

Colour as Idea: The Conceptual Basis for Using Colour in Architecture and Urban Design

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In schools of architecture and urban design, particularly in the United States, colour is rarely a subject of serious inquiry in the design studio. Colour often appears in the final phase of the design process, and the reasoning for colour choices is almost never questioned. Colour is considered secondary to building form and structure, reflecting attitudes held by many design professionals since the Renaissance. Critics in architectural reviews often refer to colour decisions as 'difficult' to discuss rationally, representing personal views that are inconsequential. The methodology presented here is an attempt to make colour consequential as an integral part of the three phases of a design process: the conceptual phase, the schematic/form-making phase and the design development phase. When this is achieved, colour decisions become part of the generative conceptual ideas of a project, and these can influence all phases of the design process. Colour can clarify and define space, form and structure. In the design development phase, the final colour decisions are focused and specific. The role of colour in design can serve as a complement to the traditional visual elements of line, structure, form and detail. This design methodology specifies how colour is used in the three phases: colour dynamics in the conceptual phase, colour tectonics in the schematic/form-making phase and colour imagery in the design development phase. Using colour as a means for recording the experience of a pedestrian view of the city is an additional emphasis in urban design. This is accomplished with experience maps, and using colour to represent the life of the street through street activity diagrams.

Introduction

Aristotle, in his *Poetics*, established the rationale used in the 'disegno versus colore' debate during the Renaissance. This rationale argued that colour is secondary to pure line drawing. Charles-Edouard Jeanneret, the architect known as Le Corbusier, influenced attitudes toward colour in architecture that are still held today. In a series of newspaper articles, written in 1911 and later published in *Le Voyage d'Orient*, 1965, Le Corbusier describes a trip to the Orient in which nearly every entry becomes a poem to the ecstatic experience of colour. In the 1920s his views change. Chromatic colour is separated from 'whiteness', which he considers synonymous with order, purity, truth, and architecture. This attitude, combined with similar views from contemporaries such as Adolf Loos, who associated white with the colour of heaven, and Theo van Doesburg, who considered white the spiritual colour of the times, established white as a symbol of the Modern movement in architecture. In 1920 Le Corbusier wrote *Purism* with Amedee Ozenfant. In these writings he compared architecture to painting, and the importance of colour was recognised. White retained its dominance, but the existence of other colours was considered secondary but ordered by a set of rules or 'scales', which he used in his own architecture until the time of his death in 1965 [1]. These colour rules were never as influential as his beliefs surrounding the concept of 'whiteness' as a symbol for modern architecture. Except for some experimentation with colour and form in the DeStijl movement (1920s),

and with colour imagery in the Post-modern movement (1980s), many of the attitudes that subordinate the role of chromatic colour in architecture still hold today. The belief that the status of colour in architecture and environmental design can be elevated to a primary role is the challenge. The methodology presented here addresses this issue.

Architectural Design

There are many methodologies that are utilised in an architectural design process. Most include a conceptual phase, a schematic/form-making phase and a design development phase. Central to the conceptual phase are two components:

1. A formative *idea* or concept, and
2. A *diagram* that becomes an abstraction of the idea in drawing.

The role of the diagram is to translate idea into form using drawing language belonging to the vocabulary of architecture. Methodologies by Louis Kahn, architect, and Douglas Graf, design theorist, illustrate this. Kahn would ask the question, ‘what does the building want to be?’ The answer was always given as a metaphor, which became the generative concept. He referred to the diagram as a ‘form drawing’. These were quickly drawn shapes and images that represented the concept and defined the ‘inseparable parts’. The parts were categorised as ‘servant’ or ‘served’ spaces and each was drawn in a manner that suggested their structural nature. The metaphor for the design of the Repertory Theater in Fort Wayne, Indiana, was a violin inside a violin case. The ‘violin’ was the theatre, which had precise acoustical requirements, and the ‘case’ was the protective outer shell of the building surrounding the theatre, but having no contact with the ‘violin’. The spaces in between the two were for the functional requirements of circulation, ticket office, lobby, etc.

Douglas Graf, Ohio State University, teaches a branch of architectural theory called formal analysis. Formal analysis is a reductive process, which ‘loosens’ a building into constituent parts and their relationships to one another. In the diagram, these components are reduced to simple points, lines, planes or volumes. The diagram includes both the configuration of the components as well as organisational strategies. Important to the diagrams are figure/ground juxtapositions which are shown as notations of centre and perimeter [2].

