

## **The Interior World of Colour\***

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### **ABSTRACT**

This paper reports on an exploration into the effects of colour relationships on the perception of interior spaces. The study incorporated a full size model whereby the phenomena of movement, height, and depth could potentially be demonstrated through the juxtaposition of various shades, tints, and tones. As a consequence, the principles of colour applicable to the built environment, and therefore to architects and interior designers in practice, were discovered by the students involved. Results included the observable impact of hue in relation to spatial definition and an increased awareness of colour theory and its application to architectural spaces. These findings have direct implications for design of our built environments with particular application to interior design in times where space as a resource is limited.

### **1. INTRODUCING COLOUR and THE INTERIOR SPACE**

This paper reports on work undertaken by advanced colour design students to explore the effects of colour relationships on the perception of space with the intention of demonstrating how knowledge of spatial definition through colour use can be of value to interior designers and architects. As Swirnoff<sup>1</sup> states, 'Colour can shape or alter space; accordingly, its dimensions can become a sensory basis for building form. The designer, as well as the painter, can shape the urban or environmental field by considering color at the onset of the design process, integrally, as one of its constituents'. The focus of this paper is the spatial impact of colour on interior environments. The spatial dimension directly impacts on environmental qualities including mood, image, and contextual integration.

**Colour juxtaposition:** This work builds on the theory of colour relationships where phenomena such as movement, height, and depth can be explained through the juxtaposition of various shades, tints, and tones. Before describing the two casestudies, which are the focus of the current project, a discussion of colour juxtaposition is included to provide background information to the research. Firstly, the ordering principles that the Gestalt psychologists identified and in particular the figure-ground relationship; that is, we perceive some aspects of our visual world, which are located on the same plane, as being dominant objects or surfaces (the figure), and therefore, to be 'in front' of other components (the ground). Secondly, certain colours have spatial qualities that differ from others; that is, the tendency for some colours to advance and for others to recede. Albers series of squares of green, for example, with differing degrees of lightness and darkness clearly move into the picture plane and out of it. Experiments by Albers<sup>2</sup> and the subsequent exercises by Swirnoff<sup>1</sup> applied to not only colour planes but also to objects, reflect some of the research into the effect of colour on these understandings of relative positions within our surroundings.

**Tone, tint, and shade:** If we dissect our surroundings in terms of the degree of blackness and whiteness within any combination, then we are able to identify how areas tend to divide, to dominate, to merge, or the like. The result varies from a highly defined to a rather blurred effect. We can therefore identify how the various colour scales can inform our decision making as designers. In association, the degree of contrast becomes important. The colour space assists us to deliberately manipulate our perceived world in a number of ways. Firstly through dark and light contrast, secondly degrees of chroma—greyness or purity, or the pure hue in contrast to its tints and/or to its shades. The overall effect influences how we skim the data and order the information. We construct hierarchies by prioritising information such as mass and perceived weight. This is most readily observable when browsing the newspaper. The black and white layouts use type of font, bold print, density of text, and the like to assist the reader to find the articles and the key points. However, the same logic is also relevant in the use of materials in structures and interior architecture. Over history and across cultures,

we can refer to many examples where the base of the building is constructed from a deeper coloured stone and/or the interior walls are decorated with deeper shades below the dado rail or picture rails.

**Natural value:** Hues also have a natural value when compared to other fully saturated members of the colour wheel; the most extreme contrast of the twelve part colour wheel being yellow to violet. Therefore, similar relationships identified for achromatic schemes may be attempted in pure hue combinations. It is therefore predictable that particular areas will also tend to divide, to dominate, to merge, or the like depending on the hues selected. The interpretation of mass, movement, depth, and height will be effected because of the particular combinations constructed. Itten<sup>3</sup> in his book *Elements of Color* describes the relationships described by Goethe. Each of the pure hues was designated a numerical value corresponding to its brightness. Goethe proposed that yellow is three times as strong as violet and as a consequence.<sup>4</sup> As the proportion of one to the other changes the combination can become more or less dynamic and expressive.

## 2. EDUCATING INTERIOR DESIGNERS FOR ADVANCED SPATIAL UNDERSTANDING

To challenge interior designers to move from simply adding colours, studio exercises have been devised which encourage design students to explore and discover the effect and impact of colour in relation to space and form and include a number of two dimensional and three dimensional activities which aim to engage the student with colour. This process and the findings have been described in detail in *COLOUR and SPACE: An investigation of three dimensionality* by Smith<sup>4</sup> and won't be revisited here. It was concluded however that three dimensionality depends on a) inherent colour characteristics, b) relationships, and c) the particular context. It also serves to link colour effects with meaning and emotions.

