THE ROLE OF ENVIRONMENTAL COLOUR

by

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Abstract

This thesis reviews the role of environmental colour, that found on the large manmade surfaces of pavements, facades and roofs. In addition, it provides a conceptual framework for the planner 'to think through' urban colour, that is, to reflect fully upon as a basis for developing strategies and evaluating options.

In the built environment, colour is an essential, ubiquitous, enjoyable, and, now, highly topical element. However, much of the available information is, to the planner, too specialized, complicated by unresolved debates or dated.

Therefore, to clarify the subject concisely and creatively for the planner, this thesis reviews pertinent literature, with material mainly drawn from architecture, fine arts, geography, optics, psychology, and urban design. Examples of recent or renowned uses of environmental colour, primarily from the 'Western' world for reasons of similarity of culture and climate to Canada, supplement the literature review.

As a result, this thesis reveals to the planner that environmental colour may be thought through in terms of 'Place' and 'Power' and that, far from playing one principal role, environmental colour has many precise parts. Each of the surfaces on which colour occurs offers different constraints and opportunities for colour use. At various scales of perception, different factors also influence such use. Colour's power is both spatial, to transform the appearance of our surroundings
through changing light conditions, surface spectral qualities, angles of perception, and synaesthesia, and psychological, to influence our well-being, through arousal, pleasure, and control. With this 'Power in Place', colour's symbolic, aesthetic, and functional values modify its six main roles, Background, Meaningful, Timely, Circulatory, Illusory, and Pictorial, to produce the array of precise parts which range from 'Backdrop' to 'Advertizer'.

To realize the importance of these parts, the planner promotes 'thought through' environmental colour through strategies of education, exemplification, encouragement and enforcement, and through the contributions of various professional roles. However, more research is still needed about colour's environmental potential and the public's preferences in order to develop clear colour policies, especially if, as Ellen Marx (1972) confidently predicts:

La tâche de l'urbaniste futur sera sans doute d'approfondir les critères qualitatifs et quantitatifs de la couleur et de la lumière, en collaboration étroite avec des biologistes, des psychologues, et des sociologues qui auront défini les besoins fondamentaux de silence, de l'espace, d'information et de communication de l'être humain.

(The task of the future urban planner will undoubtably be to deepen the qualitative and quantitative criteria of colour and light, in direct collaboration with biologists, psychologists, and sociologists who will have defined the fundamentals of silence, space, information, and communication needed to be human.)
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Introduction

(1) Setting the Scene

In 1925, architect Bruno Taut, then artistic director of Berlin's public housing's planning division and a leading advocate of colour as an integral element of town planning, gave a lecture on "The Rebirth of Colour". In it he stressed:

Everything in this world of ours has to have some colour or other. All of nature is colourful, and even the grey of dust or soot, even the most depressing and melancholy places always have their own typical colours. ... And since every object in nature has its colour, everything human beings create must be thought through in terms of colour too.'

Taking 'to think through' to mean 'to reflect fully upon as a basis for developing strategies and evaluating options', how can the modern urban planner, concerned with the physical environment and aware of a recent 'rebirth' of colour in townscape, 'think through' something as large and complex as a city in terms of colour?

(2) The Purpose of the Thesis.

In answer, this thesis examines the role of the dominant urban colour, that of the built environment formed by pavements, facades and roofs and encompassing both structures and the spaces
between them.

The primary purpose is to review the role of environmental colour, paying special attention to knowledge needed by the planners promoting 'thought through' environmental colour.

The secondary purpose of this thesis is to develop a conceptual framework for structuring and organizing material in a way which permits the planner to 'think through' environmental colour.

(3) Rationale

The need for this review and framework derives from a number of related reasons.

Above all, as Patrick Nuttgens observes in *The Landscape of Ideas*, the basis for planning the modern city is understanding man himself.\(^2\) Although colour is defined as the "aspect of things that is caused by differing qualities of light reflected or emitted by them",\(^3\) without an observer colour does not exist.\(^4\) Our decisions influence the place of colour which, in turn, has the power to affect our emotional well-being and our environmental perception.

More specifically, colour, as an attribute of every material, is a vital element of our surroundings. However, as Joseph Esherwick explains:

colour in the 'natural' world, the world of animals, insects, plants and fish, is used in a purposeful and
functional way. Man, on the other hand, appears to be burdened by having to think about colour, to study it, to make an issue of it, to design and plan for its use. Every manmade object, therefore, represents a colour choice, either 'thought through' or spontaneous, by its maker or designer.

In addition, environmental colour not only interests the public, but is in the public interest. Enjoyably expressive, both of qualities of light and of associated emotional values, colour is "necessary to the total man, the psychic and spiritual one as well as the physical one."

Furthermore, colour is currently a topical issue. Signs of a 'rebirth of colour' are all around, variously seen on pavements, facades and roofs that are new and colourful, recent and repainted, or old and restored. This development, partly a general reaction against previous environmental drabness and partly a particular attribute of the Post Modern movement, is characterized by a lack of traditional guidelines for colour use and by an abundance of eclectic experimentation with colour.

However, for planners seeking to learn more about this chromatic resurgence, much of the available colour literature is either too specialized, complicated by unresolvable debates, or dated.

Colour research occurs in many fields, often presupposing a previous knowledge of issues. These fields include: anthropology, archeology, architecture, biology, chemistry, fine arts, geography, neurology, optics, physics, physiology,
psychology, and urban design. All too often, inter-disciplinary data is poorly connected and communicated, so that the non-specialist, as Sir Hugh Casson complains in the Preface to Colour for Architecture: "scientists and artists make of colour a professional mystery." 

Recurrent, unresolvable debates also complicate the literature. Currently, they often occur, to use Charles Jencks' terms, between 'Post-Moderns' such as Michael Graves and 'Late-Moderns' such as Arthur Erickson. Topics for debate include whether colour should mainly (1) be intrinsic or applied; (2) draw from an achromatic or chromatic palette; (3) feature primary or secondary hues; and (4) be used to make surfaces blend in or stand out from their surroundings.

By learning more about environmental colour the planner, acting at "the interface between knowledge and action," gains a better understanding of the places, the people, and the times for whom he or she plans.

(4) Methodology.

Research for this thesis involved a literature review of material pertaining to environmental colour, supplemented by recent or renowned examples of the role of environmental colour, often illustrated. The process had five main steps: (1) searching for relevant material and examples; (2) sorting data into distinct areas; (3) studying it for pertinent themes; (4)
synthesizing findings into a theory of colour's power and place; and (5) structuring the resulting knowledge.

The literature review draws on material from several diverse fields, especially architecture, fine arts, geography, optics, psychology and urban design. The literature represents the views of several noted advocates of environmental colour, both academic and popular.

Several of the more academic advocates are: (1) in Sweden, Dr. Lars Sivik, of the University of Gotenburg, a psychologist concerned with the systematic analysis of the meaning of colours, particularly those found on exteriors; in England, Tom Porter, of Oxford Polytechnic, author and editor of two solid books representing the views and activities of a range of researchers and practitioners of environmental colour in art and architecture; (3) Dr. Peter Smith, Director of the Design and Psychology Research Unit at the University of Sheffield, known for work on aesthetics relevant to colour; and (4) A.C. Hardy, now retired from Newcastle University, specialist on the impact of large-scale manmade surfaces in rural settings.

More populist advocates of environmental colour include: (1) in Germany, the trio of Martina Duttmann, Friedrich Schmuck, and Johannes Uhl, co-authors of a popular book, Color in Townscape, intended as a "handbook in six parts for Architects, Designers and Contractors, for City Dwellers and other Observant People;" (2) in the United States, Faber Birren, author of many books and articles on all aspects of colour and a consultant to industry and government on colour concerns; and, (3) in Canada, Hubert
Roigt, a popular Quebecois proponent of 'thinking through' colour who urges in his conclusion to La Couleur: "ne laissez pas à la jeunesse l'exclusivité de la couleur. Il y en a pour tous." 11

However, since 1982, also the date of a controversial and colourful landmark, the Portland Building, the literature makes few direct references to the recent resurgence in the use of colour in the built environment. Instead, journals tend to discuss colour as a feature of a particular building, architect or stylistic movement.

Thus, to supplement the literature review, this thesis includes examples, often illustrated, of recent or renowned uses of environmental colour, primarily drawn from Vancouver but also from elsewhere.

(5) Limitations

Since a city is very large and complex to be 'thought through' in terms of colour, this thesis limits the topic in four main ways.

First, this thesis only considers the role of exterior, not interior, colour. This is partly because the former, not the latter, is usually the planner's concern, and partly because the conditions influencing the use of colour on inside and outside surfaces are vastly different. Above all, exterior colour is more likely than interior colour to be regularly in the public view; to experience more variable and harder to predict lighting
conditions; to suffer the effects of weathering; and to occur on surfaces that have a larger area, are three dimensional rather than two dimensional, and are convex rather than concave.

The second basic limit restricts the topic to colour in the built environment rather than in nature since, in most cities, the former not the latter predominates. Moreover, as Ruskin observes when discussing architectural beauty, colour in nature, unlike colour in the built environment, "never follows form, but is arranged on an entirely separate system."¹² However, the colour of the built environment does derive from natural as well as manmade materials and often serves as a backdrop for landscaping arrangements.

The third limit is the focus on large-scale environmental colour, not details. In the built environment, colour derives from a combination of personal attire, display windows, traffic lights, automobiles, scaffolding, street furniture and architectural detailing on buildings seen against a backdrop of pavements, facades and roofs. These large surfaces provide a more fixed source of colour than the details and contribute immeasurably to the overall colour of a place. As the authors of Architecture and You: How to Experience and Enjoy Buildings, note:

When you drive into a city for the first time, the fleeting glimpse of an individual building, the textures and colours of the building's fabric...make a lasting impression.¹³

Finally, for reasons of similarity of culture and climate to Canada, most examples in this thesis come from North America and
Western Europe. This somewhat simplifies the many variations in colour use caused by differences in culture and climate, particularly regarding the choice of building materials, type of building technology, mental associations and religious customs, especially as found in Islamic and Oriental cultures. Nevertheless, unique and relevant examples of the 'non-Western' role of colour, such as at the Imperial Palace in Peking or, more recently, the environmental work of Venezuelan Op artist, Carlos Curuz-Diez, are included.

(6) Organization.

Overall, this thesis takes a deductive approach to reviewing the role of environmental colour, with particular attention to knowledge needed for promoting 'thought through' colour in the planning context.

Throughout, the organization of ideas is based on a conceptual framework developed to help the planner structure and organize material about colour that may seem highly subjective, contradictory or complicated to the non-specialist. This framework permits the planner to 'think through' the role of environmental colour from four angles, each represented in a chapter: 'The Place of Colour', 'The Power of Colour', 'Power in Place', and 'Promoting Power in Place'.

To begin with, Chapter 1, 'The Place of Colour', surveys the 'colour scene' in order to present essential information to the planner about factors determining the place of colour in the
built environment. In particular, this overview examines: (1) the constraints and opportunities for colour use offered by each of principal surfaces under consideration, namely pavements, facades, and roofs; and (2) the different factors influencing colour use at various scales of perception, especially the four scales of regions and cities, districts, streets, and buildings and details. When these surface and scale factors of place combine, colour plays several main roles, here named: (1) Background; (2) Meaningful; (3) Timely; (4) Circulatory; (5) Illusory; and (6) Pictorial.

Chapter 2, 'The Power of Colour', then offers more specific insights pertinent to the planner about how colour affects people. In the built environment, colour's power has both psychological and spatial aspects: the power to influence our well-being and the power to transform the appearance of our surroundings. Together, these aspects explain much of colour's symbolic, aesthetic and functional values.

Chapter 3, 'Power in Place', next seeks to improve the planner's understanding of the many precise parts colour plays when general roles combine with values. This chapter ends with a brief examination of the contributions to 'thought through' environmental colour that the planner can make through strategies of education, exemplification, encouragement and enforcement and through various professional roles: technocrat, public servant, bureaucrat, advocate, state agent, social learner or social reformer.14
Finally, the Conclusion summarizes findings about the role of environmental colour and recapitulates the framework for 'thinking through' environmental colour clearly, concisely, and creatively in terms of 'Power' and 'Place'. The Conclusion also offers recommendations to the planner about further involvement with environmental colour and suggestions to researchers for further study about an issue whose importance will only grow as we increasingly urbanize. Afterall,

the 'tone' of town life— the psychological relationship between environment and imagination— is also profoundly influenced by the quality and quantity of colours that we see every day.15
Endnotes


7 Birren, p. 29.


Chapter 1: The Place of Colour.

Whether sparkling in the sunshine or subdued in the shadows, colour surrounds us as long as sufficient light and at least one observer are present. As an initial step in 'thinking through' such an ubiquitous element, the planner acting at 'the interface between knowledge and action' needs to survey the 'colour scene' in order to understand where to set goals.

The dominant urban colour, that of the built environment encompassing both structures and spaces, derives primarily from three large-scale manmade surfaces, namely pavements, facades, and roofs, and exists at several scales of perception. For urban planners, these are, most notably, regions and cities, districts, streets, and buildings and details. At each scale, colour is one of the distinguishing features of a place's image. Overall, surface and scale factors regarding where we decide to place colour encourage it to play several important roles in the built environment.

(1) Surfaces.

Pavements, facades and roofs all have certain characteristics that offer different constraints and opportunities for colour use. At times, however, these qualities overlap. Roofs, for instance, when used as terraces resemble pavements and when set at steep angles correspond to facades.
Pavements and facades have tactile and visual qualities in common that allow them to serve as giant canvases for artwork. Used together, these surfaces three-dimensionally delimit structures and spaces in the built environment.

(1.1) Pavements

At the base of the built environment, pavements form the floor of the city, ranging in style from simple gutters to grand staircases. They serve as safe solid surfaces, occasionally punctured by drains, for facilitating the movement of pedestrians, vehicles and run-off water. Located near the eye of pedestrians, pavements are highly visible. As the authors of Architecture and You: How to Enjoy and experience Buildings explain:

when you walk, you look down more than you may realize. People are more aware of the walking plane than they are of walls ... And roofs.²

Overall, pavements are the single largest colour surface in a city. In Europe, granite setts traditionally provided the favorite common paving,³ while in North America, black asphalt predominates. Indeed, 'asphalt jungle' is an urban metaphor. Rudovsky vehemently complains:

streets pavements represent the low-water mark of the urban environment- square miles of patched asphalt of no discernible texture and color....⁴

The intrinsic colour of pavements is usually dark to disguise dirt and save money since pavements receive considerable
abrasive wear and tear. Applied colour, such as traffic markings, is usually minimal, both to avoid confusion and to reduce maintenance costs. Rain considerably alters the colour of pavements, especially when water collects and gains an iridescent sheen from oil slicks.

However, if pavements are primarily for pedestrian rather than vehicular traffic, their large size and easy visibility make them excellent locations for advertising, artwork and even 'aesthetic experiences'\(^5\) As Porter stresses: "the attraction to the floor plane seems a natural extension facade painting."\(^6\) In fact, the largest painting in the world was Artpark, a gigantic series of huge rainbow stripes adorning a carpark in Niagara, New York.\(^7\) The painter, Gene Davis, sees no reason why art should mainly be small, indoors or seen head-on.

\((1.2)\) Facades

Facades, serving as vertical edges to the built environment, are strong features of townscape, both visually and socially. They cue people as to appropriate activities and "being seen to do so; they direct or forbid."\(^8\) Typically, facades have three zones:

- a foundation or base that connects it to the earth or pavement, middle zone with its rows of windows, and a roof- zone, which terminates the building and sets off its silhouette.\(^9\)

When facades include both walls and windows, they offer a contrast between opaque and transparent colour. Historically,
there have been three types of ways in which a window is related to structure: as a hole in a masonry wall; as a glass filling in a cage of structure; or as an integral part of the structure, where the window and the wall are the same element.¹⁰

Less continuous than pavements, facades offer opportunities for different colour treatments both of background and foreground detail and in different directions around a building. By adding a chromatic third dimension, they provide shadowing effects both on themselves and on pavements.

