	✓	✓	✓
AACA	✓	✓	✓	✓
RIBA	✓	✓	✓	✓

Table 1: Validation of selected architectural practice aspects in standard and accreditation organization. (* the star shows aspects repeat Kramer (2012) instrument)

Method

The instrument of this study was an online pilot survey conducted in Victoria, Australia, in 2014. The pilot will be used to inform an international survey to be circulated in 2015. Items in the survey were informed by a literature review on what informs designers' colour choices.

Participants

The questionnaire was given to two groups: (1) PhD architecture students, and (2) academics and practicing architects from Victoria, largely from in and around Melbourne. At the time of this conference presentation, thirty completed questionnaires had been received.

Instrument

This survey instrument is informed by the 1998 study of Janssens and Mikellides. While this previous survey was composed of six blocks plus a comments section, the current survey contains 9 blocks (Table 2). The first and third sections of the pilot survey repeat the Janssens instrument. Section II includes a series of questions on participant's colour knowledge and factors that inform their colour decisions.

	Blocks	General content	Factors/Themes	Micro factors
Section I	Block 1	Personal demographic* Educational background*
	Block 2	What you think you know about colour?	Personal background & Ability	Personal Opinion
Section II	Block 3	What you actually know about colour?		Knowledge & Education
	Block 4	Source of your general colour information*	Experience in Practice	Practical experience Colour knowledge in relation to experience
			Environmental & Human Needs	Environmental Parameters
	Block 5	Detail question about colour theory and use	Policies & Customs	Human Needs External Power and colour Choices Effective Factors on Colour Choices
Section III	Block 6	Source of colour research information* Preferred source for colour research information*		
	Block 7	What is expected from colour research		
	Block 8	Expectations from colour education		
	Block 9	Suggestions about colour education		

Table 2: The structure of current questionnaire. (Contents that have been informed by Janssens and Mikellides has been marked with *)

The survey has 120-items, consisting of 5-point Likert scale and open-ended questions (Table 3).

	Parts of Sections	Type of Questions					
Section I	Part 1	Open ended +Yes and No Questions					
	Part 2	Multi-choice Questions (5 Likert Scale)					
Section II	Factor/Themes	Micro factors	Multi-choice Questions (Likert Scale)				
	Personal Background & Ability	Personal Opinion	(1) Not at all	(2) Minimally important	(3) Some-what	(4) Moderately important	(5) Very important
		Personal Background & Preference					
	Knowledge & Education	Educational Learning effect					
		Responsibility					
	Experience in Practice	Practical experience					
		Colour knowledge in relation to experience					
	Environmental & Human Needs	Environmental parameters					
Socio-Cultural parameters							
Policies & Customs	External Power						
	Other Effective Factors on Colour Choices						
Section III	Part 1	Multi Choices Questions	Don't Know	Below average	Average	Above Average	Expert
	Part 2	Multi Choices Questions	Don't Know	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
	Part 3	Open Ended Questions					

Table 3: Schematic table of pilot survey

The first section of the survey seeks demographic data and establishes the personal and educational backgrounds of the participants. The second section of 35 Likert-scale questions determines participants' experience and knowledge of five factors influencing their colour understanding and use: (1) Personal background & ability, (2) Knowledge & education, (3) Experience in practice, (4) Environmental & human needs and (5) Policies & customs. Lastly, the third section includes 33 multiple

choice and open-ended questions on participants' educational expectations, and concludes with space for further suggestions and comments.

Result and discussion

This section reports on the analysis of the quantitative and qualitative data. Grounded theory has been used as a codifying method to reveal the major themes from comments given as qualitative data. Due to the small sample size, statistical testing of comparison of variance has not been used, because it would not give meaningful results.

Section 1

Although nearly half of the participants claimed that they had studied colour related courses, they had merely received basic information about colour theory as a part of another course with a different focus. According to the comments, colour related courses were mostly offered as an elective or as a part of another course within the freshmen year of a bachelor's degree. The most dominant comments that emerged from participant's answer to the question "state the colour related course name" reveal that knowledge of colour was most commonly learned through the process of designing or as an aspect of the design process for assignments in courses such as "architectural studio", "form analysis" and "the elements and principal of design". Additionally, participants' Likert-scale ratings (from 1=strongly disagree, to 5=strongly agree) to the statement: "the higher education that I received in colour theory was thorough" indicates that more than 50% of the participants *disagreed* or *strongly disagreed*, with 32% answering neutrally, and only 16% *agreed* or *strongly agreed* that they had received a thorough colour education (M=2.48, SD=3.1).

Section II

This section was divided into five areas on the factors impacting colour use and understanding. Answers to two questions about participant's colour knowledge and its importance in architecture shows that while 46% agreed that 'the knowledge of colour is important to architectural design' (M=4.2, SD=5.3), only 59% of participants claimed that they had at most an average level of knowledge (overall M=3.11, SD=6.61). This reveals a wide gap between what architects are taught and what they feel they ought to know.

