WHAT IS THAT PLACE? OBSERVATIONS OF THE IMPACT OF ENVIRONMENT COLOUR THROUGH PHOTOGRAPHIC ANALYSIS

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ABSTRACT

Isolating the impact of a colour, or a combination of colours, is extremely difficult to achieve because it is difficult to remove other environmental elements such as sound, odours, light, and occasion from the experience of being in a place. In order to ascertain the impact of colour on how we interpret the world in day to day situations, the current study records participant responses to achromatic scenes of the built environment prior to viewing the same scene in colour. A number of environments were photographed in colour or copied from design books; and copies of the images saved as both colour and black/grey/white.

An overview of the study will be introduced by firstly providing examples of studies which have linked colour to meaning and emotions. For example, yellow is said to be connected to happiness[1] ; or red evokes feelings of anger[2] or passion. A link between colour and the way we understand and/or feel is established however, there is a further need for knowledge of colour in context. In response to this need, the current achromatic/chromatic environmental study will be described and discussed in light of the findings. Finally, suggestions for future research are posed.

Based on previous research the authors hypothesised that a shift in environmental perception by participants would occur. It was found that the impact of colour includes a shift in perception of aspects such as its atmosphere and youthfulness. Through studio-class discussions it was also noted that the predicted age of the place, the function, and in association, the potential users when colour was added (or deleted) were often challenged.

It is posited that the ability of a designer (for example, interior designer, architect, or landscape architect) to design for a particular target group—user and/or clients will be enhanced through more targeted studies relating colour in situ. The importance of noting the perceptual shift for the participants in our study, who were young designers, is the realisation that colour potentially holds the power to impact on the identity of an architectural form, an interior space, and/or particular elements such as doorways, furniture settings, and the like.

Keywords: colour, interior design, design, environmental interpretation, photographic analysis

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INTRODUCTION

A key problem this paper addresses is: How can we ascertain the impact of colour on how we interpret the world in day to day situations? Because it is difficult to remove other environmental elements (sound, odours, light, temperature) and the event (purpose, occasion or memories) from the way we understand, and therefore, experience place, the current study sought to build on previous research. By investigating the shift in understanding of environments when viewing achromatic scenes prior to viewing the same scene in its natural colours the impact of colour was identified. A comparison was achieved by using visual imagery—in this case photography.

A shift in environmental perception by participants was predicted. Such knowledge potentially enhances the ability of a designer (such as an interior designer, architect, or landscape architect) to design for a particular target group—user and/or clients. This outcome is considered to be of value. In addition however, the participants in our study—young designers—were able to experience first hand and discuss how colour potentially manipulates the perceived identity of an architectural form, an interior space, and/or particular elements such as doorways, furniture settings, and the like. Through studio-class discussions it was noted that the predicted atmosphere, age of the place, the function, and in association, the potential users when colour was added (or deleted) were often challenged.

An overview of the study will be introduced by firstly outlining briefly examples of studies which have linked colour to meaning and emotions. This establishes a link between colour and the way we understand and/or feel prior to addressing environmental interpretation in particular. A need for knowledge of colour in context is thereby highlighted. In response to this need, the achromatic/chromatic environmental study will then be described and discussed in light of the findings. Finally, suggestions for future research are posed.

BACKGROUND

Numerous authors report the meaning of various colour groups. Colours such as yellow are said to be connected to happiness[3] ; or red evokes feelings of anger[4] or energy. For example, Ou et al.[5] studied colour emotions of single colours displayed on grey backgrounds and observed by different sub-groups. Cultural differences in responses were detected. In contrast to British observers, the Chinese preferred clean, fresh, or modern colours. The British considered active colours to be linked to 'tenseness', while the Chinese linked this emotion with hard, heavy, masculine, or dirty colours. Four colour emotions were linked by Ou et al. to colour appearance—warm/cool (hue based), heavy/light (value based), active/passive (tone based), and hard/soft (chroma and lightness).

Spatial properties of individual colours have been investigated and colour shown to influence a sense of enclosure and spaciousness[6,7,8]. In addition, the impact on moods (for example, calm or dynamic) has been explored. Lee[9] notes that human emotional responses to colour may be unconscious (innate response); semiconscious (learned and routine) linked to factors such as cultural or climatic aspects; or a conscious response (preference and association based on personal experiences, fashion trends, current politics, and/or people's personalities). Colour may also influence the interpretation of function. Typically, white is associated with sterility; or colours are associated with a function—fire trucks are fire-engine red.