The most prominent facade colours are those easiest to see. Looking up from street level, these are the colours of the foundation and first few stories. With aerial perspective:

as colors shift or fall back in the distance, that which is dark increases in value; that which is light in value softens a bit- and all things eventually fade into a medium light grey....In the old days when multistory buildings were given egg and dart or other decorative cornices, this ran contrary to the facts of aerial perspective.¹¹

Once seen, facades colour is memorable, leading to the observation that: "faces are unforgettable- in buildings as in people."¹²

Practically, facade colour helps or hinders vision depending on the amount of light reflected. White walls, for example, can be either a problem or a plus depending on the goal they fulfill. Birren, for instance, complains that "functionally considered, white is a bad colour. Where it is accompanied by high levels of natural or artificial light...it plays havoc with human vision."¹³ However, Duttmann delights in the intensifying effect
on light of whitewashed facades and pavements in Greece where white "takes on color from the Meditarranean air. First warm then paling as the day goes on, a white broken by sharp shadows and reflected by the colors of its surroundings."14

Above all, though, a consistant theme in the literature is the underdeveloped potential of facades as easels.15 Blank monochrome walls invite chromatic elaboration, whether as socially deviant graffiti or more acceptable, though still debatable, murals.16 Large scale wallpaintings are one of the most controversial urban colour topics, spurring community commotions over style and content.

(1.3) Roofs

Atop the built environment, roofs provide the dominant colour impression of a place when viewed from above or afar. Usually opaque, they sometimes have skylights and dormers or are occasionally made of glass.

At street level, flat roofs contribute less to local colour than sloped ones, whose hues provide a transition between the colours of the facade and the ever changing ones of the sky. However, awnings, as seen, for example along Robson Street in Vancouver, are an increasingly popular way of supplementing environmental colour when roof hues are not visible.

Chromatically, sloping roofs are not merely tilted walls. A.C. Hardy, after a systematic study of apparent chromatic
discrepancies between facades and roofs of the same material, noted that:

traditional roofs appear darker than walls. This occurs even though pitched roofs collect more direct sunlight, and is an almost universal effect caused by macro-texture, that is, the effect on surface colour of shadows projected from roofing elements.¹⁷

Flat roofs sometimes offer the same opportunities for environmental enhancement as pavements, with the degree of their visibility governing the amount of attention. For instance, a surface scattering of coloured pebbles atop the blue and orange apartment buildings bordering the Granville Street Bridge in Vancouver links the roofs to facades and provides a colourful foreground for passing motorists admiring the scenic civic view.

When structurally possible, roofs used as gardens and terraces and coloured accordingly give a unique dimension to urban living not known on the ground. Citing the example of the roof garden over the new garage at the historic Fairmont Hotel in San Francisco, Halprin stresses:

Up high on the roof there are views over other buildings, sunsets to see, a relaxing freedom from cars and other traffic, a privacy and intimacy which no other facility can bring and which are difficult to achieve at street level.¹⁸

(2) Scale

We see the combination of pavements, facades and roofs forming the built environment at several different scales of perception: (1) regions and cities; (2) districts; (3) streets;
and (4) buildings and details. Planning related literature, such as Boeschenstein's "Expressive Urban Colour" (1986), the Civic Trust's *Pride of Place* (1974), and Uhl's "Color Typology" (1981 in Duttmann) frequently refer to such scales as a means of classifying the complex influences on urban colour.

In certain places, such as Siena, colour use occurs mainly at the city scale, with only landmarks like the Cathedral differentiated at the building scale. This contributes character and identity to a place, so that, as Duttmann stresses, "certain colors and the moods they create seem to belong to a certain spot." Indeed, Siena even has a colour named after it—burnt sienna.

When there is more variety in scales of colour use, this, as Boeschenstein emphasizes, allows people to "relate to a range of scales and visually unify otherwise disparate environments."  

(2.1) Regional and City Colour

At this scale, civic customs and cultural preferences temper the effects of local geology, topography and climate to produce distinct urban colour, such as that of Jerusalem the Golden.

Traditionally, the regional supply of building materials, including limestone, clay, granite and slate, as well as soils for bricks and for pigments to dye stucco or woodwork, was the most accessible and affordable, with imported applied hues being signs of special status. Over the years, the combination of native materials with indigenous building styles contributed to
local character, as in the towns of northern Brittany known for their bluish grey slate roofs, facades, and even pavements. Today, however, with the increased availability of diverse materials, especially 'anonymous' concrete, the geological influence on urban colour is much less than in the past. Its influence on local colour is now most evident on roofs. As Roigt observes in an overview of North America's environmental colours:

Prenons par exemple les toits des maisons: les régions les plus chaudes de l'Amerique comme la Californie, la Floride, choisiront des tons pastels, des tons chauds comme le rouge, l'orange. Par contre, la préférence pour les tuiles bleues, une coloré plutôt froide, est surtout populaire au Minnesota et dans le Canada anglais. Dans le sud on aimera le rouge alors qu'en Nouvelle-Angleterre on préférera les tons gris. Au Canada français on vend surtout des tuiles de couleurs saturées, prouvant que les canadiens français sont bien demeures latins.

Topography affects the colour seen by providing various natural backdrops to the built environment. Most notably, flat land sets surfaces against the background blue or grey of the sky, while sloping land sets them against the background hues of the hillside rocks and soils, usually a warm red, orange or yellow, rich brown, or shades of grey and even dramatic black as in once volcanic areas such as Cap D'Agde in southwestern France. In addition, sloping sites expose more facades to overall view and permit a greater appreciation of roof hues. This can produce dramatic chromatic gradations such as the one Porter describes of Brixham harbour in Devon:

As if to celebrate their confrontation with the sea, houses descend from the upper levels of predominantly achromatic facades down to a climax of more saturated, contrasting and variegated colours on the harbour frontage.
The climate of the region determines the extent and quality of the vegetation, ground cover, waters and atmosphere against, by or through which environmental colour is seen. The quality of light also varies with latitude. In drier climates with sparkling sunshine, colour benefits from a lighter ground surface that increases the amount of both direct and and indirect light. In contrast, cooler, cloudier climates dull the saturation of colour. As Uhl notes:

even intense colours lose their brilliance in subdued light, which is perhaps why, in northern Europe, light and broken hues are so common in architecture- off-whites, light yellow, ochre, brown, pink, even light blue and purple.  

Different cities within the same region, however, such as Toulouse the 'Pink' and Albi the 'Red' in southwestern France do achieve chromatic identity by decisions based on "sympathy and tradition". In Florence, McCarthy observes:

the ochre-and-dun file of hotels and palazzi has the spruce, spare look of a regiment drawn up in drill order. The deep shades of melon and tangerine that you see in Rome, the pinks of Venice, the rose of Siena, the red of Bologna have been ruled out of Florence as if by municipal decree.

Only rarely, though, does a municipality actually implement civic colour schemes. Portoghesi states: "Turin, in fact, can boast perhaps the only example in the world of colour planned on an urban scale." There, in 1800, the Municipality set up a Council of Builders, which lasted until 1845, whose purpose was to develop and apply a colour plan for the entire city. Porter explains:
their concept was to invest principal streets and squares characterized by a uniform architecture with colours according to a co-ordinated system....The Council devised a series of chromatic pathways founded upon popular city colours. The major routes were interconnected by a network of smaller streets and squares for which secondary and more variegated colour sequences were prescribed. The basic scheme enlisted around eighty colours....

In 1978 the Municipality's Supervisor of Housing, Enzo Biffi Gentili, set up a restoration programme for this plan, which is now widely lauded and was the subject of a special conference.

(2.2) District Colour.

District colour largely derives from local activities, history or residents' ethnic background.

Just as zoning maps indicate different land uses by colour coding and we casually speak of places such as 'red light districts', the actual colour of neighbourhoods often demonstrates distinct variations based on local activities. Foote, in a detailed though dry study of colour in public spaces, concluded that different activities use very different colour schemes depending on the degree and type of interaction with the public. However, sites of greater monetary transactions, such as high-priced restaurants and shops, as well as banks, usually share the same type of colour scheme, which involves mainly cool 'elegant' tones, without seeming to confuse anyone with chromatic cues to behaviour. Boeschenstein also reports that district colour varies with land use. Most notably, residential and hospital zones generally have more subdued colours while commercial and entertainment areas tend to boast brighter hues.
District colour may also derive from the predominant materials used in a particular historic period, reflecting the technology and stylistic preferences. In Vancouver, Gastown is known for the warm red of bricks dating from the city's early days and complemented by new surfaces sensitive to the past.

In addition, the ethnic background of area residents influences district colour when they continue to use the environmental hues of their native lands. This is particularly noticeable in, for example, Chinatowns featuring a lavish use of traditional reds and greens. At first, because of differences in climate, such transfers might appear chromatically unbalanced. However, the new profusion of colour, Porter stresses based on British experience with West and East Indian immigrants, can influence indigenous residents to use more brightly coloured paints for external decoration.  

(2.3) Street Colour.

Street colour, according to specific typologies, such as Uhl's, actually occurs in four kinds of spaces: squares, courtyards, intersections, and the actual streets.  

Both activities and the visual relationships between buildings influence colour at this scale. Colour may express a desire for uniformity, as when Taut urged in 1929 that:

the aesthetics of the new architecture do not recognize any separation between...street and courtyard, between front and back.
More commonly, colour distinguishes space. The Civic Trust, for instance, stresses that:

a square might well have a different colour theme from a neighbouring street— for such changes of theme often coincide with changes of use and activity... There may be more opportunities for strong colours in a busy shopping street than in a quiet neighboring residential street, despite the continuity they have on the ground.  

Colour distinction at street scale may also have symbolic overtones. For instance, Japanese architect, Kuniko Hayakawa, known for his use of colour to downplay texture and the quality of materials, applied the 'kimono' principle for environmental colour at Hayakawa Courts housing in Tokyo. There, the outer fabric of the street facade is a restrained grey to blend with neighbours, but within the courtyard, seen in a tempting glimpse from the street through an arch, a riot of explosive colour breaks forth on facades and even pavements, marking a clear contrast between private and public urban open spaces.

(3.4) Buildings and Details.

At the scale of buildings and details, influences on colour use often resemble those affecting individual surfaces, with the personal colour preferences of property owners particularly important. A basic concern is how to relate a structure to its surroundings. As the spokesman for Foster Associates explains in an article titled "On the Use of Colour in Buildings":

the juxtaposition of buildings in the landscape can be of two kinds: imposition of the man-made object on the
landscape, or careful integration of a man-made object which is more akin to the earth.¹

Boeschenstein further specifies that a distinct influence on the colour at the scale of buildings and details is a desire to enliven surfaces, perhaps by highlighting architectural features, and to create intimate views, often achieved by simple colour contrasts.² Indeed, the Civic Trust recommends that small changes in the townscape—dark, hidden corners or shops which are only glimpsed from a main pedestrian route, or a focal point at the end of the street—may often successfully be given added significance with some really strong colour, especially if only seen fleetingly.³

(3) The Roles of Colour.

Colour in Place, therefore, occurs in the built environment on surfaces whose chromatic effect acts at several different scales of perception. Overall, our decisions about the place of environmental colour influence the general roles it plays. Variously classifiable, these roles, although they frequently overlap, provide a way for the planner to 'think through' the many purposes environmental colour fulfills.

Most fundamentally, colour in the built environment, like the natural hues of regional topography, acts as a Background to other foreground colours. More significantly, often reflecting the customs and cultural associations of communities, colour plays a Meaningful Role, speaking a chromatic 'language'. Occurring over time as well as in space, colour also has a Timely
Role. By providing visual connections and continuity, especially at the scale of streets, colour also achieves a Circulatory Role in aiding movement. Then, as colour mediates visual relation between surfaces, it plays an Illusory Role too. Finally, given the scope for details provided by large manmade surfaces, colour also performs a Pictorial Role, thereby contributing to advertizing and environmental art.

For these general roles to become the precise parts discussed in Chapter 3, 'Power in Place', they must by tempered by the symbolic, aesthetic and functional values arising from the spatial and psychological aspects of the Power of Colour.
Endnotes.


5 Halprin, p.92.


15 Especially Cullen, Duttmann, Halprin & Porter.


17 Porter, p.49.

18 Halprin, p.179.

19 Duttmann, p. 32.


21 Boeschenstein, p. 276.

22 Porter, p.38.


24 Hubert Roigt, *La Couleur*, 2nd. Ed. (Arthabaska, P.Q.: Editions Pourguoi Pas, 1981), p.154. (Let us take as an example the roofs of houses: the hottest regions of America, like California, Florida, choose pastel tones, hot tones like red and orange. In contrast, the tile preference for blue, a colder colour, is especially popular in Minnesota and anglophone Canada. In the south they like red but in New England they prefer grey tones. In francophone Canada we sell, above all, tiles with saturated colours, proving that French Canadians have really remained Latins).

25 Porter, p.115.

26 Uhl in Duttmann, p.94-99.

27 Duttmann, p.32.


30 Porter, p. 40.


32 Boeschenstein, p. 276.


34 Boeschenstein, p. 276.

35 Porter, p. 69.

36 Uhl, in Duttmann, p. 85.

37 Boeschenstein, p. 276.


39 Civic Trust, p. 64.


42 Boeschenstein, p. 276.

43 Civic Trust, p. 46-47.
Chapter 2: The Power of Colour,

There is little doubt that colour holds great importance in life today, and the more man understands this, the better will colour serve his welfare and be put to beneficial use.¹

While our decisions influence the place of colour, it, in turn, affects both our environmental perception and our emotional well-being. We have known of colour's apparent power ever since the ancients, not distinguishing between the structural and image-making potential of materials, used environmental colour, especially on roofs, to scare away evil spirits.²

Today, when considering environmental colour in the planning context, we do differentiate between the two interrelated aspects of colour's power: the spatial, more easily studied power to transform the appearance of our surroundings and the psychological, more subjective power to influence our well-being. Together, these aspects give colour much of its symbolic, aesthetic and functional values. Bevlin stresses this power, saying:

Like notes of the basic scale when expanded into a symphony, color has seemingly unlimited variation and enormous capacity to manipulate our emotions.³
Colour's power to transform the appearance of our surroundings makes it a dynamic element of the built environment. This power derives from several sources, closely related to the four factors of colour perception. Porter and Mikellides define these factors as:

2. The Spectral Characteristics of the Object.
3. The Sensitivity of the Eye and Brain.
4. Psychological Factors.

In particular, changing light conditions, variable spectral qualities, an alterable angle of perception and synaesthesia all contribute to visual variety. Birren stresses:

it is not just that one colour is better than another.... What has been learned from research is that variety is, of itself, psychologically beneficial.

Such variety aids spatial orientation by distinguishing forms and is an important source of sensory stimulation, enlivening the urban scene with chromatic continuity and character. Portoghesi, emphasizing the ongoing, evolving nature of 'Colour in Town', explains:

Psychologists teach us that we need to enjoy chromatic sensations but we need especially to perceive their changes. And colour changes have often been the response to the need to renew the environment....
(1.1) Changing Light Conditions.

Natural light alters the appearance of environmental colour over time and with weather.

Environmental colour changes in time both diurnally and seasonally. For colour to be visible, a certain threshold of illumination must exist. On a sunny day, natural light, especially well reflected by white surfaces, shifts from dawn's pinkish-orange to yellow and then to white or even blue, as from a north sky in summer, before returning to the warm glow of sunset and the pale rays of moonlight.

In general, during the day, exposed colours are most subdued at dawn and dusk, growing brighter in between and even 'washing out' to white in the bright glare of noon. This gives rise to a phenomenon known as 'local colour' which refers to the colour we know a surface to be as opposed to colours we actually see on it. Thus, for example, although we know that the roofs of two False Creek housing clusters in Vancouver are red, depending on the lighting conditions, as well as the reflective quality of the surfaces and our distance from them, these roofs might appear red, violet, yellow, orange or even green in some places. Sparkling highlights might be almost white.