**Aim:** The aim of the current work was to develop a more in depth understanding of how these principles can be applied to our built environment. It involved a small number of students working in a self-directed manner in the colour studio. The course work involved seminars and discussions as well as studio work. The aim of the course was to introduce to the student the principles of colour and light that are applicable to the design of the built environment. It was envisaged that on completion of the course the student should have developed a sound knowledge of the principles of perception in relation to coloured environments; an ability to manipulate form and space through the application of the theories of light and colour; an ability to define, explore and successfully resolve problems through project work in this field; and the skills to work in a team including the ability to communicate professionally his/her ideas verbally and visually.

**Method:** Understandings gained from initial project-work in conjunction with the knowledge gained from the introductory unit were applied to a full-scaled room or model. This required experimentation and the development of a visual strategy. The interpretation and emotional response to the resultant coloured environment was also to be explored. The investigation was undertaken in a space created through a module partitioning system supplied by SCI constructed from a 2400mm high metal frame clad with 600mm x 1200mm wide removable panels. The two case studies were each carried out on two sides of a four sided room. All panels were then painted to comply with a predetermined colour plan. The experimentation involved an exploratory approach based on action research where an initial hypothesis was made, tested, and reflected upon. Once the final coloured surfaces were achieved various lighting conditions were explored to demonstrate how the spatial qualities could be manipulated. In addition, a number of participants were invited to enter the space and comment on what they perceived to be happening spatially and emotionally in both situations.

## 4. THE CASESTUDIES

Two casestudies (GR and AB) will be discussed here to demonstrate the process. Each student was given two sides of the rectilinear room to use as their hypothetical space. It became obvious that the students' level of engagement was high and that the hours they spent experimenting and discussing each other's work was beyond the unit requirements. GR focused on the design elements and principles—balance, scale, emphasis, harmony, colour space, colour interaction, and lighting. She used as her starting point the description of the elements by Feisner<sup>5</sup> in *Colour: How to*

*use colour in art and design.* In addition, in order to help contextualise her investigation GR selected a palette suitable for a fragrance store. As she is also interested in texture she included material (netting) and wool strands in addition to paint. In contrast, AB was interested in two particular aspects or illusions—transparency and figure ground. To contextualise her work she reflected on the colour palette she had used in a first year design project and sought to extend her knowledge on how she could have manipulated the space more purposefully.

#### **Case study 1<sup>6</sup>: AB explores transparency and figure ground illusions**

AB sought to explore how individual colours have a sense of spatiality. She elected to do this through an investigation of transparency and the principles of figure ground relationships. Most impressive was AB's strong strategy outlined below:

a. Mockup in greys/achromatic scales, which involved a panel completed using strips of varying widths and positions on the grey scale, to explore spatial relationships. This combined theory and practice to identify the most satisfactory relationship.

b. Experimenting with shadow effects to see the difference in the spatial relationships when the combination took on the appearance of a darker palette. 'the portions of some stripes in shadow appeared to become luminous while others disappeared from view entirely...the stripe on far right was apparent in shadow but disappeared when a portion of it was exposed to the light and dropped backwards (receded) at the panel's edge...' (AB6)

c. Accidental 'reverse background' to the selected hue pattern and reflections. The integration of a purple background that was much darker compared to the original grey scale 'gave almost the exact reverse of the effect of the grey scale experiment; it was as if I had relaced the white background with a black one.' (AB:3)

d. Select desired combination: AB deliberately wanted to 'give the impression that the wall was moving away from you, as though one could almost make their way down a corridor through the centre of the trees. [stripes of colour] Thus, I set out to create the illusion that the 'trees' on the far side of this wall were close, and that those in the centre were more distant.' (AB:5)

e. Created composition 'Norwegian wood': Although AB understood that some of her observations had been reported previously, she came to actually experience them and to raise questions about why these phenomena may be occurring. For example: 'Therefore, there is a tendency for figures whose colour of the ground to be dominant and to advance or appear as though they are in front of the plane. Contrary to this, figures whose colours closely resemble that of the ground tend to merge with the ground and drop out of view'. ... 'this knowledge is highly valuable for planning the arrangement of the colours of walls.'