Colour in combinations

However, knowledge of the impact of colour in relationships will be of value to designers in their practice. As Moretti and Lyons[10] state colour selectors, 'rather than showing a small area of a single colour should allow the user to select, and see the effect of selecting, groups of colours…';'colours are chosen out of context, and frequently do not appear as expected when applied'; and are, 'selected individually without regard of other colours; …and concepts of colour harmony are not widely understood...'[11]

The need for colour combinations has already been addressed by researchers such as Oberascher et al.[12] in relation to colour emotion; and by, Kobayasi and his colleagues[13] in relation to meaning. The later sought to identify the meaning of three colour relationships drawn from Japanese society. Resultant guides to colour combinations and meanings are readily available[14]. However, Kobayashi's colour combination image scale is said to be limited because[15] it does not explain differences between various design concepts addressing real projects. Instead colour combinations only include three-colours and emotions are related to the Scale.

Researchers identified by Lee[16] working with colour combinations and various design disciplines include: Korean company IRI Inc., who developed a tool based on objectified Koreans' emotions in

response to colour combination for industrial design; Korean Fashion Color Association (KOFCA); Park and Jung, who developed a colour coordination support system for car interiors; and JIIA, who developed 'The Interior Color Coordination Dictionary' which integrated three psychological axes (mechanical–natural, light–dark and strong–mild) and emotional subgroups (including elegance, natural, Japanese, classic, dynamic, high-tech and casual); and, Eun and Lee, who linked emotions of colour combinations to styles of clothing displays as well as respondent's residential location.

Colour combinations and environments

However, generic descriptions are of little use for designers of the environments that we inhabit. Firstly, a colour such as yellow manifests itself in hundreds of subtle colour variations such as buttercup yellow, sunshine, lemon yellow, banana spirit, golden yellow, and the like through the production of colour ranges or colour-ways for all the major industries such as paint, laminate and textile companies to name a few. Secondly, designers use colour in conjunction with space, form, materials, and existing locations. Any colour exists is in the company of others. It is also influenced by lighting conditions – even a white kitchen is never just white due to time of day and conditions such as shadows and reflections.

As reported previously[17], designers, such as Barragan, Holl, Foster, and Piano, use colour to express form, structure, or services within single buildings, and thereby, affect the way the façade or exterior draws attention and is interpreted. Internally, designers also use colour to express the planning logic including, wayfinding and orientation strategies[18].

In relation to colour combinations and interior design, Lee[19] demonstrated that 'red-centred' and 'blue-centred' types of colour combinations, emotions shift to 'heavy and hard' area from 'soft and light' in varying dimensions as contrast in tone increases. Yellow-centred combinations were 'soft' moving only to the 'sober' as tone difference is greater while grey-centred combinations did not seem to effect emotion. However, although Lee[20] uses typical scenes of interior space (living rooms, bedrooms, kitchens, bathrooms) and simulated scenes of colour combinations these were still stylised drawings depicted as flat coloured planes. The ambiguity and complexity of real life settings is missing. Studies by Guerin and colleagues [21] [22]have utilised images of interiors in an attempt to understand preferences and meanings across cultural groupings. This involved six 'abstract color palette'…representative of a six 'pictures of an interior' where the palettes were computer-generated colour compositions of hue, value, chroma, contrast, overlapping, and adjacencies'. The latter's findings showed that preferences were culturally linked but the meanings were ambiguous.

In relation to environmental colour, designers and researchers have carried out studies of the impact of colour in natural settings. For example, Minah[23] has revealed the impact of colour on the readability of a city and how colour can impact on the skyline of large American cities. Others, such as Lenclos, have investigated colour usage which creates cultural distinctiveness[24]. Unique colour palettes can identify cities[25] or individual houses such as those of the Ndbele people in South Africa[26].

This study aims to bridge these existing works by looking at meaning and emotion in natural settings of the built environment; albeit controlled by using photography.

METHOD

The object of the current exercise was to interrogate the impact of colour on the interpretation and experience of the world around us—particularly the built environment. In order to do this, participants were asked to critique a series of environments in terms of the colour relationships present, to describe the potential mood of a place, and to identify descriptors that are appropriate to particular settings. The settings were all built spaces but a range of images were selected for this pilot study—entries, interiors, and exteriors of buildings.
This investigation was carried out during two sequential years. The participants were university students drawn from a number of design disciplines—however, they were largely interior design

students in their third semester of their undergraduate degree. Time was provided within the normal class activities within the Colour Studies studio to undertake the exercise.

The exercise consisted of two stages.

Stage 1: During the week prior to the studio, students were given an A4 pdf document containing a series of black and white images of the built environment to view via the unit on-line-teaching site. For each of the images, the student was asked to study the images and to record which adjectives provided as a list of descriptors described the environment as shown.