In formal analysis, the Villa Farnese at Caprarola, can be diagrammed as a point in space, and Piazza del Campo, Siena, as a void surrounded by lines forming a perimeter. Both are figure or *centre* (Figures 1 and 2).

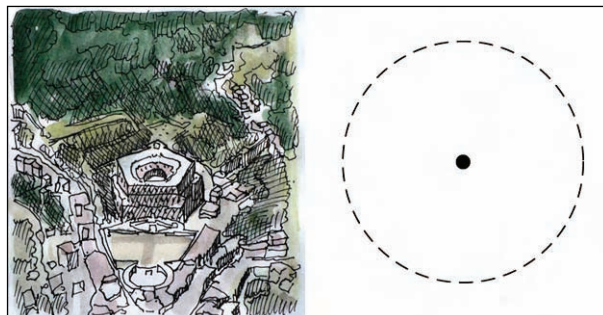


Figure 1 Villa Farnese, Caprarola, Italy; figure as point in space



Figure 2 Piazza del Campo, Siena, Italy; figure as void

Graf's analytical drawings of Louis Kahn's Meeting House at the biological laboratories at the Salk Institute in La Jolla, California, show a central space as figural (Figure 3). The perimeter consists of a series of connected buildings, each with their own centres and perimeters [3]. As in the Repertory Theater, there is a hierarchy in the components that represent organisational strategies in the diagram.

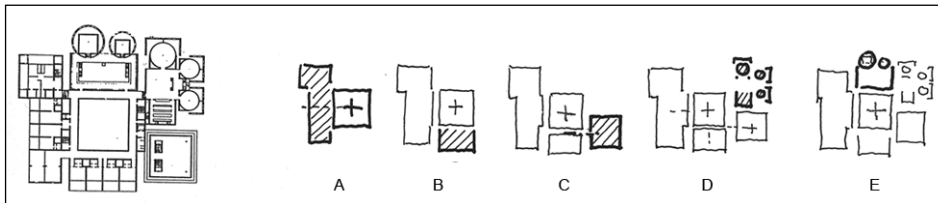


Figure 3 Salk Meeting House; plan and analytical diagrams showing an organisational strategy

The addition of colour to these design drawings can both clarify and serve as 'interpreter' for the *concept*. Colour can become a component or 'partner' in the form drawings, and has the capacity to enhance the concept. Three roles that colour can play in the design process are defined here:

1. Colour dynamics
2. Colour tectonics, and
3. Colour imagery.

Colour Dynamics

In the conceptual phase of the design process, line diagrams are used to represent an abstract relationship of the essential parts of a building. These parts can be described metaphorically or formally. The relationship and juxtaposition of these parts to one another creates the generative idea that is the concept and point of departure for the design. These drawings are usually monochromatic. If one assigns colour to the parts in these diagrams representing, in the designers' eyes, the character of the part, then colour contrasts or juxtapositions between the parts will represent the dynamic relationship of the parts. Red/blue contrasts may be active/passive, saturated hues may be dominant, and muted hues subordinate. These new juxtapositions can represent events in the experience of architecture, i.e. hierarchy, opposition, separation, connection, transition and assimilation. The colour choices in the conceptual phase, although abstract and diagrammatic, will begin to influence choices in lighting, materials, and surfaces that continue throughout the design process (Figure 4).