Throughout the day, surfaces facing different orientations receive varying amounts of light, with south-facing elevations, if unobscured by the shadows of other structures, receiving the most and north-facing ones the least. Thus, except at high noon, moving around a building with the same colour treatment on
all sides reveals colour variations prompted by differences in orientation. Depending on the complexity of form and massing and on solar orientation, different surfaces periodically darken with shadows, providing three dimensional chiaroscuro.

Then, as darkness approaches:

space tends to contract, distances cannot be effectively judged, forms tend to flatten out into silhouettes, details are lost, and colours and colour values undergo radical transformation.³

Deep colours tend to melt together in brightness, if not in hue, with all dark tones appearing to blend together and seem alike in brightness. Low levels of illumination, such as moonlight, permit the perception of shape, movement and the size of objects, but not colour.⁴

At night, environmental colour ceases to come predominantly from large manmade surfaces, unless they are strongly floodlit. Instead, the main colour seen comes from the array of city lights which give a golden, greenish or orangish glow, except when emitted from behind stained glass in a way that, for example, distinguishes church facades at night. At night, lights may be attached to surfaces or shine through openings such as windows, skylights or glass blocks giving light to basements below. A dramatic example of changing environmental colour over the day-night cycle is the Willis, Faber and Dumas Office in Ipswich, England, designed by Norman Foster. By day, it appears a dark, reflective crystal, but, at night, the reverse is true.
Over the months, colour varies even more. Cited by Porter on the subject, noted French colourist, Jean-Phillippe Lenclos, states:

although a building may reflect the same range of colour as its mineral environment, its colour is not static. It evolves, shifts and changes seasonally as a result of changes in light, air humidity, rain and drought. ¹⁰

A prime example of this variation is Walden 7, a giant apartment near Barcelona by Ricardo Bofill. There, the chosen colour fades to reddish brown in the winter but blossoms to orange-red in the summer sun.

Summer light may differ considerably from winter light. The former may be clear and crisp, while the latter is misty, as in Vancouver, or the reverse may be true, as in Japan. Blue summer skies are usually bright and vibrant while grey winter ones are often dull and flat. Summer groundcover is greener, allowing for the filtering of light through leaves whose absence in winter dulls the effect of light. Of course, in winter, a reflective ground cover of snow combines the effects of both direct and indirect sunlight to intensify environmental colour.

Moreover, the effects of pollution are often more intense in dry seasons. Lynch notes that haze and smog dull environmental colour, first perceptually, as colour becomes harder to see, and then actually as overall surface tones become whitish, yellowish and eventually black with pollution. ¹¹ Over the years, solutions to this problem have provided places with distinctive colours. Thus, parts of London, such as Bedford Square, are known for the combination of practical dark facades
with selective white details around windows and entrances, colours adopted by eighteenth century owners to simplify maintenance. Today, with the reduction of pollution from fossil fuel burning, brighter surface hues are more practical than before for industrial sites such as steel mills which were previously painted black for protection.

On overcast days, natural light varies less over time and reduces colour contrasts. If the light is 'flat', variations in colour caused by shadows disappear. On rainy days, the staining of exposed surfaces temporarily darkens them, and some pavements gleam with the iridescent patterns of oil slicks. Opinion differs over the relative merit of chromatic versus achromatic colours in such weather conditions. Bruno Taut, for instance, as a chromatic advocate, wrote:

In an old street in Magdeburg half already painted and half left grey, it was possible to see on a rainy day how the painted half possessed plastic and truly material life while the grey part seemed a disturbing and abstract ghost.

Wilhem Hausenstein, for example, stresses that poor weather actually accentuates achromatic colour. Poetically comparing Paris to "a painting of infinite grey, grey in grey", he observes:

the grey of dark and cloudy, even rainy days does not subtract at all from the effect. On the other side of the Rhine it sometimes drives us to desperation; not here....The greys of the buildings retire behind a screen of grey air....How lividly white Notre Dame stands in the rain, an apparition wrapped in a soft grey web.
Ironically, the same light that reveals colour also destroys it as part of weathering. Generally, this affects applied colour, which fades and peels, more than intrinsic colour although iron rusts, copper takes on a green patina and, as Faulkner warns,

in the choice of stone account must be taken of the changes wrought by time. Some kinds of stone become very dark, others bleach, some will show beautiful time stains, others remain cold.\(^5\)

Reactions to the chromatic variety produced by weathering include acceptance as a sign of time, repeated restoration, efforts to overstate applied hues with emulsion paint, and even symbolic celebration, as in Greek villages where:

the annual ritual of limewashing houses and pavements acts as a kind of rebirth. Paint redefines the close working relationship of inter-personal spaces, with progressive layers of pigment softening the corners of form and welding vertical to horizontal.\(^6\)

(1.2) Variable Spectral Qualities.

A surface’s ability to absorb, reflect or transmit light, also alters the colour seen. These characteristics mark the difference between surfaces with similar colour, and, since details blur over distance, help the eye convert a two-dimensional retinal image into three-dimensional information about the nature of space in general and distance and depth in particular. Colour seen varies with both the type and texture of materials.
Many urban colours are intrinsic to their materials, but, since building materials are primarily chosen for their structural rather than expressive value, other applied colours are often added. Intrinsic colours are usually of the earth, metallic, or concrete.  

Brick and stone both display earth colours, often with minute surface variations. These materials, therefore, serve well to relate surfaces to natural settings. Brick comes in many hues depending on the type of clay used in manufacturing. The resulting hues, as seen in Amsterdam, for example, range from yellow and red to brown and violet, all in many shades.

Stone has distinctive colours too, since no two blocks are ever identical. Some of the surface stones frequently seen in the built environment include: granite, especially on pavements but also facades, in grey, pink and purple; limestone, in white, buff, grey, yellow, cream, pink, brown and red; marble, for ornamental paving and facades as well as in chips for composition roofs, all in many different hues; sandstone in white, cream, yellow, red, black and green; and slate, used most often on roofs, in black, blue, grey, purple, green and red.

The natural colours of metals are often shiny, as with certain stainless steel girders on facades, or altered by exposure to air. Prevalent metallic hues, especially on roofs, include the gold of anodized aluminum and the reddish bronze of copper which later darkens and turns green.
Glass comes in almost every hue and is either clear, translucent, or opaque. An enduring material, glass usually preserves colour indefinitely, with exceptions gaining special significance. Faulkner, for example, cites the case of clear window glass in Boston which, because it contained manganese, turned violet over time. Since it came to represent 'Old' Boston, it became fashionable and the coloured effect intentionally reproduced.\textsuperscript{18}

Concrete, as Foster explains, has a poor chromatic reputation:

though surrounded by much evidence to the contrary, most of us still tend to think of concrete as invariably grey, dirty and stained: the epitome of soul-destroying ugliness.\textsuperscript{19}

In defence of such a maligned product, the Portland Cement Association has published a pamphlet titled \textit{Colour and Texture in Architectural Concrete} which promises that concrete has texture and color to satisfy the esthetic and functional needs of modern architecture...[with the] spectrum of color ranging from the icy blues of crystalline quartz, through delicate pastels to the flaming reds of vitreous and ceramic decorative aggregates.\textsuperscript{20}

However, despite this publicity, Foster insists:

attempts to achieve a significant difference in the colour...by the addition of pigments has not been very successful: time and exposure result in fading. The shades of grey, however, can be brightened by using white cement, silver sand and a near-white granite when making up the concrete.\textsuperscript{21}

If the intrinsic colour of materials is displeasing or inappropriate, applied colour adds a protective and identifying finish. Plaster and stucco, naturally grey or white depending
on the hue of the sand used, may be coloured integrally with coloured sand of pigments. Limewash, or whitewash, to which other colours may be added, is the traditional coating of vernacular buildings and works best in areas such as the Mediterranean where it "reflects solar heat, suits clear bright light and is not subject to such bad weather."22

Materials forming surface layers and skins offer opportunities for detailed chromatic variation. Mosaics, for instance, gain their distinctive colours from small pieces of glass or stone, called tesserae, set in mortar. When the glass splits unevenly, it has a highly valued reflective quality with many shades and subtle colour gradations. Environmental colour from mosaics usually occurs on pavements but also appears on facades as traditional as those of Orvieto Cathedral and as modern as those of the National University of Mexico's library. Tiles, terracotta and, of course, paints and pigments come in a nearly unlimited selection of hues, offering further choices for enlivening the built environment with colour.

Surface texture, both tactile and visual, further alters colour seen.23 Tactile texture, which expresses something of the nature of the material, affects colour by being rough or smooth and coarse and fine. Given the same lighting conditions, colour appears darker and more saturated on rough or coarse surfaces, such as shuttered concrete, than on smooth or fine surfaces such as polished marble. Verity explains:

rough textures give more visual vibrancy to colour, because they give variety of tone value through uneven distribution of light, whether in small scale [as in a gravel path] or in the larger scale of rustication on a building.24
Visual texture, which gives a special quality to the light, distinguishes, most notably, between dull and shiny, and opaque and transparent. Matt surfaces and matt paints reflect diffusely while polished surfaces and gloss paints reflect specularly, so that colours look darker and more saturated when reflected from a glossy surface than from a matt surface. Surfaces letting light through also tend to look lighter than opaque ones.

(1.3) Alterable Angle of Perception.

A third source of chromatic variety in the built environment is a changing angle of perception as the viewer moves through space.

With normal vision, the location of a surface in the visual field determines how much colour we see. Porter and Mikellides explain:

at the edge of our visual field, the object would appear grey. Then, as it moved across, its blueness followed by its yellowness would become apparent. Its red and green characteristics would appear only when the object approaches the centre of our field of vision.

This perceptual process appears to reinforce the tradition, discussed by Bacon in The Design of Cities, of highlighting landmark buildings with stronger colours than their more subdued surroundings. With impaired vision, only bright contrasts of colour are visible.

In addition, there are four points of view from which colour can be observed:
walking down a street we see colour surfaces from the side, from the front, from below or from above, depending on how fast we walk and what attracts our interest.\textsuperscript{28}

The viewer's proximity to a surface also influences the chromatic appearance of our surroundings. Venturi and Rauch, for example, have decorated facades with 'auto' scale murals visible to motorists as well as to pedestrians.\textsuperscript{29} Furthermore, the juxtaposition of visual events or whole objects causes them to undergo perceptual change. For example, two colours placed side by side may appear to change their hue. Their respective light wavelengths have not altered, but the brain is affected in its perception.\textsuperscript{30}

In addition, glass curtain walls show some of the greatest chromatic changes with an alterable angle of perception:

glass walls metamorphose through three stages: opaque and solid from a distance, they begin to mirror what is opposite them as we move closer until, finally, when we are standing directly before them, they grow transparent and reveal what is behind them.\textsuperscript{31}

\textbf{(1.4) Synaesthesia.}

Finally, through synaesthesia, the production of a mental sense impression by stimulus of another sense, colour transforms the appearance of our surroundings by altering apparent size, weight, and depth of various surfaces. The apparent temperature of various colours is particularly important in producing these effects.
Some chromatic colours seem warmer or cooler than others, traditionally as an attribute of hue. Red, orange and yellow, upon which the eye more clearly focuses, seem to form the warm end of the spectrum, while green, blue and violet, on which the eye less clearly focuses, are at the cool end. However, research by Sivik shows that saturation is also relevant, with deeper tones appearing warmer than paler tints. Thus, deep green may seem as warm as pale red.

Spatially, warm and dark coloured surfaces appear larger, longer, and heavier than light and cool hued ones. Apparent depth changes too, as warm, dark or saturated colours seem to advance, while cool pale ones tend to recede.

(2) The Power of Colour to Influence our Well-Being.

Colour's power to influence our well-being, in particular moods and behaviour, derives from the nature of our reaction, to it. As with any environmental stimulus, we respond to colour in terms of three emotional dimensions: arousal and non-arousal; pleasure and displeasure; and feelings of dominance and submission. Depending on whether the overall effect is favorable or not, we either approach or avoid the stimulus. Thus, an understanding of colour's dimensions helps the planner interested in 'liveable' cities. Ball stresses:

the ultimate reason for any scientific study of color is to learn how to utilize color so as to have a predictable effect on people.
However, many subjective factors complicate the objective evaluation of colour perception, including aspects of personality and previous experience with colour in various contexts. In general, regarding personality, Birren states:

emotionally responsive persons will react freely to color; inhibited mortals may be shocked or embarrassed by it; restricted and detached types may be unaffected.\textsuperscript{14}

Age is one of the more predictable variables of experience. Children, until the age of four and a half years, are colour 'dominant' more than form 'dominant.'\textsuperscript{15} Until the age of about twenty five, we usually prefer distinct colours, often bright primaries. Then, as vision starts to blur and we slowly lose the ability to distinguish tones, we prefer secondaries and rely more on experience than the eye to inform us about our surroundings.\textsuperscript{16} The most famous example of this perceptual colour shift with age is Monet's celebrated series of paintings depicting the colours of the facade of Rouen Cathedral.

In addition, people trained to consider colour professionally respond differently to it than the general public. In a frequently cited study, Margaret St. George showed that art students had more objective and impersonal attitudes to colour\textsuperscript{37} while Sivik found that last term architecture students evaluate the beauty or ugliness of environmental colour very differently from lay people.\textsuperscript{38}

Despite the many variations in individual colour response, as a group people are more alike than unalike, permitting colour
increasingly to be used therapeutically. While such uses mainly involve interior colour, colour outdoors in the built environment still affects us significantly in terms of arousal, pleasure and control.

(2.1) Colour and Arousal

Most immediately, colour has the power to arouse varying levels of physical and mental activity in the viewer. As Birren explains:

human beings will react whether they like color or not. Reason or emotion may not enter into the matter...responses are frequently involuntary and automatic.

Colour, in conjunction with light, has the power to trigger overall unconscious responses. Birren distinguishes between the centrifugal force of warm colours such as crimson or peach and the centripetal force of cool colours like turquoise and jade.

Warm colours, especially in conjunction with bright light, exert a centrifugal force which directs action away from the viewer towards the environment. Without human volition, optical stimulation causes an increase in muscular tension, an attraction to the stimulus, and a tendency to lean towards the source of bright light and vivid colour. General autonomous arousal occurs as respiration rate, heart action, blood pressure and cortical (brain) activity increase. In contrast, cooler hues and dimmer light have a centripetal action, away from the body and towards the viewer, that produces the opposite physiological reactions.
The effects of each force promote specific activities. The tension, excitement and warmth usually aroused by warm hues encourage muscular effort, action, awareness of surroundings and a cheerful spirit. Thus, Birren recommends using warm hues in places where manual tasks and sports take place. However, resting and visual or mental tasks requiring good inward concentration better suit a cold coloured environment, where those hues usually produce feelings of well-being, calmness and coolness, as well as reducing anxiety. This distinction between warm hues in energetic areas and cooler ones in quieter ones correspond to Boeschenstein's observation that: "residential neighborhoods generally have more subdued colours than commercial districts, and hospitals are more muted than entertainment zones."  

(2.2) Colour and Pleasure.

In addition to stimulating, automatically, different levels of physical and mental activity, colour also, more subjectively, stirs feelings of pleasure and displeasure depending on the emotions aroused. Bevlin explains:

Each of us brings to the perception of visual stimuli a collection of experiences, associations and memories that may be triggered by a given color...color may evoke a strong response, pleasant or unpleasant, even if the viewer does not understand the reason for the response."

The earliest psychological research on human colour response focused on preferences. Most notably, when Bullough
studied "The 'Perceptive Problem' in the Aesthetic Appreciation of Single Colours", he discovered four different attitudes towards colour likes and dislikes. The 'objective' group like colour because they are saturated or bright and dislike them because they are dull, mixed or foggy. The 'physiological' are pleased by colours that seem stimulating, soothing or warming, but are displeased by hues that appear somehow dazzling or disturbing. The 'associative' group find colours pleasing depending on the associations brought to mind, while the 'character' group attribute positive or negative traits to colours as though they were people.

Without necessarily explaining how or why, the literature frequently mentions the pleasurable power of colour. Ackerman and Peterson, for example, stress that, independent of material and form, colour has emotional effects: "yellow and red...are called 'gay', black and deep blue 'sombre'." However, few authors refer to actual research, perhaps because most studies of colour's power to excite emotions and feelings concentrate on two-dimensional colour seen indoors where fewer variables affect perception.