Stage 2: In the class session, for each of the images, the students were then asked to record their response to the same photograph of environment but this time it was presented as a colour image. The same descriptors were provided.

1.   **2.**   **3.**

Fig 1. Images 1, 2, 3 as shown to the participants a) black and white and b) colour.
Images 4 and 5 are represented here as line drawings due to copyright restrictions.

4.
Image 4's original interior consisted of intense red (vermillion) lit from the right hand side
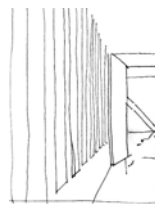
5.
Image 5's original interior consisted of a warm yellow corridor lit from the left hand side. Beyond the doorway the room was cyan with a shaft of natural light from the left.

The descriptors have been chosen from the adjectival pairs originally proposed by Osgood et al [27] in their semantic differential studies in the 1950s. A number of these descriptors have been used by others as reported in the background to this study. The descriptors are:
Hard, Soft, Cool, Warm, Casual, Elegant, Chic, Classic, Dandy, Modern, Natural, Formal, Romantic, Gorgeous, Youthful, Mature, Domestic, Clear, Wild, Dynamic, Pretty, Calm

On completion of the exercise, small tutorial groups of four or five were formed and they were asked to discuss the following questions:
- Did your interpretation of place change? (For example, consider what type of place it seemed to be, who goes there, how is the atmosphere, how expensive is it, etc?) Identify similarities and differences. Consider HOW colour influenced your understandings.

In addition each group was asked to identify:
- Two or three principles that you can conclude are involved in the interpretation of the built environment?

This formed the basis of a class discussion concerning the impact of colour on interpretation of place.

RESULTS

Possible respondents were 69. Of the 69, the number recorded considered the image represented the characteristic (descriptor) provided. * marks the descriptors where the total number of respondents is greater than 40 (55%). Note: A nil or void response acknowledges that the participant did *not* think the descriptor significantly suited the environment).

Table 1. Respondents who believe the descriptor suits the environment depicted in the image
Legend: col: colour, bw: grey scale/black and white. The addition of colour altered the response:
< decrease in number of respondents; > increase in number of respondents;
- little change in total number of respondents (less than 10 respondents).

Image	1		2		3		4		5	
Descriptor	**bw**	col	**bw**	col	**bw**	col	**bw**	col	**bw**	col
Hard	30	18 <	66*	65* -	22	25 -	39	41* -	46*	28 <
Soft	24	44* >	4	8 -	34	41* >	33	28 -	25	42* >
Cool	16	39 >	42*	60* >	31	16 <	40*	6 <	50*	24 <
Warm	38	39 -	10	6 -	35	63* >	27	67* >	15	54* >
Casual	6	20 >	10	17 >	23	21 -	15	10-	21	33 >
Modern	1	5 -	50*	62* >	62*	69* -	29	37 >	52*	61* >
Romantic	56*	50 -	1	0 -	17	21 -	13	25 >	7	4 -
Natural	12	8 -	5	5 -	6	19 >	34	22 <	24	10 <
Elegant	60*	39 <	4	7 -	48*	43* -	32	31 -	29	19 <
Chic	26	33 -	5	5 -	47*	43*-	9	14 -	24	18 -
Classic	60*	41*<	3	1 -	19	13 -	27	20 -	9	4 -
Dandy	11	27 >	4	8 -	15	21 -	13	9 -	5	27 >
Clear	7	6 -	27	36 >	43*	34 <	47*	26 <	53*	48* -
Formal	56*	28 <	20	15 -	43*	38 -	42*	53* >	38	17 <
Wild	1	21 >	29	40* >	10	21 >	2	13 >	6	31 >
Gorgeous	26	36 >	3	3 -	20	24 -	13	18 -	9	12 -
Dynamic	9	26 >	46*	51* -	41*	45* -	23	38 >	28	54* >
Pretty	31	47* >	3	3 -	19	25 -	15	18 -	12	20 -
Calm	20	30 >	6	7 -	28	25 -	53*	29 <	43*	23 <
Youthful	1	16 >	17	33 >	32	46* >	6	12 -	27	52* >
Mature	57*	42* <	11	8 -	23	22 -	38	45* -	27	3 <
Domestic	19	15 -	14	14 -	9	7 -	16	8 -	20	15 -
Total	567		380		627		566		570	

Based on the number of respondents, the coloured environments, when compared to the black and white environments, are as outlined in Table 2.