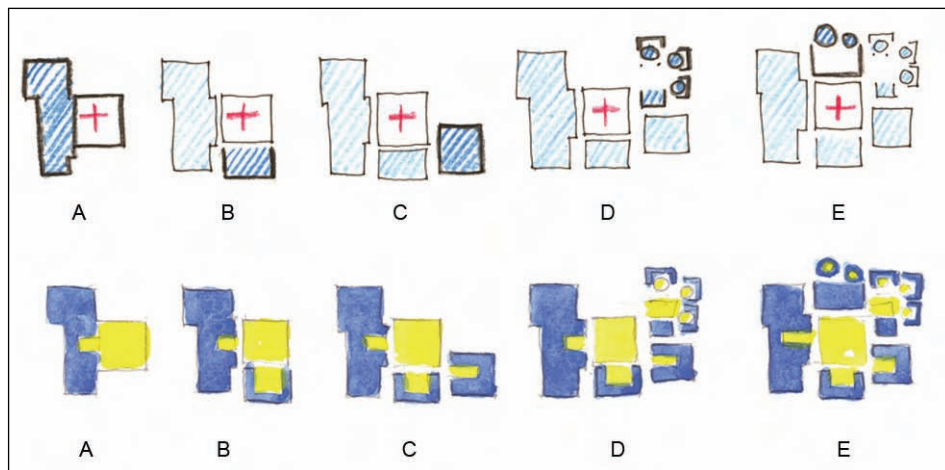


Figure 4 Salk Meeting House; colour dynamics in analytical diagrams

Encouraging colour experiments in architectural design studios is not commonly practiced, but students of painting and graphic arts are familiar with colour/form design projects. Painters, including Johannes Itten, Paul Klee and Joseph Albers, who used colour dynamics in their design studio exercises, taught early design classes at the Bauhaus. Bauhaus colour exercises are still used in some schools of design, but usually not as a part of an architectural curriculum.

Colour Tectonics

In the schematic/form-making phase of architectural design, rough plans and building sections are investigated with form and massing studies. Most often, form studies are monochromatic models, built in cardboard or foamcore. In these models form is usually defined by shade and shadow. As these studies become refined, tectonic articulation adds further complexity. Here, the addition of colour becomes important, particularly dimensional colours that define figure/ground juxtapositions (Figure 5). Again, techniques familiar to students of painting and graphic arts, as well as those from Bauhaus teaching, are foundations for these studies. The work of Lois Swirnoff, *Dimensional Color* [4], is important background for colour tectonics, and the paper 'Figural Colour in the Seattle Cityscape', by Minah [5], describes colours that become figural in urban settings. Colour tectonics is most often used for the definition and clarification of form and detail, but it has the potential to obfuscate three-dimensional form. Colour and pattern strategies from camouflage techniques can be useful in projects that blend architectural form into a background context. Architects who intentionally 'deconstruct' architectural form as expression are familiar with techniques employed in colour tectonics (Figures 6 and 7).



Figure 5 Defining structure and detail with colour contrast

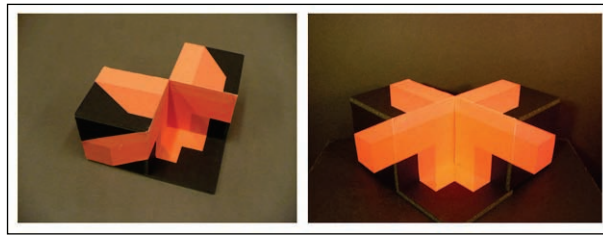


Figure 6 Colour used to deconstruct form



Figure 7 Light/dark contrast obscuring form

Colour Imagery

Colour imagery is the subject where most attention to colour in architectural design has been placed. These are the colours one experiences perceptually in architecture, which convey materiality, physical context, cultural context, symbolism and emotional response, as well as imagery related to conceptual goals and form definition. There is a body of research in the areas of colour and culture, colour symbolism and the emotional response to colour that serves as a foundation for colour decisions in the design development phase of this methodology. The work of Jean-Philippe Lenclos in designing with contextual colours from nature, and Bente Lange's colour methodologies applied to historic urban contexts, are valuable resources to architecture and urban design in design development. In this phase, the student is building upon colour decisions from the concept and schematic/form-making phases, and the colour choices here are focused and specific. The goal throughout is to make the colour choices an evolving development through all phases of the design process. The final colour imagery will be based on knowledge from the field of colour, and integral with the architectural form, and the conceptual beginnings of the design.

Design of the City

The design of the city, like architecture, begins with a conceptual point of departure. There are many methodologies used in this process. Most urban design focuses upon changes in existing cities, i.e. intervention, renewal, expansion, design of infrastructure, densification, etc. The comprehension of the city form and its conceptual beginning are primary to this work. The first step in the design process is the representation of the urban fabric diagrammatically. As in the previous example of the diagram of Kahn's Meeting House at the Salk Institute, the city can be represented as a complex series of interrelated parts that form the constituent elements.