Wright and Rainwater, for example, made a notable study of colour and emotions in which they identified six principal dimensions in feeling excited by colour: (1) happiness, which depends mainly on lightness and, to a lesser extent, on hue; (2) warmth, which depends on hue, especially redness; (3) calmness, which depends on darkness and blueness; (4) forcefulness, which depends on colour darkness; (5) showiness, which depends on
saturation, and, to a lesser extent, on lightness; and (6) elegance, which depends on saturation and hue, so that with greater and deeper blue comes greater elegance.6

However, two psychologists, Dr. Lars Sivik of Goteborg University, Sweden, and Dr. Peter Smith of Sheffield University, England, have done original research on the pleasing and displeasing aspects of environmental colour. Sivik's studies focus on the connotations of external colour on buildings while Smith's work examines colour as an element of environmental aesthetics.7

Sivik's experiments show that we evaluate colour in terms of spatial, social and emotional factors. Spatial pleasure or displeasure, such as a sense of inviting intimacy or of overwhelming claustrophobia, depends on synaesthesic effects. In particular, "the blacker or darker the house, the more enclosed is perceived the space between the buildings."8

The social factor concerns what is often called 'taste'; that is, whether environmental colour is vulgar or cultured, calming or exciting, and unusual or common. Sivik showed that this factor has a clear co-variation with saturation. Stronger colours are, above all, most exciting.9

Emotionally, we respond to colour as being beautiful or ugly, friendly or hostile, and warm or cold. Preferences tend to reflect familiarity. Sivik found that yellow through red and the chromatic area between green and yellow are most pleasing. The opposite hue areas, between red and blue and between blue
and green are liked less, except for the lightest colours. Pure grey and greyish buildings are displeasing, with black liked the least.  

Indeed, black has depressing and dramatic connotations, that sometimes make it a risky environmental colour. Blackfriars Bridge in London, for example, used to attract many suicides when it was painted in accordance with its name. However, once repainted green, the number of suicides decreased by a third.

Sivik also showed that prolonged exposure to certain environmental colours changes connotations of pleasure and displeasure. Residents who intensely disliked a shade of metallic blue in the laboratory, came to love it once familiar with such a strange colour on their apartment blocks. Neighbours who simply saw the blue facades came to like them, but others who only heard of the blue housing or saw photographs of it continued to register deep dislike. However, residents of pale violet and grey buildings never came "to stomach" these colours. As a result, Sivik concluded that "people do adjust to unusual house colours if they do not basically dislike the colour as such." Overall, Sivik found that "people consider it self-evident that colour is an important factor in environmental design."

While Sivik's work concentrates on psychological responses to colour, Smith focuses physiological aspects too. According to his findings, the brain's reaction to colour involves two different sections: the neocortex and the limbic system (in the
mid-brain and brain stem). The neocortex, which is responsible for conscious rational thinking, "is responsive to the more subtle colours which are described as 'cerebral' or 'sophisticated'. In contrast, the limbic system, which is responsible for generating emotional response, has two attitudes to colour:

first it is responsive to high chroma, brightness, shine, and glitter for their exotic quality; their sheer impact potential. Secondly, it ascribes symbolic meaning to certain high chroma colours: a symbolic programme with archetypal origins.56

Each section of the brain registers a different type of aesthetic pleasure. The neocortex responds to what Smith calls the first three 'orders' of aesthetics: (1) balance and harmony; (2) complexity and pattern; and (3) a combination of (1) and (2). Fourth order aesthetics concerns the limbic system:

the pleasure derived from the contemplation of a mass of detail which by-passes the rational classification process because of its feverish complexity. Usually such presentations are spiced with bright colour and high polish.57

Aesthetically, balance and harmony are not synonymous. By analogy, balance involves the synaesthesia of weight and harmony that of sound. Whether observing a local mural or an urban panorama, we notice the colour to area relationships in such a way that:

when colour saturation is equated with area, it may be reasonable to suggest that the greyed colours over large areas establish balance with bright colours over much smaller expanses.58
Townscapes popularly labeled 'picturesque' reveal balance
at work. Analyzing Honfleur, for example, Smith states:

The majority of buildings are both roofed and walled
with slate, imposing straightaway a unity of colour
and tone as well as texture, since slates are of a
regular size. This large area of subdued blue-grey
colour contrasts with the more strident colours and
tones of the boats against the quayside. The water in
the harbour represents a third element which echoes
the muted colours of the houses. Thus there are three
distinct bands of colour and tone which may be roughly
schematically depicted in terms of colour to area
relationship.\textsuperscript{59}

Such knowledge of chromatic balance at the urban scale is
especially pertinent to planners in places that try to convey a
scenic image, for example, Whistler, B.C.

Harmony is appealing proportion with "at least two entities
which are not identical and between which there is sufficient
difference to dispel uncertainty, but not so much as to cause
excessive dominance".\textsuperscript{60} Classification schemes for colour
harmony are controversial, but, regarding colour building
materials, Porter praises Moon and Spencer's proposals for three
kinds of distinct colour harmony: 'identity', 'similarity', and
'contrast'.\textsuperscript{61} Each type of harmony may include the achromatics,
has distinct advantages and conveys a different mood.

'Identity' is monochromatic, involving colours of the same
or nearly same hue but with well spaced values and chromas
inducing colour change.\textsuperscript{62} Alexander advocates it as the "safest
route to providing architectural colour harmony".\textsuperscript{63} Applied
well, 'identity', often a trademark of certain architectural
firms specializing in large scale projects such as Taller de
Arquitectura in Spain, is sophisticated and elegant, calm and soothing.

'Similarity' involves colours sharing a common hue, for example, green and yellow-green. Tonal variations stress 'similarity'. Such a use of three adjacent hues, generally confined to either the hot or the cool spectrum, is usually pleasing, soothing and easy to use.

'Contrast', in which balance is vital, refers to colours of distinctly different hues. This harmony is interesting to see and does "enliven the effect of a group of more closely related colours". The most stimulating contrast occurs between complementary colours, those located directly opposite each other on the colour wheel.

In addition to registering pleasure from balance and harmony, the neocortex also appreciates the tension between chromatic complexity and pattern. Complexity, involves novelty, originality and variety, to enliven the built environment and prevent monotony. Both a high ratio of novelty to familiarity and rate of information across a given setting. Thus, as Smith explains:

The bare white walls of Rudoph Schwarz's Fronleichnamskirche, Aachen are still complex because they represent such a radical departure from the church norm. The [monochromatic and sculptured] west Front of Strasbourg Cathedral, on the other hand, is complex on the level of its rate of incident.
Environments which are complex on both counts, as in Paris at the Centre Georges Pompidou which bristles with brightly coloured ducts and vents against a more subdued backdrop, have a distinct attention-getting shock value suited to certain landmarks attracting large numbers of people.

Pattern counteracts the stimulating effects of complexity by providing coherence and clarity of perception. Much of the generation of aesthetic response derives from the satisfaction achieved by pattern recognition. Chromatic pattern occurs both at the scale of a single surface and throughout the built environment, linking spaces and structures of different styles and dimensions.

Most frequently, large-scale pattern, which Smith likens to environmental 'rhyme', involves surfaces sharing a similar element of design, such as colour. Colours may be the same type, for instance, matt instead of glossy, or actually the same hue. Colour also aids dimensional co-ordination when used proportionately to link the dimensions or levels of a structure. This may be as simple as paving stones of contrasting hues warning of changes in elevation or as complex as a glass facade reflecting an older building using similar surface colours. In addition, colour contributes to the 'tone' of a place, both literally, through related and contrasting qualities, and figuratively, by expressing the perceived status of a part of the built environment in relation to the entire urban setting, perhaps, for example, as garish or refined.
When balance and harmony are present with complexity and pattern, we also experience a third 'order' of aesthetic pleasure. Smith considers this combination "perhaps the highest manifestation of the aesthetic principle". The fourth 'order' of aesthetic pleasure provides simpler, more sudden environmental enjoyment. This involves the limbic system which "reacts pleasurably to exotic colours, brightness and simple rhythm." Chromatic vibrancy in places like Granville Island satisfy this need and are an important reason for attracting the public. Smith argues that limbic satisfaction is vital to the urban scene:

Cities are kept alive by their Times Squares and Piccadilly Circuses. Las Vegas fails aesthetically because it is Times Square repeated ad infinitum.

The type of pleasure offered by the colour of a place also varies over time. The Willis Faber and Dumas building at Ipswich, England, for example, appeals to the neocortex by day but, "becomes a limbic-intensive experience after dark when it takes on a wholly new, sparkling image."

Personality and experience do, of course, influence the degree of pleasure felt from observing, both consciously and unconsciously, environmental colour. However, ideally, a well-planned community offers the public opportunities to experience both neocortex and limbic generated spatial, social and emotional pleasure within the course of an average day's activities.
In addition to stimulating various levels of arousal and pleasing or displeasing the observer, colour's psychological power also elicits feelings of environmental dominance or submission. The nature of these feelings depends on our sense of 'competence', the capacity to interact effectively with the environment, and of 'cognition', the activities and operations we perform in order to 'know' or 'understand' an object or an event.\(^2\) The planner aids 'competence' and 'cognition' by informing and mediating.

In "Colour, Competence, and Cognition: Notes Towards a Psychology of Environmental Colour", Friedman and Thompson, following in the tradition of Lynch and the Goodmans, logically assert that "frequently, knowing and understanding an environment is a necessary precondition of having an impact upon it."\(^3\) In particular, Lynch stresses that since environmental 'sense' is a matter of knowledge and attitudes, its indirect political and psychological costs may be high for particular groups. For example, while more often used to maintain social dominance, it can also be employed to extend revolutionary consciousness...it will be a battleground, even when its material and functional cost is low.\(^4\)

Colour contributes to 'cognition' through character and continuity as an ordering device helping to establish links between environmental elements. 'Cognition' corresponds closely to Lynch's 'structure', discussed in Good City Form:
At the scale of a small place [structure] is the sense of how its parts fit together, and in a large settlement is the sense of orientation: knowing where (or when) one is, which implies knowing how other places (or times) are connected to this place.\(^7\)\(^5\)

Colour character in time and place derives from chromatic distinction in hue, saturation, and lightness that distinguish surfaces either from their neighbours or from their tones at other times. Landmarks, for instance, often accentuate their special status by changes in colour of roofs, facades and even surrounding pavements. Indeed, the San Francisco Urban Design Plan notes, about colour in context, that "when highly visible buildings are light in color, they reenforce the visual unity and special character of the city."\(^7\)\(^6\)

Colour clues to orientation in time include both shortterm surface shadowing that improves our "grasp of clock time which enables us to order our day" and longterm historical colour that appeals to "the deeper emotional sense of how the present moment is linked to the near or distant past and future."\(^7\)\(^7\) Lynch also emphasizes that:

since our internal representation of time is poorer than our internal representation of space, we are more dependent on external clues to keep us temporarally well oriented.\(^7\)\(^6\)

In addition to underlining spatial and temporal character, colour also contributes directly and indirectly to continuity in both space and time. On the Boston Freedom Trail, for example, a series of red footsteps painted on the pavement through the colonial part of town clarifies the confusing maze of streets
without disturbing the experience of urban complexity. Less directly, on the Italian island of Burano, buildings based on reddish grey pavements and topped by greyish red roofs sport distinctive facades of brilliant reds, blues and yellows. Following city board recommendations, these facades are repainted in similar shades and as the need arises, never a block at once in order to establish a certain formal continuity and make the workings of time especially clear.

While the 'thought through' use of cognitive colour helps everyone, since poor orientation means lost time and wasted effort, it is vital for people likely to be lost or at risk in their surroundings, namely strangers, children, industrial workers and the visually impaired. Expo 86, for example, had colour coded zones to reduce environmental confusion and promotes visitor confidence. Primary school sites chromatically organized in hues that promote appropriate levels of arousal and positive emotions not only aid orientation but also draw attention to structural components, beneficially demanding "that the child utilize them as elements for learning". The application of set pipe identifying and safety colours, such as the American Standard system, at factories, industrial sites, and even public markets, while never a substitution for the elimination of a hazard, informs and simplifies surroundings for workers. Colour coding places frequented by the visually impaired, who crave any and every speck of colour or contrast, with bright saturated hues, such as at the Illinois Regional Library for the Blind and Physically Handicapped, by Stanly Tigerman, not only improves orientation but also functions, to
quote Porter, "as a challenge to that facile superficiality with which the disabled are often regarded".

Overall, the psychological benefits of 'cognitive' control through colour are considerable. As Porter and Mikellides emphasize:

Clearly defined colour, as an organizational and informational aspect of architectural expression in public and external spaces, can provide an unambiguous structure which is able to reduce apprehension in complex, large-scale of totally artificial environments.

In addition to facilitating identification, colour also provides identity in the built environment. Traditionally, we have a chromatic impact on our surroundings through either the decor of private domain or graffiti. Surface colour demarcations, however, subtle, express the identity of the structure and its occupants, distinguish between public and private areas, and generally aid in establishing territoriality. Essential to our well-being, this is a pattern of behaviour and attitudes held by an individual or group that is based on perceived, attempted or actual control of a definite physical space, object or idea and may involve habitual occupation, defence, personalization and marking of it.

Typically, though, residents of high density, rental or public housing, places where the urban population increasingly lives, do not have the opportunities to control exterior colour and thereby express individual and collective identity. This lack relates to reduced environmental satisfaction and involvement as well as increased crime.
Notable alternatives to this chromatic anonymity, however, do exist. In Germany, for example, colourist Friederich Ernst von Garnier personalizes each living unit within a large-scale mass by colour schemes that visually detach sections through colour weight or describe illusions of recession and projection in the facade. In San Francisco, architect Joseph Esherwick coloured the facades of Banneker Homes, a low-rent housing project in a drab, deterioriated neighborhood, with a palette "limited to inexpensive colours readily available with a major aim being that of giving identity to particular locations but cohesiveness to the entire group."

In the context of crime prevention, Oscar Newman reports great success with modifications to the colour and texture of facades at Clason Point where he was originally astonished at the chromatic discrepancy between vibrant, personalized interiors and the dreary uniformity of the architect designed exteriors:

raw concrete was the prevalent material; grey and off-white the dominant colour. Only the glass areas occasionally broke up the drabness by reflecting a blue sky.

In consultation with the residents, who chose the colour and texture for their own units in co-ordination with neighbors, Newman devised an eight colour experimental scheme. The New York Housing Authority deemed the additional twenty five percent cost of facade finishing worthwhile as it accompanied drastically reduced repair costs. Vandalism decreased once the
new colours were in place and residents, inspired to take more pride in their environment and to undertake their own decoration and maintenance of the project, started painting their own doors and windows. Such reactions are the basis for the Civic Trust's book of environmental guidelines, *Pride of Place: How to Improve Your Surroundings*.

Indeed, such relative feeling of dominance and submission aroused by colour lead chromatic advocates, such as Foster Meagher, head of the San Fransisco design group, 'Colour Control', to assert that a well thought through colour scheme, appropriate to the site and its users, spurs neighbors to a redecoration of their own domains and attracts tourists rather than graffitists, a claim shared by many North American and European muralists.⁸⁶

Porter, in an experiment sponsored by the City of Oxford Highways Committee, tested the connection between planned and spontaneous colour by repainting a drab achromatic pedestrian underpass prone to graffiti with vertical bands of four bright, cheerful hues: green, yellow, orange and red. After two years, "despite the project's media exposure and its intermittent use by fans of visiting football teams," Porter reported total success: no graffiti at all.⁸⁷

Taking into account the key aspects of cognition and competence, a key issue concerning colour and control is clearly the discrepancy between reactions of the general public and those of the individuals responsible for structuring the environment to which we respond. Since chromatic tastes
generally differ between the general public and those people trained to consider colour professionally, Friedman and Thompson warn:

those individual responsible for the structuring of environments—architects, planners and designers—are probably unaware of the failing of the physical environments in areas of 'competence' and 'cognition' because they are the members of the very groups which are most likely to have these needs met. If you are an urban planner you can have the impact upon the city and are provided with models and concepts which allow you to comprehend, or at least attempt to comprehend, the complexities of physical contexts. 