Table 2. Interpretation of coloured environments compared to the black and white environments

Image	Aspect 1	Aspect 2	Aspect 3
1	softer, cooler	more casual, less elegant, less classic, dandier, less formal, wilder, calmer, more dynamic	more gorgeous, prettier, more youthful, less mature
2	cooler	more casual, more modern, clearer, wilder	more youthful
3	softer, less cool, warmer	more natural, less clear, wilder	more youthful
4	less cool, warmer	more modern, more romantic, less natural, less clear, more formal, wilder, less calm, more dynamic	
5	less hard, softer, less cool, warmer	more casual, more modern, less natural, less elegant, more dandy, less formal, wilder, more dynamic, less calm	more youthful, less mature

When analysed in detail, it is seen that the coloured images attracting more respondents varied between 0.7 and 20%. However, the distribution of the responses among the descriptors, where the total number of respondents are greater then 55% (marked with * in Table 1), varied (up to 148% increase). Thus, colour affected the choice of some descriptors significantly for a particular image. The most significant variations (increase or decrease) for the images are given below.

Image 1: soft: 83% increase, pretty: 66% increase, formal: 50 % decrease, classic: 32% decrease, mature: 26% decrease.

Image 2: cool: 70% increase, wild: 38% increase, modern: 24% increase.

Image 3: warm: 80% increase, youthful: 44% increase, soft: 21% increase, clear: 20% decrease.

Image 4: warm: 148%, clear: 45% decrease, formal: 26% increase.

Image 5: dynamic: 93% increase, youthful: 93% increase, warm: 36% increase, modern 17% increase.

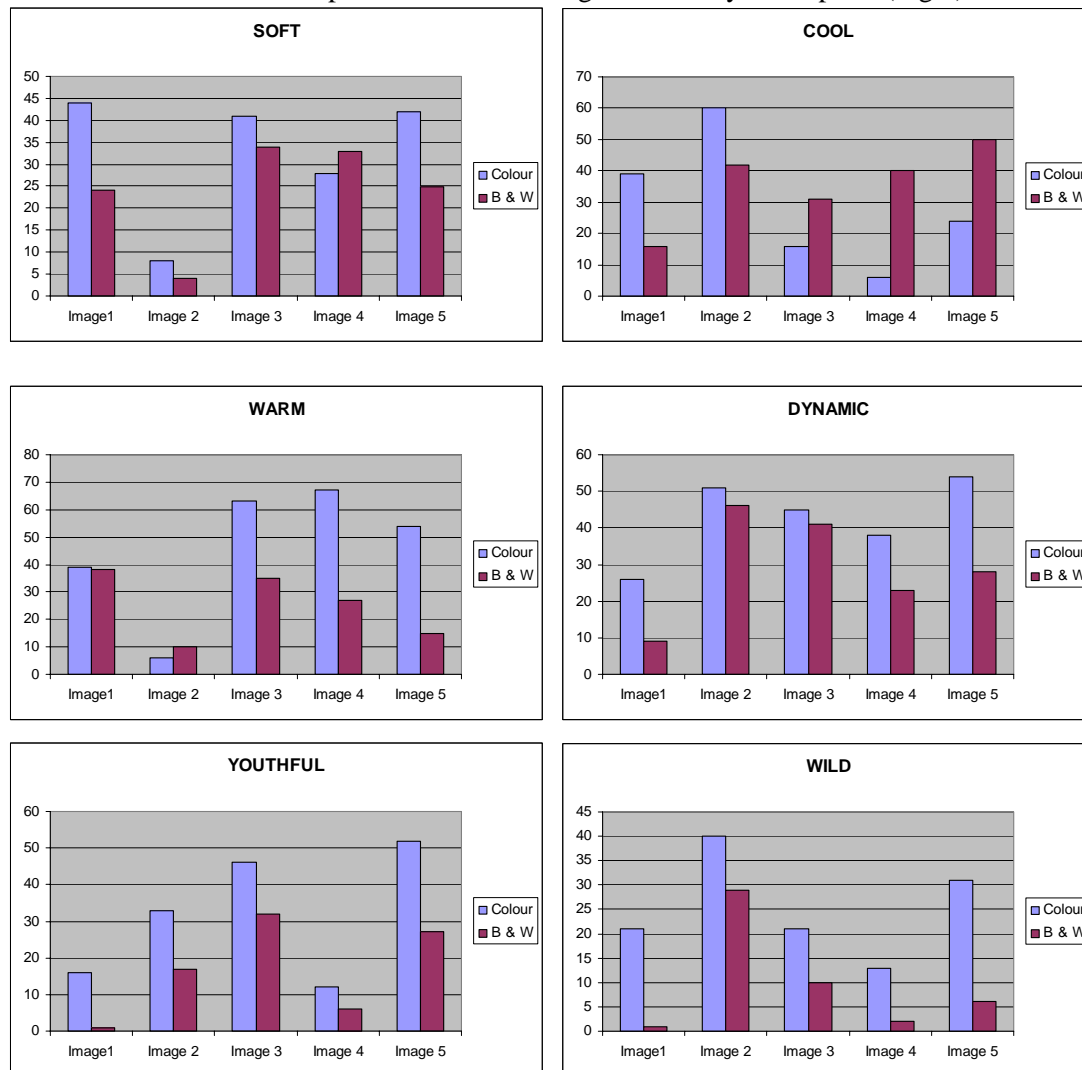Some of these results are represented in the histograms for key descriptors (Fig.2).