These parts, in turn, can be vicinities or neighbourhoods at one scale, and details of public/private interactions at another. The components that make up paths, edges, districts, nodes, and landmarks [6] are translated in the diagram as lines, perimeter, centre and figure. The intrinsic sense of wholeness, or city as object is ever present, and therefore pieces of the city can be referenced as the relationship of the part to the whole. This part-whole paradigm with its implied hierarchical set of relationships suggests foreground/background juxtapositions and, like the architectural design methodologies, will use some of the visual means described above for representing these components graphically. A challenge in urban design is to represent graphically not only the physical form of the city, but the experiential qualities as well. Two drawing examples of particular interest to this study represent the experience of a city as well as its physical form:

1. The Nolli map of Rome [7] uses figure/ground drawings to show the public and private realms of 16th century Rome
2. Louis Kahn's traffic plan for mid-town Philadelphia, Pennsylvania, uses movement symbols as the primary component [8]; arrows represent the direction and volume of traffic, and the system of streets is analogous to waterways and harbours.

Colour and Urban Design

Colour is used more frequently in urban design drawings than in architectural design. The primary use of colour in urban design is to categorise and clarify large amounts of visual information. Comprehensive plans and land use maps of cities use standard coded colours to represent the use patterns of a city. Digital technology has provided the easy access to city maps, plans and aerial photography of cities. These can be layered and manipulated with endless combination of colours, and some very comprehensive representations of urban form have resulted (Figure 8). Of interest is the use of colour to represent quantitative census data visually in city plans. Each data type (e.g. population, income) has a specific colour. When two or more data types are layered in transparent colours, additional colours will emerge as clusters of new information [9].



Figure 8 Land use map, King County, Washington

City and Experience

Most representations of the city contain information showing physical form and/or quantitative data. The city, unlike most architecture, is difficult to experience as form in its entirety. One experiences the city as fragments over time. How one forms a mental image of the city when experienced over time from an eye-level perspective is of interest to urban designers. Kevin Lynch used the term 'place legibility' in an investigation of ways people attempt to navigate and interpret the physical form and structure of the city [6]. Amos Rapaport defined 'environmental cognition' as that which is based upon multiple experiences with repetitive pieces of the city that are logged in a memory bank, and are then compared to new visual experiences [10]. This cognition aids in forming 'mental maps' of the city.

Addressing these issues, the *experience map* is a record of the colour one experiences as a pedestrian in a city. This is plan view of the city showing individual building footprints. In these building footprints, the colour and elevation patterns are recorded within a cone of

vision from the opposite side of the street at eye level. The relative heights of buildings are represented by the thickness of lines outlining the buildings (Figure 9). Colour, elevation pattern and building heights are determined to be factors that contribute to visual harmony or lack thereof in an urban environment [11].



Figure 9 Rome and Seattle experience maps; building elevation, colour, pattern and heights shown in a plan view

Streets

Streets also play an important role in this urban fabric. In formal analytical terms a city street is a centre between two perimeter walls, and experienced as a volume, or room, defined by these walls. Streets are the largest public realms in the city. Streets also form the personality of a district within the city: its energy, its movement and the kind of public life generated there.

Two maps in the *Virgin City Guide* for New York City, illustrating the experience of street life are relevant:

1. 'Top Shopping Zones' showing districts in colour, streets as voids, and bands of red (R) along the blocks in varying intensity where shopping occurs
2. 'Night Time Hot Spots' shows streets in light violet (RB), blocks in darker RB (night imagery), and areas of nightlife in circles of YR in a range of sizes depending upon the activity [12].

A third map, the *Touring Club Italiano Roma* map differentiates streets as white voids and traffic arterials as continuous yellow lines [13].

Art and City Form

Mondrian's 'Broadway Boogie Woogie' stands out as an example of movement and energy in an abstraction of a city map that represents the Broadway district of New York City. The streets are yellow with red and blue squares appearing in a broken rhythm (Figure 10). Larger blocks in red and blue become figural nodes, and the totality is an energetic moving stream [14]. Paul Klee in his Bauhaus teachings developed a vocabulary of lines and patterns to show many types of movement [15].