(3) The Values of Colour.

The power of colour to transform the appearance of our surroundings and to influence our well-being makes it a very important element of the built environment. In particular, we value colour for symbolic, aesthetic and functional reasons the planner 'thinking through' the subject needs to understand.

Colour's symbolic value derives from our ability to differentiate between hues and to relate them, emotionally and intellectually, to abstract ideas, values or things not present. Until the Renaissance, this was the primary value of environmental colour, the expression of a traditionally established system of meaning. Today, while fixed meanings are rare, colour still reenforces, to use Lynch's term, 'legibility':

The urban environment is a medium of communication, displaying both explicit and implicit symbols: flags, lawns, crosses, signboards, picture windows, orange roofs, spires, columns, gates, rustic fences. These
signs inform us about ownership, status, group affiliation, hidden functions, goods and services, proper behaviour, and many other things which we find it useful or interesting to know.\textsuperscript{89}

Currently, Faber Birren is a leading exponent of symbolic colour and Michael Graves a leading practitioner who "by assigning symbolic meanings to his architectural palette,...uses their potential to full effect."\textsuperscript{90}

Colour's aesthetic value reflects the pleasure we experience at different times from certain hues and their relative placement and patterning. As Smith states: "aesthetic value is not an innate quality of objects, but an interpretation imposed by the mind."\textsuperscript{91} This value now prevails, decoratively calling attention to various surfaces and structures.

While no objective test exists for aesthetic or symbolic value, colour's functional value expresses our quantifiable capability to use a specific hue to meet a practical need for which it is especially suited. This value is increasing in importance as we learn more about the specific spectral qualities of different materials, the dynamics of perception, and the psychologically therapeutic potential of colour.

In place, these values modify the general roles of environmental colour in order to produce the many precise parts that colour plays.
Endnotes


4 Porter and Mikellides, pp.78-79.


8 Faber Birren, 1982, p.49.

9 Porter and Mikellides, p.78.


16 Porter, p.110.


18 Faulkner, p.72.

19 Foster, p.126.


21 Foster, p.126.

22 ibid, p.188.


25 Porter, p.79.

26 Porter and Mikellides, p.83.


28 Uhl, p.94.

29 Fleming, p.17.

31 Duttmann, p.42.


34 Birren, 1982, p.29.

35 ibid.


41 Faber Birren, 1982, p.33.

42 Boeschenstein, p.276.

43 Bevlin, p.92.

45 Ackerman and Peterson, p.951.


47 The Bibliography lists several of their most noted works regarding colour.

48 Sivik in Porter and Mikellides, p.131.

49 ibid, p.130.

50 ibid.

51 Lois Wexner, "The Degrees to which Colors (Hues) are Associated with Mood Tones," Journal of Applied Psychology, 6 (1954), pp.432-435.

52 Roigt, p.153.

53 Sivik in Porter and Mikellides, p.135.

54 ibid, p.138.

55 ibid.


57 Smith, 1979, p.10.

58 ibid, p.17.

59 ibid, pp.56-57.
60 ibid, p.20.

61 Porter, p.85.

62 idid.


64 Porter, p.85.

65 ibid, p.86.

66 Smith, 1979, p.44.


68 Smith, 1979, p.68.

69 ibid, p.10.

70 ibid, p.87.

71 ibid.


73 ibid, p.34.


75 ibid, p.134.


78 ibid.

79 Friedman and Thompson, p.34.

80 ibid, p.32.

81 Porter and Mikellides, p.42.


85 Newman, pp.49-50.

86 Porter, p.58.

87 ibid, p.31.

88 Friedman and Thompson, p.32.


90 Porter, p.72.

91 Smith, 1979, p.9.
Chapter 3. Power in Place.

Having reviewed environmental colour's place and power in Chapters 1 and 2, this chapter now examines the precise parts colour plays when symbolic, aesthetic and functional values modify its general roles, namely Background, Meaningful, Timely, Circulatory, Illusory, and Pictorial. These parts may be discussed and classified in several ways, with the typology presented here (Table 1) developed to clarify issues for the planner. Although the literature gives environmental colour's specific parts many different names, where possible, the most common terms appear. Of course, since these parts frequently overlap, on some surfaces colour serves many purposes.

Planners having the most direct experience with environmental colour's precise parts are usually professionals in the New Towns of France and England, such as Nanterre and Peterlee, or in historic areas like Colonial Williamsburg. Otherwise, most planners encounter issues of environmental colour indirectly through urban design, housing, heritage preservation, environmental art, festivals or urban blight and renewal. Although artists, architects, builders and property owners are responsible for putting 'thought through' colour in place, the planner, aware of the significance of these various parts, does much, both indirectly and directly, to promote it.
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Table 1
Power in Place: The Precise Part of Environmental Colour.
In this role, environmental colour either supports another element of design or provides a favourable contrast to foreground hues. Background colour is subdued and fairly uniform over large areas whereas the foreground hues thus highlighted are brighter, more saturated and often more mobile or more easily changed. Environmental colour frequently plays this role in places with abundant detail colour, for instance, along shopping streets or by parks.

(1.1) Symbolic Background Colour: Backdrop.

Symbolically, background colour serves as monochromatic backdrop to the bustling activities of the urban scene whose predominant hues come from people and produce.

Traditionally, the surface colour of markets exemplify this part (Fig.1). Smith explains: "at ground level there is a rich profusion of things to satisfy all limbic criteria: vivid colours, glitter, noise, smell...the press of the crowd."¹ All around, the more neutral environmental colour "acts like a picture frame, an ordered and restraining boundary."² Recently, though, as with London's Covent Garden:

the unruly market place has taken a beating in Britain, victim of the obsessive tidiness of planners. Where new towns are built, the commercial centres are buried in great windowless sheds. Their most prominent architectural features are ducts and air vents."³
(Fig. 1) Symbolic Background Colour: Backdrop.

Arab Market in Bethlehem. Environmental colour as neutral backdrop to the local, transient diverse hues of people and produce. The blue on window frames serves to scare away flies who dislike that hue.
In Vancouver, however, although markets are indoors, their exteriors are far from drab. The facade and roof of Robson Public Market, for example, suggest a giant greenhouse in which much of the produce for sale within could have been grown. The glass reflects outdoor activity and permits passers-by glimpses of indoor shoppers who also see out, although environmental perception is somewhat tinted in the manner of L.F. Baum's fictional Emerald City. The exterior colour of most Vancouver markets, though, acts more as an aesthetic foil than a symbolic backdrop.

Aesthetic Background Colour: Foil.

Aesthetic Background Colour acts as a foil. It either complements another element of design, such as form, or contrasts with details of landscaping, structural ornament, and window displays.

Since colour is the means by which we perceive other elements of design, such as form or texture, colour's strength or complexity can distract attention. Ruskin, realizing this, produced a famous though oft-debated dictum:

Infinite nonsense has been written about the union of perfect colour with perfect form. They never will, never can be unified. Colour, to be perfect, must have a soft outline or a simple one; it cannot have a refined one.⁴

More recently, Birren observes:

Color is likely to detract from form. Because color is more primitive in its appeal than form, a building exterior...designed, for example, in red or yellow, green or blue, may be judged by the average mortal more for its hue rather than its shape.⁵
(Fig. 2) Aesthetic Background Colour: Foil. Geodesic Housing near Jerusalem. Simple, subdued colour emphasizes the complexity of form and links the unusual structure to the dusty landscape like a bizarre barnacle encrusted on the earth.

(Fig. 3) Aesthetic Background Colour: Foil. Yemin Moshe, Jerusalem. Background Colour as aesthetic foil to nature, creating various visual contrasts.
Thus, where form is complex, simple and subdued colour as an aesthetic foil varies only to emphasize three-dimensional edges (Fig. 2).

However, not all authors appreciate this prejudice "which equated strong colour—considered to be emotionally rather than intellectually judged—with a distraction from form." Porter, for instance, believes that, in brilliant sunlight, at least, a high contrast between saturated colours is an excellent means of pattern-making while exploiting architectural elements.

Aesthetic background colour also acts as a foil to nature, an especially important part in densely built up areas with few gardens or parks (Fig. 3). When environmental colour plays this part, several contrasts occur between colours that are, for example, subdued or saturated, large-scale or small-scale, hard or soft, fixed or mildly mobile, and eternal or seasonal.

In addition, aesthetic Background Colour serves as a foil to manmade detail. In this part, environmental colour acts as neutral frame to polychrome displays of merchandise and advertizing (Fig. 4) or as a contrast to building details (Fig. 5). At Granville Island Public Market, for example, praised in *Architects Forum* for its encouragement of the "subjective enjoyment of forms and color", the metallic facade hues serve as a backdrop to brighter details of simple colourful lighting lintels, street furniture, and doorways leading within where, as project architect Joost Bakker observes, "the tenants are the show."
Robson Street, Vancouver. Grey shop fronts act as a continuous foil to brighter, distinctive detail colour from window displays, advertising awnings and structural ornament such as the false blue pediment rising from red columns. Green metal poles also suggest branch-denuded trees.
Restaurant, Vancouver. Neutral facade colour as foil to the lavender columns and sign. As an unusual colour, the detail hue attracts attention, although research by Sivik has shown a deep dislike for the use of pale violet in the environment. Perhaps its appearance here serves to underline the irony of the restaurant's name.
(Fig.6) Functional Background Colour: 'Dirt Disguiser'.

Moped Parking Lot, Florence. Dark, slightly variegated pavement colour functions as a 'dirt disguiser'. Seen from above or from the side, a parking lot such as this displays an everchanging kaleidoscopic arrangement of individual colours against the background of a permanent, practical communal hue.
(1.3) Functional Background Colour: 'Dirt Disguiser'.

Frequently, Background Colour simply functions as a low maintenance attribute of materials disguising dirt difficult to remove\(^1\). Pavement hues often play this part, providing a basic background for the mobile manmade ever-changing chromatic patterns of various vehicles (Fig.6).

(2) Meaningful Colour.

Meaningful Colour expresses the customs and cultural preferences of communities and the materials they favour using in the built environment. Since various colours have different associations, particular hues gain special significance as a means of environmental communication.

(2.1) Symbolic Meaningful Colour: Metaphor.

In this role, colour acts as a metaphor, representing concepts beyond the surfaces it adorns.\(^1\)

The references may be direct, especially to nature and the elements. This is one of the earliest uses of environmental colour, notably found on one of the oldest buildings in the world, the ancient ziggurat at Ur called the 'Mountain of God.' There, as archeologist C.L. Wooley discovered, the base of the tower was black, the upper part red. The shrine at the top had walls of blue glazed tile and a gilded roof. These chromatic variations mystically signified the various divisions of the
(Fig. 7) Symbolic Meaningful Colour: Metaphor.

Blue Horizon Hotel, Vancouver. Colour used symbolically to reinforce an establishment's name. Here it suggests languid, exotic repose and the colour, at least, is psychologically restful and unusual enough in the urban scene.
(Fig. 8) Symbolic Meaningful Colour: Metaphor.

Dome of the Rock, Jerusalem. Used over time and in many places, a traditional application of colour may come to symbolize the structure upon which it acts. A golden dome and a patterning of blue, white, and yellow tiles have, in addition to representing heaven and quotations from the Koran, come to signify 'mosque' in a generic sense too.
Universe: the dark underworld, the habitable earth, the heavens and the sun.\textsuperscript{12} Today, Meaningful Colour represents natural elements most frequently with the blazing red of fire station facades or as a symbolic reinforcement of establishments having chromatic names (Fig.7).

Symbolic Meaningful Colour also represents indirect associations to ideas. Since, for example, in the West, white symbolizes purity, by day, the surface hue of the White House in Washington gleams with pristine incorruptibility, while, floodlit at night, the building glows brightly against the forces of darkness. Such symbolism, though, may unexpectedly develop ironic chromatic variations. At the city scale, for example, 'Bologna the Red' earned its nickname both for its predominant surface hue and its major political affiliation. At the building scale, the bright white of the Victor Emmanuel II Monument in Rome represents the idealistic hopes for Italy's unification, but in the less visible background, pillars show grimy staining of pollution.

Applied consistently over time and in many places, Meaningful Colour also comes to symbolize the type of structure upon which it acts, expressing either functional values, as on a road, or aesthetic ones, as on a mosque (Fig.8).

\textbf{(2.2) Aesthetic Meaningful Colour: Expressing Materials & The Quality of Light.}

In this part, environmental colour expresses either the character of materials or the quality of the light.
Apartments, Vancouver. Framed between a blue sky and green plants growing from brown earth, the building’s various colours differentiate between materials used: grey concrete base; mauve stucco facing; pink wood trim; transparent, colourless glass windows and plexiglass balustrades; white piping, horizontally, as balcony rails and, vertically, as drainpipes; and grey asphalt roof tiles. Such chromatic distinctions also aid communication about the building’s parts.
Medici Palace, Florence. The same stone appears on all three stories, but the chromatic effect varies so that the building appears progressively lighter as the eye moves upwards. The ground floor has heavy rustication, the next two stories increasingly more dressed and lighter coloured stone. Finally, at the top of the building, the cornice is rougher, and therefore darker.
El-Asqa Mosque, Jerusalem. Light reveals starkly simple hues. The pavement and facade are both 'of this world', and accordingly share the same material cut directly from the earth. A dark wooden door and window openings, filled with brightly polychrome glass not visible from the exterior, puncture the otherwise uniform facade. The dome, however, which represents a 'higher' world, is a contrasting dark and more precious colour, silver. Light reveals the colour of these materials and chiaroscuro further emphasizes the difference in materials and their location. Near noon, the top of the dome becomes bright white while the shadowed facade darkens, although the pavement remains bright for further contrast.
With regard to materials, aesthetic Meaningful Colour either differentiates between them (Fig.9), which prevents buildings from looking like monochrome models,\textsuperscript{13} or emphasizes the chromatic versatility of a single material, depending on the treatment of surface texture (Fig.10). In addition, the colour scale from very light to very dark permits a great range of light reflection that also distinguishes different surfaces (Fig.11).\textsuperscript{14}

(2.3) Functional Meaningful Colour: Coding.

In addition to playing symbolic and aesthetic parts, Meaningful Colour also functions as a code, identifying obstacles and hazards, especially in industrial settings. Such a part, as Faulkner explains, "depends on bright colors that attract immediate attention and are recognized quickly."\textsuperscript{15} By extension, such colours serve as guides in emergencies (Fig.12).

Colour coding originally began for pipe identification, together with safety colours. In Canada, Roigt explains: (1) red is for fire protection; (2) orange and yellow indicate dangerous materials; (3) blue is for protective materials; (4) green is for safe materials; and (5) purple is for extra-valuable materials.\textsuperscript{16} This corresponds closely to both the American and British identification schemes.
(Fig.12) Functional Meaningful Colour: Coding.

Vancouver General Hospital Sign, Vancouver. Functional use of bright primary hues to colour code large freestanding signs in a setting where the background surface colours make a subdued or achromatic contrast.
To aid memory, these colour have symbolic or psychological meanings associated with their functions. Red, afterall, is the colour of fire and yellow and orange the hues of flames. Wexner showed in a psychological study of two-dimensional colour and mood tone relations that blue and green are seen as tender, secure and calm, partly because of their peaceful association with nature. Purple, until 1865 when chemist Perkins accidentally developed the first synthetic dye, for a shade of mauve, was extremely hard to make from natural sources. Thus, as an applied colour, rather than a violet intrinsic to certain bricks or types of streaked marble, purple appeared rarely, and then most often on the robes of royal or religious dignitaries.

An impressive example of environmental colour coding are the five giant cranes at a steel mill near Marseilles, coloured by Lenclos to serve a triple function:

first, to make them clearly visible in a polluted atmosphere, and to give each an identity (prior to repainting they had been a uniform grey); second, to fragment their huge size, the differences among them being indicated by a predominant pilot colour (afterwards, [Lenclos] learned that each was given a nickname by operatives); third, to assign different colours to each of the crane's components in order to code what was safe from what was dangerous.