Responses to the four options for the question "how do you rate the importance to your colour use of the following socio-cultural factors?" revealed possibly the most interesting finding of the pilot study. Figure 2 shows that although all options reached a moderate level of importance, the aesthetic taste of clients (M=3.84, SD=4.65) was seen as the most influential socio-cultural factor informing colour choices, compared to: *Designer's personal tastes* (M=3.5, SD=4.2), *cultural and religious value of colour* (M=3.5, SD=3.03) and *symbolic meaning of colour* (M=3.6, SD=2.6).

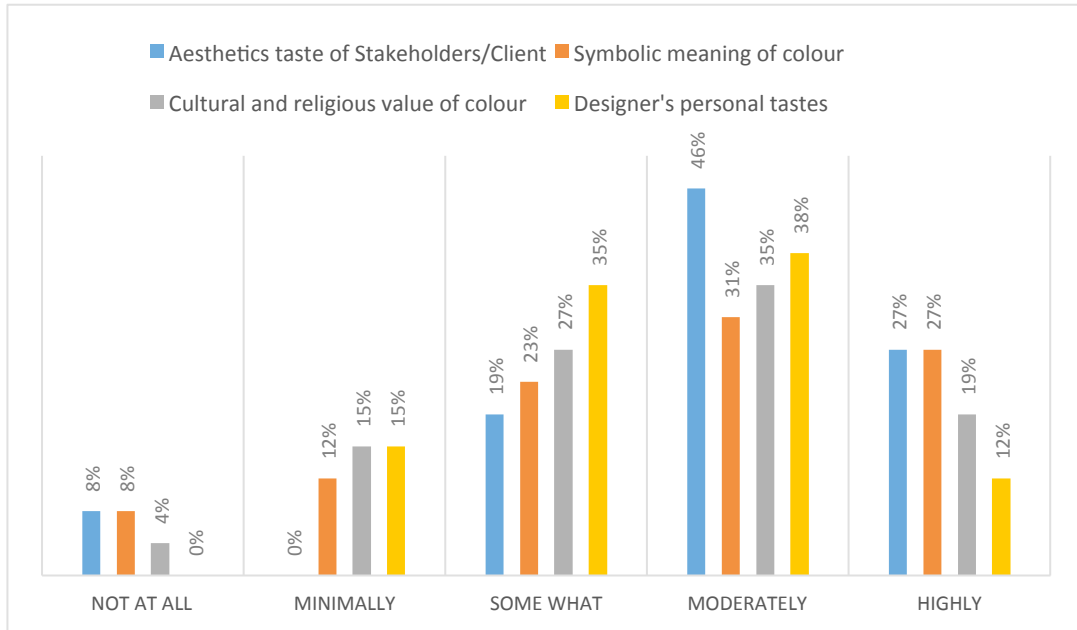


Figure 2: The level of socio-cultural impacts on architects' colour use

Section III

This section investigated participants' expectations from architectural education.

Codifying participant's response to the question "what kind of colour information and training is necessary to receive in architectural education?" revealed four themes:

'introduction to colour theory', 'colour use in architectural design', 'influence of colour on community' and 'colour as an industrial and/or natural material.' Thus all

participants who answered this question believed that having at least a basic

knowledge of colour is necessary for architects. Moreover, codifying comments to

the question "who should make decisions for cities about the architectural use of

colour?" reveals strong agreement (80%) on the belief that architects are at least

partly responsible for colour choices in the built environment. Interestingly, architects

in collaboration with other professionals were most numerous identified (in 48% of

comments) as making decisions about colour, with 35% of participants identifying architects as the only professional making colour decisions.

Similar to Janssens and Mikellides study, which concluded that the colour training that architects received in their educational period was not sufficient to answer to their concerns about colour use in architectural design, this study finds a sharp contrast between the high level of importance attached to colour among architects and the degree of colour knowledge taught in Australian schools of architecture.

Future Research

The pilot survey has highlighted two important further research questions that will be the focus of our subsequent international survey of colour use by architects: (1) does a lack of education about colour theory limit architects' willingness to use colour in their designs?; and (2) are architects and their clients the only two stakeholders who have a significant role in determining the colour of our cities' buildings? At the time of writing, around ninety architects and fifty Higher Degree by Research students have completed the international survey. As around 40% of these respondents study or practice in Iran, the survey also promises to enlighten culture differences in the use of colour in architecture.

Conclusion

Consideration of the psychological impact of colour, compared to the level of colour knowledge amongst architects - the professions most commonly seen as responsible for colour choices in the built environment – identifies the paucity of colour teaching in architectural education as a pressing issue. Findings from the literature and a pilot survey show a clear gap between the levels of knowledge perceived as required on

colour use in architectural practice, and the educational training that is received. Thus it seems that although architects have confirmed the key role of colour in architectural practice, colour is considered a secondary concern in architectural education. The survey also suggests that while architects see the importance of their role in informing appropriate colour choices, client preferences have a greater impact on colour choice than contextual factors that it might have been expected should have a greater influence on the colour of our cities: i.e., the cultural and religious values of colour and its symbolic meaning. It might be argued that putting needs of the client ahead of more community-wide stakeholders in respect to colour choices reflects a lack of confidence in architects about colour use, and that this low confidence results from poor colour knowledge due to the limited training given in architectural education.

Acknowledgement

This study was supported by Deakin University, Vic, Australia. The authors are grateful to this support.

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