f. Transparency: AB commenced with some knowledge of Swirloff's work and how through the placement of colour planes an illusion of transparency can be created. This was done by using solid modules of 1200 x 600 in differing purples as noted earlier. The question AB set for herself was to see if translucency could be achieved by using tonal intermediaries rather than hue intermediaries as Swirloff had shown. AB concluded that this was not achieved reflecting that in addition to the modular definition and the small viewing distance in the room, that 'although the colours appeared to be tonal intermediaries of each other, the effect of this in this case was that their spatiality was dramatically different. Instead of being read on one plane, the colours moved in space.' (AB10)

The findings by AB directly inform interior designers in general of the power of colour when applied to space. She felt that her knowledge had grown and that her findings raised questions for others to address.

#### **Case study 2<sup>7</sup>: GR explores the principles of design using colour**

Some of GR's reflections in relation to some of the elements investigated are included. Through these investigations, observations and reflections, the student came to understand in a first hand manner the influence of the relationships on what she and others were observing. This was particularly rewarding when the student had initially stated that they had trouble dealing with theory and technical aspects and instead enjoyed the practical or more 'creative' aspects of design. Through this project the student came to understand colour through her own research, which was also her creative practice.

*Rhythm* is important to designers as it is a means to order spaces and create unity while embracing diversity. GR experimented with combinations of red against white and grey stripes and panels and

observed: ...the repetition of red vertical lines against achromatic background created a 'sense of energy' ;and... 'concentration of lines to left of lime panel gradually becoming sparser to either side of it, thus allowing the eye to move comfortably within the composition.' GR:7) GR aimed to explore Feisher's comment that repetition can 'impart the feeling of movement to then impart a vibrating motion' and that 'the sense of progression imparts motion' (GR:6) *Balance* was explored by using differing hues, differing proportions, and placing the colour in asymmetrical combinations. The following quote reports on some of her reflections. '...inverse proportions of warm(red) and cool colours (lime) were used. The thickest red lines were positioned closely to a much larger lime (S 0560—G70Y) panel to emphasise contrast of hue. Other fine red vertical lines were positioned throughout the composition but due to minimal proportions, they do not detract from the focal lime panel. Therefore, asymmetrical balance was achieved through contrast of values and proportion of hues. (GR:2-3) *Scale* was also explored through the extent and intensity of the colour area. Observations made included that pale lime sliver on grey were ignored in contrast to the larger panels of lime. Also the fine red on white background had a greater presence. 'the hue [red] did not melt into the white background but instead layered it. Unlike the slivers of lime which had white added to them, the original lime panel was not altered and its visual impact appeared to reflect that...therefore, colour and scale were effected by the amount of hue (in proportion to other hues) applied and its boldness (intensity). (GR:4)

## APPLICATION AND CONCLUSION

In this paper an investigation of two students undertaking an advanced colour studies elective is introduced. The assumption underpinning this project was that the quality of the interior environment is influenced by the purposeful juxtaposition of contrasting hues, tones, tints and shades because these relationships affect how we interpret spatial relationships. Its relevance of this knowledge for interior designers is evident. The first student explored the design language through the application of colour relationships such as contrast of extent and hue which can dramatically influence what we perceive. The second targeted how the illusion of transparency and figure ground can manipulate spatial quality and colour appearance. The impact of the scale of the space, viewing distance, and the spatiality of each of the selected colours was demonstrated to be important. Both revealed the importance of the context of colours in how they appear and how they 'behave'. In summary there were clearly observable impacts of the selected hue in relation to spatial definition.

The emotive impact of the colour combinations were not described as fully in terms of mood but were in terms of intensity and the effects of scale. Observers were invited into the space but the results are less conclusive due to the low numbers. For example, observers of AB and GR space were asked to describe their initial reaction and how they felt within the space. For example respondents noted: 'Exciting and uplifting' (Observer1—GR); 'Trippy. Busy at one stage, calming at the other. Don't even want to look at Norwegian Wood [striped wall]' (Observer2—AB); 'Transparency wall is secure, really like this wall.' (Observer3—AB)

Through this investigation increased awareness of colour theory and its application to architectural spaces has been achieved. This potentially forms the basis of further research where greater control of colour selection and observations can be monitored. This initial study serves to identify deep understandings for each individual student rather than striving for generalisable data.

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## References

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- 6 Allison Boynton, Research report and reflections, Interior Design Program, QUT
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