This functional 'language' of colour has inspired architectural 'high-tech' experiments with strong colours in which: "the control of contrast between hues lies at the essence of 'indexing' a building", with decisions on colour tone also important. Such coding occurs, notably, in Vancouver, on the Geology Building at the University of British Columbia, and, in Paris, at the Centre Pompidou. There, the chromatic array of
exposed struts, ducts and escalators spark continual controversy. Smith, for example, praises the bright colours for "adding a dramatic bit of sparkle to a rather grey section of Paris" while Birren, for instance, warns that these hues "may seem incongruous and grotesque indeed in one of the most consistently beautiful cities in the world." 

(3) Timely Colour.

This role emphasizes variations in colour through time, either over centuries or diurnally. Specific colours serve to suggest certain periods, to set various tempos or to produce predictable reactions to solar heat.

(3.1) Symbolic Timely Colour: Historical Reference.

Symbolically, Timely Colour plays a historical part of special interest to heritage planners. Historical colour refers to certain periods, such as the "Brown Decades", from 1865-1895, or historical personalities, such as the rulers of the Sung Dynasty (960-1127) who also favored brown. Duttmann observes of this part: "colors fix a certain epoch for all time in a city; this has happened in Cracow, where the meloncholy hues of art nouveau linger on like a perpetual twilight".

Traditionally, old buildings display historical colour with hues typical of their time of construction. On the urban scale, this usually represents the hues of a city's period of greatest
growth, as with Savannah's brickdust reds and Georgian greens, or of a moment of great glory, as with the 'Maria Theresa' yellow in Vienna's core. Timely colour also symbolizes steady growth over the centuries, as with Jerusalem's pervasive golden stones; spurts of development that distinguish new areas from the old, as in Vancouver where, often, the original downtown core features the warm hues of brick and the later one the cooler colours of glass and concrete; or vestiges of the recent past when a 'period' colour, rather than an eclectic selection, prevailed, as the original earth tones of Vancouver's remaining California Style bungalows.

Historical colour on old buildings usually occurs as a result of chromatic survival, preservation, alteration or restoration. Certain colours, especially those of natural materials such as the warm yellow sandstone of Cracow, last as long as their surfaces. Other colours result from the efforts of preservationists who develop a local historical palette, such as the one in Colonial Williamsburg, for "those who wish to relate to values they attribute to that period."  

Other colours survive in altered states. Neglect, for instance, whether intentional or not, changes some hues (Fig.13). Outright destruction alters colour too (Fig.14). In addition, lack of attention to tradition changes colour on old buildings. Turin, for example, gained a monochrome image due to a pervading 'Turin yellow' which, because of indiscriminate redecoration together with a misconception that it is a colour traditionally associated with its architecture, blankets the city.  

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Granville Island Sheds, Vancouver. Historical colour deriving from neglect and showing the destructive power of natural forces. This shed shows discoloured versions of original hues as applied colour fades and peels and the exposed iron rusts. In such a part, colour represents change over time and provides a timely contrast to bright new hues on nearby restored buildings.
Fig. 14) Symbolic Timely Colour: Historical Reference.

Bombed building, near Jerusalem. Historical colour from unplanned chromatic patterns acting as a timely reminder of the destructive forces of man.
However, historical colour does reappear as a result of restoration. In Turin, for instance, the city sponsored an ambitious restoration program, set up by the Municipal Supervisor of Housing, Enzo Biffi Gentili, to repaint buildings in accordance with the hues indicated on the historic masterplan. Portoghesi reports: "This infinitely extendible 'Colour Palette' became the point of reference for planners." In North America, Dr. Roger Moss, a director of the Historic House Association of America, reports in an article titled "You can't paint 'em white anymore" that "historic color revival is raising public consciousness." Vehemently against 'whitewashing' the past, Dr. Moss stresses the importance of either a careful microanalysis or a close examination of pertinent documents in order to determine original colours. A danger of excessive preservation or restoration, though, is the risk of freezing a single chromatic phase in an evolving culture and restricting later opportunities for reinterpretation.

In addition to occurring in the genuinely old built environment, historical colour also increasingly occurs on new facades where it provides an excellent link between the old and the new. This part offers an alternative to the dimensional coordination planners, according to Smith, often favour as an attempt to tidy up "chaos [and] marshall all new buildings into the same form, with variations only in the trimmings." Frequently, linking the old and the new involves direct chromatic replication. At the scale of buildings, similar colour harmonizes new structures with old ones (Fig.15).
Extension to St. Paul's Hospital, Vancouver. Adaptation of the original building's red and cream facade on the new addition provides a clear link between past and present constructions. At the same time, the red brick of the extension is also a 'sign of the times' in the immediate area which, to the south and east, is increasingly displaying brick facades whose hues provide a chromatic link to the restored warehouses in Yaletown.
In addition to replicating colour, modern buildings with white paint, roughcast concrete and glass provide an excellent contrast to more polychrome or patterned traditional ones, creating what Uhl calls a "dialogue between old and new on a town-planning scale". Glass curtain wall facades, in particular, (Fig.16), often act "like a conscious homage to the past- great expanses of glass, being intrinsically non-ornamental, function like mirrors in which old buildings live again in a reflection". Not all observers, though are enthusiastic. Smith, for instance, complains that reflective buildings are:

a kind of self-negating architecture which derives its raison d'être from its surroundings. Unfortunately, irregularities in the reflective skin are unavoidable, and so images appear distorted, resulting in a kind of hall of mirrors effect.

Instead, Smith praises a rarer kind of chromatic link between old and new which he terms 'metaphoric.' This involves subtle echoes or hints of similar colours rather than direct analogies. As an example, he cites the Cathedral Square in Rouen where "a council building...displays inflexions towards the half-timbered traditional buildings common to old city" by using white ribs and a black background, reversing the typical figure-ground relationship.

Occasionally, as on Disneyland's 'Main Street', the intended effect of historical colour is less connection than contrast with hues normally found in the contemporary surroundings. Retrospective chromatic variety signifies humanizing welcome in the context of the prevalent neutrals and achromatics of the
(Fig. 16) Symbolic Timely Colour: Historical Reference.

Hotel Vancouver, Vancouver. Chromatic dialogue between the old and the new in which the glass curtain wall facade of a nearby highrise reflects the hotel's grey facade and green roof with a golden tone and unexpected 'Gaudiesque' distortion: Hommage or Hall of Mirrors?
Modern, though not Post-Modern, built environment. Such uses of timely colour often mix historic periods with wild eclecticism in order to provide nostalgic, escapist pleasure.

Finally, symbolic Timely Colour also serves as a 'sign of the times'. At the moment, chromatic variety in the built environment is fashionable, spurred partly by general cycles in taste and partly by the specific efforts of architects following the Post Modern movement. Porter and Mikellides stress: "exuberant colour has always followed periods of austerity, and is often applied to contrast with monochromatic or dismal surroundings or to re-establish identity." Whereas Modernism favours achromatic hues enlivened by occasional bright primaries, Post Modernism is, as Jencks emphasizes when distinguishing the movement from Late-Modernism, is "pro-ornament" with a palette, in which "reds tend towards pink, yellow to orange and blue to purple."

Thus, in Vancouver today, surfaces in the built environment reveal several current colour trends, including: (1) the increased popularity of pastels, such as the pink and misty mauve championed by Michael Graves (Fig.17); (2) a renewed interest in warm earth tones (Fig.18); and (3) the use of more saturated, unusual 'post-industrial' hues (Fig.19).

(3.2) Aesthetic Timely Colour: Tempo Setter.

Acting on a shorter temporal scale than historic periods, namely the diurnal one, colour also sets our tempo of behaviour.
Symbolic Timely Colour: Historical Reference.

Fig. 17) Apartment, Vancouver. Facade, whose colours act as a 'sign of the times', displays the recently fashionable pastel hues, popularized by the Post-Modern movement. The colour easily dates the decor to the late eighties.
Family Student Housing, U.B.C., Vancouver. Recently applied warm earth tones, on roofs and pavements as well as the townhouse facades, act as a 'sign of the times.' Even the highrise, previously plain grey exposed concrete, has been repainted in matching hues that symbolize its part in the same housing development despite its different density.
(Fig. 19) Symbolic Timely Colour: Historical Reference.

Apartment, Vancouver. Eye-catching orange-red brick with complementary blue-green trim, part of the building's 'Post-Industrial' style, act as a 'sign of the times' signifying current tastes.
Through synaesthesia, the actual passage of time seems slower in areas with warm colours, on which the eye more clearly focuses, and faster in cool hued surroundings.\textsuperscript{37} Lively theatre districts, for example, such as Drury lane or Broadway, reveal, by day and by night, lights and colours of apparently contrasting temperature which underline the temporal character of the area. By day, streets, frequented for routine or monotonous tasks such as commuting, have cool hued surfaces and are naturally lit, often using quiet colour schemes that "may express dignity and repose"\textsuperscript{38} and please the neocortex. However, at night, when apparent slow motion is more pleasurable for eating and entertainment, these same streets come ablaze with bright light and glowing colour that "tends to express gaity and excitement"\textsuperscript{39} and offer limbic satisfaction.

Industrial zones also benefit from a clear colour distinction between cool hued work sites where time is underestimated and warm coloured recreation areas where it is overestimated.

Overall, regarding tempo, Porter and Mikellides recommend in their conclusion to \textit{Colour for Architecture} that:

red and the other fully saturated hues—particularly orange and yellow—appear to be ideal colours for incorporation into dynamic spaces where bodily locomotion, physical tasks or circulation are involved, such as...indeed, streets, concourses and pedestrian ways.\textsuperscript{40} (Fig.20)

\textbf{(3.3) Functional Timely Colour: Heat Absorption and Reflection.}

Practically, timely colour maximizes or minimizes the heat absorption and reflection of materials over the diurnal cycle.
Facade Detail, Vancouver. Red tiles enliven the lower level of a plain concrete building with a colour conducive to movement. The band of red also breaks up the building's height, provides visual interest at eye-level, and contrasts with the blue tiles lining the pond to intensify the chromatic effect of the water.
Light coloured opaque surfaces reflect heat, remain relatively cool to touch, and are well suited to south-facing facades and pavements around swimming pools where people are likely to be barefoot. In contrast, dark opaque surfaces absorb thermal light rays and convert them into heat later radiated.

Transparent materials, such as glass, are particularly likely to have colour contribute to heat absorption or reflection. Heat absorbing glass:

contains a metallic oxide that gives glass a blue-green, bronze, or gray tint and absorbs much of the heat from the sun. A considerable amount of heat is dissipated externally, thus reducing the amount of heat that is transmitted.  

Green glass is increasingly popular in Vancouver, both on roofs such as the Provincial Courthouse, and facades, either as a curtain wall or windows (Fig. 20). However, this functional use of colour, while adding to the overall chromatic variety of the exterior environment, does not always completely reduce interior heat transmission or glare.

Heat-reflecting glass, available in deep or light gold, silver and gray also controls solar heat and reduces daylight glare by having one face of the glass covered with a thin metallic coat of high transparency and high reflective properties.
(Fig.21) Functional Timely Colour: Heat Absorption.

New Building, Vancouver. Green glass windows promote heat absorption. A considerable amount of heat is dissipated externally, thus reducing the amount of heat that is transmitted indoors, functionally reducing air conditioning costs while adding visual variety to the exterior facade. Here, the green glass combines with the yellow walls for a harmony of 'similarity'.
(4) Circulatory Colour.

Colour playing the circulatory role establishes associations between different environmental elements. Both continuity and contrasts between neighbouring hues indicate locational context. In this role, colour contributes to the urban 'legibility' advocated by Lynch:

structuring and identifying the environment is a vital element among all mobile animals. Many kinds of cues are used: the visual sensations of color, shape, motion or polarization of light.\(^2\)

(4.1) Symbolic Circulatory Colour: Identity.

In this part, colour, especially when applied decoratively to attract attention to the surfaces it adorns, signals a particular location and represents environmental 'control'. By giving identity to a place, colour simplifies spatial orientation. Through surface colour, we express:

a wide range of visual relationships from mutual attraction to exclusion as well as subtle distinctions such as completions, clashes, contrasts, bridges and reinforcements between components.\(^3\)

Chromatic identity occurs at several scales of perception and with different planning requirements. At the urban scale, colour serves to distinguish a city from the surrounding countryside (Fig.22 & Fig.23). This usually requires considerable municipal planning. At the district scale, colour also contrasts an area from its neighbours, a part often involving community planning to co-ordinate efforts (Fig.24).
(Fig. 22) Symbolic Circulatory Colour: Identity.

Festive Illumination, Grenoble. Colour through light signalling location at the city scale. This chromatic dynamism derives from a combination of collective planning and individual enterprise that leave no doubt as to the identity of the place.
(Fig. 23) Symbolic Circulatory Colour.

City Roofs, Florence. Seen from the highest point in the city, the roof of the Cathedral, the distinctive red roofs of Florence, which contrast with the surrounding greenery, give the city a special character. To preserve the image of the place, planners have helped the city draft laws enforcing a strict range of acceptable roof colours.
Granville Island and Bridges Restaurant, Vancouver.

The environmental colour found in this area distinguishes it from neighbouring ones. Characteristic of the place are: (1) the use of intense colours usually associated with industry; (2) a system of strongly coloured industrial pipes; (3) steel-outlined and multi-paned windows and doors as well as colourfully outlined skylights—all expressive of 'technology'; and (4) corrugated steel cladding and stucco finishes. The yellow roof and sides of Bridges Restaurant make it stand out as a local landmark, clearly visible but, seemingly, mysteriously inaccessible from most directions.
At the street scale, either architects, builders and owners distinguish a structure from adjacent ones (Fig.25) or a consultant provides cohesive unity with a comprehensive colour scheme. Uhl, for example, in a detailed examination of streetscape unity, offers six suggestions for unifying a street with 'thought through' colour:

1) Emphasizing the planarity of the facades by painting them a uniform, light tone on both sides of the street;
2) Composing the street in spatial terms with a homogeneous dark scheme for facades and dark asphalt pavements;
3) Having the foreground colour of the facade relief the same throughout, with variable colors of rendering or vice versa;
4) Applying horizontal stripes of color, dividing facades into foundation, base, window zones, roof zone, and thus lengthening the street's perspective;
5) Having the foreground light and the background dark for continuous contrast; and
6) Changing foreground and background from building to building in a regular pattern."

Finally, at the building and detail scale (Fig.26), individual property owners decorate surfaces within their domains with colour that represents:

a sort of signature which, apart from acting as a protective layer, describes personality, status and territory....More subtle changes can be found in high-density areas where colour and texture play tandem roles in defining areas of territorial space."³

Altogether, environmental colour in the part of 'identity' aids circulation by symbolically serving as signs of literal and figurative 'place.' In addition, symbolic Circulatory Colour contributes immensely to what the Townscape Institute, a nonprofit, public interest organization in Cambridge, Massachusetts, concerned with urban liveability, calls:
(Fig.25) Symbolic Circulatory Colour: Identity.

Broadway Streetscape, Vancouver. Colour here accentuates differences in the form of buildings along a street, stressing the identity of individual properties. The common colour is that of the public pavement, which in comparison with that on private facades is drab, dull and disorganized. All buildings in this group, however diverse in style, emphasize the roof or roof line with colour in some distinctive way.
(Fig. 26) Symbolic Circulatory Colour: Identity.

Store, Vancouver. Unusual contrasting colours quite unlike those of neighbouring structures serve to draw attention to the place and give it a distinct identity, especially as the colours also act as locational clues. In addition, the type of colours used indicate the nature of the store: hues considered 'cheap' by conventional taste signal the possibility of bargains within.
The human need for connection and identity with place, a relationship that enriches the spirit and heightens one's sense of aesthetic pleasure.  

(4.2) Aesthetic Circulatory Colour: Spatial Progression.