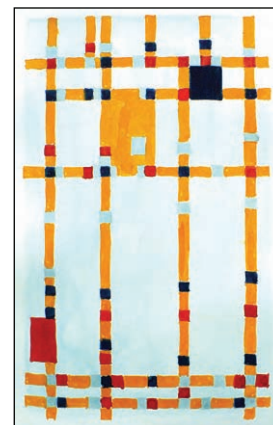


Figure 10 *Broadway Boogie Woogie*, showing street energy and rhythm (P Mondrian)

Colour and the Street Experience

A purpose in this study is to find a way of representing the multiple experiences of the street in drawing. One proposal shows information that will include pedestrian and traffic volumes, and identification of activities that give life to the street (i.e. retail stores, restaurants and food venues, bars, music venues and theatres) (Figure 11). This drawing shows traffic arterials in yellow in varying degrees of chromaticness indicating volume and intensity. Lines in orange, parallel to the street, show vehicular movement. Line width indicates volume. Pedestrian movement is shown in dashes parallel and on the periphery of the street in darker analogous colours. Volume is shown by the quantity of dashes. In the sidewalk space in plan, in front of every building is a rectangle of colour coded to activities that give life to the street. Red is used for retail shops, blue for bars and music venues, and black for theatres. This colour plan would be shown for all streets in the city. The *street activity diagram* is the terminology used for these drawings, which can be combined with the experience map (Figure 12).

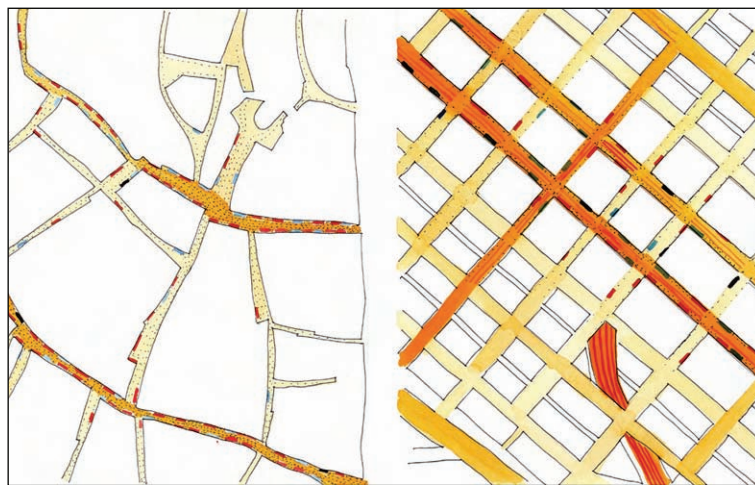


Figure 11 Rome and Seattle street activity diagrams representing movement and public activities



Figure 12 Rome and Seattle experience maps with street activity diagrams

Conclusion

The goal of these studies is to show how colour becomes a component and partner in all phases of the design process in both architectural and urban design. Colour dynamics, colour tectonics and colour imagery describe roles colour can play in the three phases of a design process. In urban design colour can represent experience in drawings of the city, and these aid in the

process of cognitive mapping. A future study is to represent an entire city with an experience map showing colour, elevation pattern and building heights from a pedestrian view, and a representation of the life of the street with street activity diagrams. Colour and pattern will comprise the visual vocabulary. The repetition of elements in this map will form constellations or clusters of information recalled from experience and memory that become meaningful from many points of view. One might read these maps like an abstract expressionist painting in which colour patterns emerge from the complexity of the total colour field (Figure 13). These repetitive patterns represent simultaneous experiences seen holistically.

The experience map is like the 18th century garden carpets of Kurdistan that represent both real space and the imagery and experience of the garden. These maps have the potential to represent not only real physical space, but the experience of place as well.

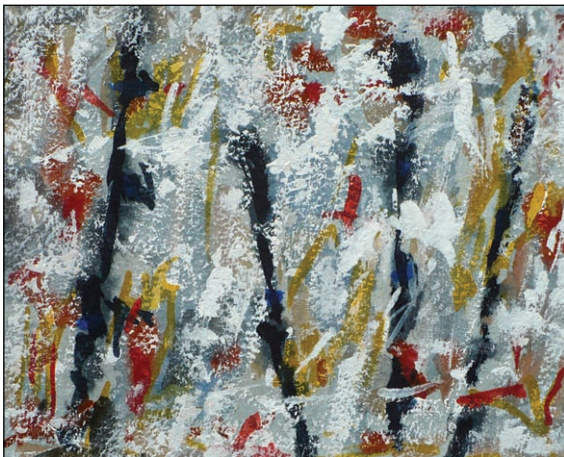


Figure 13 Colour constellations in an abstract expressionist painting: *Blue Poles* (after Jackson Pollock, 1952)

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