Fig 2. Number of respondents/image/descriptors Soft, Cool, Warm, Dynamic, Youthful, Wild for black and white and coloured environments (Images 1-5) .x-axis: images, y-axis: number of respondents.

Students described their interpretations of place and the role or impact of colour in their shifting understandings in a variety of ways. These are demonstrated by the following quotes copied from students' folios.

Impact: Focus of attention:
'my interpretation …was extremely different to that of the coloured. It was clear that when studying the bw images I relied completely on the shapes of the structures within the building to form my opinion. This exercise really brought home the fact that colour can have an astounding impact on how

we view the environment and can be used to emphasis structure. Principles used: proximity, closure, figure ground, continuity.'(LK 09).

Impact: Temperature and mood
'the application of monochromatic red [scheme] tends to raise the temperature of the room compared to the bw. The light source from the right creates shadows so the light and dark contrast is [more] mysterious and has a sense of depth [Image 4]; BW: Cool, modern, elegant, clear, formal, and calm place…pathway to the clinical space is clean with the…continuity of repeated light leading in that direction; COLOUR: …create an emotional shift from warm to cold…the light ray [directs]…to the left from warm, intimate space to a cold atmosphere [Image 5](HYS.09)

Impact: Through placement or composition
'…harmony is created by the repetitive use of colour and form which creates rhythm-the repetition gives formality…; contrast of pure hue, saturation, [and/or] extension are present in all images…'(EJS.09)

Impact: Interpretation of users, identity and ambience
'the mood or ambience in an environment and ordering principles are involved in the interpretation …by identifying the possible users…and analysing the organisation (foreground, proximity, etc) one interprets the images. The ambience …is aided by lighting, visual harmony, clarity of line; identity is aided by modern-ness, busyness, hardness, etc all of which are better perceived in colour' (PC.09)

DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH

The schemes depicted in the images can be summarised as:
- No1: Analogous blue/blue-purple/purple; with decorative pattern
- No 2: Three contrasting pure hues blue, red, and green; non-decorative
- No 3: Varying saturation of green plus honeyed timber; non-decorative
- No 4: Contrast of saturated yellow and contrasting blue; non-decorative
- No 5: Monochromatic scheme of saturated reds; non-decorative

From the general class discussion it was evident that Image 2, the Pompidou Centre was the least 'deceptive'. The strong verticality and level of contrast was understood as being an industrial site in grey. The addition of colour to highlight the services was seen to reinforce first impressions. The colour was said to make it more lively or playful as reflected by the descriptors recorded.

Image 1 created the most discussion by the class. The original place had been read as quite staid and to be a carved timber entry—reflecting a more classic or expensive shop. The decorative and colourful treatment was described as being a complete surprise. Most people were amazed that it was a young fashion designer's boutique in Zurich.

This study was limited to explore if colour impacted on the impression of the environment when compared to a black and white image of place. It has revealed that colour does have impact and its assessment in relation to places rather than as chips or isolated combinations is important. The participants were able to gauge the impact and to note their own changes in understanding of the type of place and its possible functions through discussion and reflection.

An advantage of this study was the capturing of the environment as it exists and not as a stylised drawing. The later is often undertaken in an attempt to reduce the variables influencing the interpretation. However, as environmental designers it is the integration and the complexity of context that is important. In addition, three extensions could be made to develop this study and increase the significance of the findings as well as applicability. Firstly, multiple images or videos of each setting could be used to form a deeper connection with the place–initially achromatic and then in true colour. Secondly, one image of the five (or each) could be manipulated to explore the impact of particular colour combinations depicted in the other four. Thirdly, the descriptors could be extended and/or ranked to give richer data. In addition the qualitative discussions could be recorded to capture the way the images were analysed to determine their nature and the role that colour played in that process. The

next logical step is to provide immersion in actual environments that can be viewed as if they are achromatic and then experienced in their 'true colours'. Technological aids could be designed to enable this comparison to be achieved. All would assist designers to understand the potential impact of colour on environmental interpretation.

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