When playing this part, colour "gives continuity and form to the experience of moving through spaces." Such colour use occurs both spontaneously and as a result of careful planning although, as Bacon laments at the start of a detailed analysis of this part in *The Design of Cities*: "the purposeful use of colour in a sequential sense is almost unknown in contemporary practice." Both Lynch and Cullen stress that chromatic changes surrounding movement engenders an appreciation of urban beauty. Smith, in *Architecture and the Human Dimension*, offers a specific examination of circulatory aesthetics.

In particular, Smith distinguishes between teleological aesthetics, which involves progression towards a climax or goal, and lineal aesthetics, which relates to the kind of urbanism extending over considerable areas of a city without reaching any discernible goal. Colour contributes to both types of aesthetic progression.

Teleological progression, according to Smith, has four possible attributes. The first is facades, such as arcades, which impel movement (Fig.27). The second factor contributing to teleological progression is a prestige gradient. Venetian pavement colours, for example, indicate proximity to the vital core of the city, the Piazza San Marco. In outlying streets, or, strictly speaking, passages, grey granite setts provide the
visible base for the built environment. Nearer the Piazza, in more exclusive areas, mosaics start to decorate pavements with unusual colours and patterns. Then, finally, the Piazza San Marco boasts beautiful pink and white paving exemplifying, as Halprin notes of all great urban spaces in the world, that the city floor "can be patterned, texture, colored, and thrown like a rich rug underfoot."50

The third factor is the presence of a visible part of the goal, which often has a distinctive colour. Thus, for Vancouverites going downtown, the green roof of the Hotel Vancouver acts as a landmark identifying their destination.

Finally, as a fourth factor, Smith indicates the importance of glimpsing further scenes along the way, such as the intermittent curves of a road whose hues contrast with surroundings.

One of the most dramatic uses of colour to emphasize spatial progression occurs at the Imperial Palace in Peking. It has all four attributes of teleological progression: elevated arcades; a prestige gradient expressed in terms of accessibility; the highly visible yellow and gold of the Forbidden City's roofs, gleaming like a secret treasure trove; and glimpses of further scenes, most notably through the Green Gate.

As described by Bacon,51 the viewer passes through four zones, each with a distinct colour, that heighten anticipation for the final chromatic climax: first, the Outer City where buildings with neutral black roofs prepare the eye for fresh
experiences; then the Inner City brightly beckoning with brilliant blue-purple tile roofs and red doors with gold ornaments; next the gate to the Imperial City, outlined in green, the most immobile colour which indicates stability; and, finally, the chromatic splendor and intensity of the Forbidden City with gold and yellow roofs marking a contrast between the tops of the temporal world and the blue peak of the heavenly one.

Environmental colour also contributes to lineal progression through chromatic consistency and contrast (Fig.28). Smith specifies:

it is the older cities that are rich in contrast between light and shade, between one building plane and another, and between colours and textures.\(^{53}\)

The colours of a long pedestrian mall in Rotterdam, cited by Bacon,\(^{54}\) exemplify the chromatic contribution to lineal progression. There, unlike in North America where often flowers of many colours are used together, monochromatic flowers are massed into large zones "where the progression of movement is articulated."\(^{55}\) The neutral or subdued continuity of surface colour on pavements and facades acts as a complementary backdrop to the everchanging natural hues of plants and pedestrians.

Aesthetic Circulatory Colour, therefore, contributes to the pleasure of progression through space. Teleologically, variations in colour convey anticipation and fulfillment, while, lineally, they provide continuity with occasional change.
(Fig. 27) Aesthetic Circulatory Colour: Spatial Progression.

Rue de Rivoli, Paris. The arcade's light and shade pavement patterns, similar in effect to railway ties, heighten the aesthetic pleasure of moving through space by psychologically impelling movement and, thus, contributing to the experience of teleological progression.
Pedestrian Mall, Strasbourg. Black and white half-timbered facades in the historic part of town contribute to lineal progression through continuous contrasts between light and shade, volumes and textures and between different building planes.
(4.3) Functional Circulatory Colour: Legibility.

Functionally, Circulatory Colour also improves actual legibility and acts as a spur to movement. This part applies particularly to transportation planning, both for vehicles and for pedestrians.

Functional legibility, necessary for the expression of environmental information, is "the capacity with which a figure or shape can be recognized against its background." This depends on three factors: (1) appropriate illumination; (2) the size of the figure or its angular size; and (3) the colour contrast between the figure and its background. Birren reports that the light-dark contrast is more important than the chromatic contrast:

- black on yellow holds first place, then green on white, red on white, blue on white, and black on white. In strong illumination light colors on dark backgrounds are superior; in dim illumination the light background seems essential, with dark colors clearly contrasted on it. Visibility depends almost entirely on contrast, with yellow superior to white because it produces less blur and compels attention.

Surface legibility is relevant to roofs and facades serving as backgrounds to signs giving directions and to pavements with traffic markings. At Lonsdale Quay Public Market, for example, the north facade carries a large cylinder announcing 'MARKET' in white superimposed on a dark background.

Pavement markings, using high contrast colours, differentiate between pedestrian and vehicle zones, as well as dividing directions of traffic and indicating appropriate driving
behaviour. Crosswalk markings, for example, are often simple alternating bands of white and black, as on English 'zebra' crossings whose pattern symbolically alludes to nature.

The addition of a third colour to crosswalks improves legibility by further colour and texture contrast. When the town of Rutland, Vermont, hired artist Fernand Leger to embellish local crosswalks with colour in the Sixties, this move was hailed as "one of the very few examples of creative color experimentation to be seen in American urban planning." Such chromatic variations are now more common. In Vancouver's Kerrisdale, for example, the principal pedestrian crosswalks also contain the warm red hues of brick (Fig.29).

(5) Illusory Colour.

Illusory colour mediates the visual relation between surfaces to alter our perception of the built environment. This role's power derives from our instinctive attention to the brightest and most contrasting features of a scene, synaesthesia, and the eye's use of colour to identify and to define objects in space. To be effective in this role, the colours used must contrast in relative lightness, occur mainly at the scale of buildings and details, and be seen in context.
Kerrisdale Crosswalk, Vancouver. This crosswalk uses three colours to improve the legible discrimination of spatial zones, especially for pedestrians with impaired vision for whom the texture reinforces the chromatic markings. In addition, the continuity of the warm red hues of surrounding sidewalks across the asphalt roadway emphasizes the importance of pedestrian zones and visually links different segments of the shopping area.
In place, Illusory Colour plays three parts of particular interest to planners concerned with urban beautification projects: (1) it, symbolically, attaches or detaches surfaces from their settings; (2) it aesthetically emphasizes aspects of appearance; and, (3) it functionally, camouflages.

(5.1) Symbolic Illusory Colour: Attachment and Detachment.

In this part, colour, usually symbolic of property ownership, similarity of activities or architectural style, visually attaches or detaches surfaces from their surroundings. This is one of environmental colour's oldest parts, present throughout history:

back to ancient times when a man lived in a cave at the same time as he built temples, deliberately and symbolically placed in the landscape.\(^5\)

Symbolic Illusory Colour integrates surfaces with their setting by using colours culled from neighbouring surfaces (Fig.30). Similar hued pavements are especially important as extensions of facade colour. Such visual attachment serves to highlight group unity.

In contrast, Symbolic Illusory Colour also isolates surfaces from environment with unusual or bright hues that attract attention (Fig.31). These colours distinguish between various materials and define form and volume in a way that celebrates architecture and intensifies our experience of it.\(^6\) Contrasting colours on different surfaces as well as on the lines, planes and openings of a building clarify the scale of the built form.
Flase Creek Townhouses, Vancouver. At this housing cluster, the identical beige facade colour attaches individual units to the group. In addition, as a shade of the brown predominant as a surface hue in the area, colour links this cluster to neighbouring ones, while, as an earth tone, it visually ties them to the landscaping. The red roofs further distinguish the units as part of a distinct cluster, although to avoid monotony and to differentiate somewhat between units, blue-red and orange-red hues alternate in random patterns. Additional attachment to the area occurs by having housing with identical hues in both halves of the original False Creek development. However, when seen from a distance, the red roofs detach the clusters as a whole from their surroundings and act as an orientation landmark representing False Creek in general.
Kitsilano Townhouses, Vancouver. Facade colour not only detaches the development from achromatic, monotone neighbours, but also signals the difference between the commercial lower levels, painted a dark, practical grey, and the brighter hued, polychrome housing section above. However, even the apparent chromatic detachment between units is an illusion: each floor of the same cloured section is actually a separate unit.
Thus, by visually detaching surfaces, Illusory Colour symbolically expresses individual distinction and the special character of a building.

Whether to attach or detach with colour is very much a matter of environmental context. The work of Lenclos exemplifies both approaches. He either uses colour that is sympathetic to the natural and traditional environment or, where no natural environment exists, incorporates colour that imposes an artificial aesthetic for new urban and industrial projects. Lenclos believes that colour, "by its plastic and rhythmical powers of expression...is able to release a poetic dimension which complements the man-made environment." 

(5.2) Aesthetic Illusory Colour: Altered Spatial Perception.

In this Illusory part, colour pleasurably deceives the mind and the eye about the appearance of the built environment.

Colour deceives the mind through synaesthesia, including apparent size, weight and depth. In place, this power serves to underline spatial character.

Since warm and dark colours make surfaces appear smaller, such hues make a large structure or space, such as a gigantic plaza, seem smaller and more intimate in scale. In contrast, cool and light colours seem to expand space. Such hues, therefore, enlarge the apparent size of small courtyards or narrow passages. Along streets, the background tone of facades influences the apparent size of details and street furniture seen
at the same time, with lighter objects looking larger than darker ones, especially with contrasting foreground and background shades. Colour also alters apparent size by means of a pattern fragmenting large surfaces (Fig.32 & Fig.41) and vertical or horizontal bands on facades to emphasize either height (Fig.37) or width (Fig.20).

An altered perception of weight applies particularly to the vertical arrangement of surfaces. A red roof supported by yellow columns rising from a white pavement, for instance, looks top heavy. Porter and Mikellides offer suggestions for using the apparent weight of colour to establish stability in external environments. These range from articulating heavy colours, such as saturated reds, blues and violets to encourage equilibrium in spaces where a positive gravitational link exists between pavement and roof plane, to manipulating "the form of ascending horizontal gradations on the facades of high-rise buildings or skyscrapers with the heaviest colour at their base." Overall, dark, heavy base colours anchor structures to the ground, while light hues at higher levels reduce the apparent heaviness of architectural mass. A range of ordered colour gradations ascending a facade gives different levels of a building special identity (Fig.10).

Regarding perceived depth, since warm, dark or saturated colours appear to advance, used on facades edging spaces they heighten the overall sense of enclosure and draw attention to protrusions. In contrast, cool, pale or unsaturated hues optically minimize facade protrusions and widen spaces.
(Fig. 32) Aesthetic Illusory Colour: Altered Spatial Perception.

Fairmont Medical Building, Vancouver. Facade colour acts to alter spatial perception by fragmenting the apparent size of large surfaces: horizontal white bands emphasize width rather than height, while the alternating pattern of purple blocks further reduces the actual vastness of a massive block.
However, Bruno Taut demonstrated when artistic director of the planning division on Berlin's public housing board in the 1920's that even relatively dark colours can produce optical widening if proper lighting conditions are taken into account during the planning of colour schemes.64

In addition to altering the appearance of our surroundings through psychological effects, Aesthetic Illusory Colour also plays a more pictorial part. Thus, to deceive the eye, environmental colour acts as an integral element of large-scale trompe l'oeil paintings (Fig.33). These attempt to represent objects as though they existed in three dimensions at the surface of the painting. Used since ancient Greece, when Zeuxis reportedly painted such realistic grapes that birds tried to eat them, trompe l'oeil painting became popular as a cheap substitute for expensive building materials and exterior ornament such as cornices, rusticated stonework, stucco and windows, with or without shutters. Citing European examples, Porter states:

At the time when the work of a skilled painter and decorator cost far less than the materials of rich ornament, the thrifty Genoese resorted to a sham decoration in order to bring an impression of opulence and elegance into their streets.65
(Fig. 33) Aesthetic Illusory Colour: Altered Spatial Perception.

Kerrisdale Trompe l'Oeil, Vancouver. Realistic but inexpensive facade embellishment enlivens a blank wall with witty colour that challenges our sense of perspective and gives character to the previously unremarkable building.
Today, when skilled trompe l'oeil painters are rare, such detailed illusory colour is usually remedial, often on historic buildings such as the Old Jail in Strasbourg where a very realistic trompe l'oeil fills a blank marring the symmetry of facade fenestration.

Now, trompe l'oeil's tend to be more pictorial than material. Usually commissioned as part of a building improvement scheme, they either enliven a blank monochrome facade or make historic references, often producing unforeseen but positive repercussions in the community.⁶⁶

(5.3) Functional Illusory Colour: Camouflage.

Functionally, environmental colour camouflages surfaces, making them as inconspicuous as possible or in some way changing apparent size or identity.⁶⁷ This is the reverse of using vivid colours for identification. Colour plays this part naturally on the fur and feathers of many animals, and was originally used by man in war, especially to conceal military installations from the air. Thus, for instance, the walls and roof of a building may be painted so that a road appears to run across it.

In more ordinary settings with some unsightly elements, environmental colour as camouflage either disguises, distracts from or distorts them. When, for example, "one of the objectives of a street improvement plan is to tidy up all the bits and pieces that accumulate on buildings over the years,"⁶⁸ the Civic Trust recommends 'painting out' badly sited pipes, wires, electrical boxes and metal brackets that cannot be removed.
(Fig.34) Functional Illusory Colour: Camouflage.

Parkade, Vancouver. This parkade, instead of having a uniform facade colour, such as grey, with visible cars providing the occasional visual variety, is enlivened by bright red piping. This stylized camouflage creates a certain mystery about the building's function, especially on the top floor, as well as brightening the edge of a dark, open interior, accenting architectural components such as glass canopies, and reducing the apparent size and massing of the structure.
Camouflage colour also serves to distract attention (Fig.34). In addition to being planned at the time of construction, it also remedies unexpected problems. Jencks explains the camouflage at Le Corbusier's famous l'Unite d'Habitation in Marseilles:

the use of color on the reveals was conceived as a result of a mistake in the mullion design when Le Corbusier was away from his office. The coloured sides were created to take one's eye away from the monotony of the window pattern, but they also serve other incidental functions, one of which is to reduce the scale of the gigantic project.  

The camouflage was so successful that Porter now praises Le Corbusier's use of exterior colour to deflect modified natural light, tinted by paint, into interiors.

Colour as camouflage also distorts the appearance of the built environment by fragmenting scale and mass. Architect Carlo Santi, for example, decided to 'humanize' a massive housing project in Bologna by painting exterior walls with curved, multi-coloured shapes totally unrelated to the forms they covered. Such a use of large-scale environmental colour sometimes earns the name 'Supergraphics'. Porter explains:

Drawing from Pop Art symbolism, stripes, arrows, and letterfoms etc. Have been magnified to building proportions as a means of breaking up blank exterior planes, in some case used paradoxically to change three dimensional impressions of physical form.

Some of the most distinctive Supergraphics adorn the curvacious facades of eight tower blocks in Nanterre (Fig.35 & Fig.36). These unusual and witty colour schemes by Fabio Rieti express a philosophy that:
Apartments, Nanterre. 'The architectural monument to Supergraphics' attempts to camouflage the size of a monumental mass by apparently random areas of bright colour that fragment area. Some colours suggest the contours and colours of the earth and natural foliage (Fig.35), while others adapt the hues and formations of cloudfilled skies (Fig.36).
When a building is considered out of scale with its setting or a site considered devoid of colour identity, promotes the injection of strong colour as a 'humanizing' element which will introduce a sense of place."\(^7\)

(6) Pictorial Colour.

In this role, environmental colour contributes to large-scale outdoor art and advertising. The power of Pictorial Colour is both practical, since the information potential of a black and white image is increased when transferred onto a coloured image, and pleasurable, as colourful murals and mosaics are excellent ways to beautify cityscape.

In place, Pictorial Colour symbolically edifies, aesthetically entertains or, functionally educates about consumer products. In all these parts, environmental colour acts both as the frame and as an essential element of the picture. Of all the six main roles environmental colour plays, the Pictorial one is the most likely to reunify the three arts—painting, sculpture and architecture—whose paths diverged during the Renaissance when:

the age of the specialist was at hand....The painter kept color as his principal means of expression; the sculptor turned to form and the architect to line. This division was true until recently, and each art lost something by being separated from the others.\(^7\)
Symbolic Pictorial Colour, most frequently applied to facade paintings and sculpture, serves to edify observers by representing religious mysteries or moral principles. Traditionally, every colour had an assigned meaning. Birren stresses:

There were few abstractions as today, murals that attempt to spiritualize commerce, progress, and whatnot through the emotional implications of hue... symbols and hues were as fixed... as the letters of the alphabet.  

Such notable and now monochrome buildings as the Parthenon, Notre-Dame and Wells Cathedral all exemplified Pictorial Colour's symbolic part in their polychrome past. In ancient and medieval times, sculpture and painting were considered essential to architectural elaboration, not simply as isolated art forms. Originally, the Parthenon was not a pristine marble temple. Above columns tinted ivory, gilding and contrasting hues adorned the capitals, relief sculpture, cornices and freizes, some of whose reconstructed colour can be seen at the Royal Ontario Museum. Porter explains:

the pediments and friezes acted as giant billboards narrating the mythology of a Golden Age. Here, a strong colour - much as it does on modern hoardings - played a symbolic role. Blue, for example, was associated with 'truth' and 'integrity', colour attributes which were later to re-emerge in the cloaked Madonna of Christian symbolism.

In the Middle Ages, Pictorial Colour, enforcing the teaching of the Mysteries, symbolically enlivened cathedral facades such as Wells' where all one hundred and seventy six full size statues
were brilliantly coloured. In general, as research at Notre Dame revealed, exterior colour, seen in bright sunlight, was much more vivid than interior colour, seen in light diffused by stained glass.

Over time, these exteriors suffered from weathering, a problem that still reduces the lifespan of Pictorial Colour. In addition, increased literacy removed the need for colour symbolism while the Protestant Reformation criticized its use as 'pagan' and 'sensuous'. Today, symbolic Pictorial Colour occurs mainly on the surfaces surrounding Islamic mosques, Oriental shrines and Eastern temples.

(6.2) Aesthetic Pictorial Colour: Artwork.

Since the Renaissance, Pictorial Colour has played a distinct aesthetic part, entertaining the viewer and forming an increasingly popular element of the 'urban experience'. Outdoor art is a leading way of familiarizing the public with the potential of environmental colour. Porter recommends:

*Generally, the instrument of colour can be used to invest existing buildings with all the elements of expression, story-telling, ambiguity and communication that it lost some time ago.*

Wallpainting is delightfully diverse in style and source. Style ranges from the abstract (Fig.37) to the realistic (Fig.38). Murals, in addition to being painted, may be tiled (Fig.39) or even sculptural in effect (Fig.40). Indeed, Halprin advocates treating monochromatic walls as giant friezes gaining colour variation from the interplay of light and dark.
Office Building, Tel Aviv. Abstract rainbow-style mural exemplifies large-scale environmental art while also educating observers about possible colour gradations and emphasizing the building's height by chromatic fragmentation. The pavement hues and pattern also serve to alter spatial perception and attract the eye.
'The Whale', Vancouver. Realistic mural enlivens blank facade with giant outdoor artwork that shows the observer what they might have seen had no buildings existed between the parking lot and the waterfront. Adding an unexpected splash of colour and spontaneity to the largely subdued hues of the surrounding surfaces in the financial district, this mural is now a Vancouver landmark, acting as an identifying marker aiding spatial orientation.
(Fig.39) Aesthetic Pictorial Colour: Artwork.

Courtyard, Barcelona. Tiled mural offering a fleeting glimpse, through a gate, of Pictorial Colour primarily as an adornment of private space, but also visible from public areas.
(Fig.40) Aesthetic Pictorial Colour: Artwork.

*Casa Batlló, Barcelona.* Pictorial Colour with a sculptural twist. Both the facade and roof here act as a canvas, exemplifying the potential of ordinarily flat surfaces for imaginative expression.
Specifically, citing the example of Danziger's entrance to Hebrew University in Jerusalem, Halprin urges making the most of a surface since by using it as a canvas for works of art, or modeling it as sculpture, the wall gains another dimension and achieves a sense of scale, texture and shadow pattern, which makes it interesting for the passerby.  

Wall paintings are either sponsored or spontaneous. Civic sponsors usually apply Pictorial Colour to improve dilapidated environments or, as in France, to alleviate the harshness of modern architecture. Spontaneous murals, often community based, either celebrate or criticize events, issues or characters indigenous to the setting. One of the most famous facade murals was *The Good, the Bad and the Ugly* in Battersea, London which: "graphically documented local discontent at the decline of their area", only to be destroyed in the process of urban renewal. 

Pavements, as well as facades, provide excellent opportunities for outdoor artwork. The French are among the most innovative with artistic floorscapes. These range from simple schemes of multi-coloured bricks laid out like a woven tapestry along a resort's promenade, (Fig.41) to Gerard Singer's playful pavement profusions and protrusions of blue, designed to amuse children with a fantastic pretend lake at a high density housing scheme in Evry, and to Victor Vasarely's dramatic spatial illusions in Creteil New Town where colour and patterning alone totally transformed the roof of the Centre Commercial and the open plaza before the public buildings. There, as Duttmann evocatively describes:
(Fig. 41) Aesthetic Pictorial Colour: Artwork.

Plaza, Valras Plage. Pavements also act as canvases for artistic effects with colour. Here, the multicoloured bricks weave a warm pattern in the style of an abstract tapestry. The polychrome irregular pattern also serves to fragment the apparent size of the plaza.
The roof of the huge shopping centre is a landscape of emergency exits and ventilators, painted in stripes of white and various blues; one thinks of the sailboats on the nearby lake, and the roof itself is like a body of water with a new city on its horizon. The plaza in front of the Centre de Commerce is paved entirely with glossy blue and white slabs; gently undulating lines create the illusion, from near and far, of depth, of modelled surface-water in motion. The surrounding buildings, otherwise unrelated to each other, seem all to float, detached from the earth.  

(6.3) Functional Pictorial Colour: Advertizer.

Functionally, Pictorial Colour also acts as an advertizer, attracting attention to purchasing possibilities. Colourful advertizing has existed since about 3000 B.C. When the Summerians used pictures to promote their wares. Environmental colour usually plays this part on blank facades, flank walls and gable ends, although, occasionally, it occurs at the scale of the street, as in Piccadilly Circus.

Functional Pictorial Colour is either part of an actual advertizement or makes more indirect references to consumer products. Hog’s Heaven, for instance, a mural surrounding a Los Angeles meat-packing plant, wittily depicts the life of a pig from piglet to sausage. In Vancouver, music is a prominent influence on the commercial use of Pictorial Colour with, for example, an organ store boasting a keyboard cornice, a stereo shop a mural of giant speakers, and a record store, painted musicians adorning a side wall (Fig.42). As the Civic trust stresses:

Properly handled in terms of siting, scale and volume, advertizing can offer a more rational use of colour than the sometimes arbitrary painting of buildings in different colours.
(Fig. 41) Functional Pictorial Colour: Advertizer.

Black Swan Records, Vancouver. The side facade of this store features an eye-catching ensemble of painted musicians whose artistic efforts suggest the type of store they adorn. Not only does such functional Pictorial Colour attract business unobtrusively, but it also enhances the appearance of the neighborhood.
Endnotes


2 ibid, p.87.

3 ibid, p.85.


7 ibid, p.68.


11 Porter, p.110.

13 Faulkner, p.5.


15 Faulkner, p.21.


18 Porter, p.121.

19 ibid, p.123.

20 Smith, p.127.


22 Lewis Mumford, *The Brown Decades*, a book whose title captured the mood of the American post-Civil War era, when brown building materials were popular.

23 Birren, (1982).


26 Porter, p.40.


28 Roger Moss, "You can't piant 'em white anymore."

29 Smith, p.49.

30 Uhl in Duttmann et al, p.90.

31 ibid. P.91.

32 Smith, p.129.

33 ibid, p.49.


36 Porter, p.72.
Porter & Mikellides, p.105. The effect of colour on our sense of time and tempo of behaviour is of special interest to researchers concerned with the totally artificial environments of manned spacecraft centres.

Faulkner, p.5.

ibid.

Porter & Mikellides, p.143.

Faulkner, p.17.


Boeschenstein, p.278.

Uhl in Duttman et al, p.97.

Porter, p.110.


ibid.
49 Smith, chap. 9-11.


51 Bacon, pp. 232-239.

52 Roigt, p. 165.

53 Smith, p. 111.

54 Bacon, pp. 228-231.

55 ibid, p. 228.

56 Faulkner, p. 21.

57 ibid.


60 Porter, p. 116.

62 Lenclos, in Porter & Mikellides, p.75.

63 Porter and Mikellides, p.143.

64 Duttmann, p.24.

65 Porter, p.32.

66 Fleming, p.88.

67 Faulkner, p.20.


70 Porter, p.20.

71 ibid, p.118.

72 ibid, p.120.

73 Faulkner, p.2.


75 Porter, p.13.
76 ibid, p.32.

77 Halprin, p.132.

78 Porter, p. 126.

79 Duttmann, p.159.

80 Civic Trust, p.50.
Conclusion

(1) Summary of Findings about the Role of Environmental Colour.

Based on a literature review supplemented by recent or renowned examples of colour use, this thesis shows the planner that environmental colour may be 'thought through' in terms of 'Place' and 'Power' and that, far from playing one role, environmental colour has many precise parts.

The place of colour is determined by a number of physical and social factors. Each large-scale manmade surface offers different constraints and opportunities for colour use. Pavements form the largest continuous colour surface in a city but, partly because of wear and tear and partly because they are mainly in the public domain, they receive relatively little attention in terms of their chromatic potential. Facades, however, reveal the most chromatic elaboration and character. Roofs, in turn, give colour identity to a place when seen from above or afar, with colour on sloping roofs more visible.

Different factors also influence colour in place at various scales of perception. At the scale of regions and cities, civic customs and cultural preferences modify the effect of local geology, topography and climate. At the scale of districts, activities, history and the ethnic background of residents are all influential. At the scale of streets, visual relationships between buildings and intended moods are important, while at the scale of buildings and details, colour enlivens surfaces and
either integrates or isolates them from neighbouring ones. Understanding these influences of place helps the planner know where to set goals for promoting 'though through' colour.

Colour's power is both spatial and psychological in effect. The power to transform the appearance of our surroundings provides vital visual variety. This derives from lighting conditions that change over time and with place, surface spectral qualities that vary with the type and texture of materials, alterable angles of perception regard direction and distance, and synaesthesia of colour temperature, weight, depth, and size. The power to influence our well-being affects both our behaviour and moods. We respond to colour in terms of: (1) arousal, either heightened or lowered; (2) pleasure, deriving from emotional, social and spatial associations, and from aesthetic experiences appealing to both the neocortex and the limbic system; and (3) control, depending on the effects colour has on our 'competence' and 'cognition'. The planner seeking to promote 'thought through' colour taps this power.

In place, environmental colour's symbolic, aesthetic and functional values modify its general Background, Meaningful, Timely, Circulatory, Illusory, and Pictorial Roles to produce the many precise parts colour plays. Since the literature presents them in no consistent way, this thesis discusses them in terms of: (1) Background 'Backdrop', 'Foil', and 'Dirt Disguiser'; (2) Meaningful 'Metaphor', 'Expression of Material and Light', and 'Coding'; (3) Timely 'Historical Reference', 'Tempo Setter', and 'Heat Absorbtion and Reflection'; (4) Circulatory 'Identity',
'Spatial Progression', and 'Legibility'; (5) Illusory 'Attachment and Detachment', 'Altered Spatial Perception' and 'Camouflage', and (6) Pictorial 'Edifier', 'Artwork' and 'Advertizer'.

Putting colour in place is, of course, the responsibility of artists, architects, builders and individual property owners. However, decisions by planners influence the role of environmental colour both directly and indirectly.

(2) Recommendations to the Planner.

Given the realizable potential of environmental colour to play a variety of important roles that transform the appearance of our surroundings and influence our well-being, the planner concerned about the physical environment and aware of the recent 'rebirth' in colour, should undertake to promote 'thought through' colour by:

(1) Reading about, observing and discussing colour issues to increase professional awareness of the importance of environmental colour and the effects planning decisions are likely to have on its role;

(2) Developing strategies of education, exemplification, encouragement, and enforcement.

Strategies of education include publishing and distributing information about the use of environmental colour as well as
Guidelines for local use and, if necessary, setting up a commission to develop a civic colour palette.

To exemplify 'thought through' environmental colour, public authorities can develop strategies of systematic colour programming,' for example public buildings could have similar colour designations to identify appropriate jurisdictions and uses and public paths, such as the Boston Freedom Trail, could have continuous or graduated colour to aid 'cognition'. If a local palette is developed, the hues could be centrally displayed, as at Turin's city hall where they serve as an easily visible reference for planners.

Encouraging 'thought through' environmental colour generally involves strategies either of co-operative consultation and advising or of sponsorship and publicity.

To enforce 'thought through' colour as a local tradition acceptable to the majority of citizens, the planner must provide politicians with pertinent information in order to regulate the choice and treatment of environmental colour. Such laws, as in Venice, may limit the surface colour to a prescribed range of hues, of, as in Siena known for distinctly hued pavements, protect colour by restricting vehicular access to avoid surface discolouration.

These strategies aim to ameliorate the appearance of the built environment at various scales of perception and to improve the quality of life for citizens by tapping the positive potential of colour to influence mood and behaviour.
The choice of strategies in any community depends, above all, on the colour needs and opinions of the citizens. In some places, often for historical reasons, a consensus on the type and treatment of environmental colour exists which needs to be encouraged and enforced. In other places, a plurality of colour tastes exists, requiring some refereeing by planners and education about the potential power in place of various parts played by environmental colour with places in the civic domain setting the example of 'thought through' colour use.

(3) Applying the special perspective and skills of each planning role. T.I. Gunton, in a classic article of planning theory, "The Role of the Professional Planner", outlines several professional roles planners can play: technocrat, public servant, referee, advocate, bureaucrat, stage agent, social learner and social reformer. He concludes that, as no single part suffices, planners should concentrate on learning which situations require which roles.²

With regard to colour issues, the role of the planner as technocrat, in which the professional sets goals, identifies and chooses means, controls implementation and finally reviews the results is, with one exception, somewhat like that of a colourist, such as Lenclos. Both claim to use objective scientific knowledge in their efforts to solve society's problems.² However, the colourist, whose scope is narrower than that of the typical planner, also invokes artistic creativity. Ideally, as a result, the similarities in process improve
Professional communication, while the differences in style prevent overlap and bridge the gap between knowing and doing.

Then, the planner as public servant providing expert analysis on value formulation, means identification and effectuation is well suited to evaluate chromatic situations and promote solutions such as guidelines. A leading example of such a planner is Enzo Biffl Gentili who, in 1987, as Turin's municipal Supervisor of Housing, set up the large scale, long term, now widely lauded program to restore the city to the chromatic glory of its original 1800 civic colour scheme.

As a referee when goals are not specifically identified, the planner, who keeps the public interest in mind in terms of aesthetic pleasure and 'control' responses, serves to adjudicate between differing sides in chromatic debates. These often concern the need for a colour scheme at some scale and the selection and application of appropriate colours. Planners on design review panels often play this role.

Even more actively, in the role of advocate, the planner works for a specific interest group or cause, identifying alternative means, lobbying politicians to accept goals and reviewing results. This role suits planners with a particular interest in: (1) the overall positive effects of colour; (2) its beneficial use in a specific context such as heritage sites, or (3) its effect on the 'competence' of a specific group. Oscar Newman's efforts, on behalf of residents of Clason Point, urging the New York Housing Authority to provide facade colour and texture modifications despite an initial extra cost, exemplify
this role. Indeed, with regard to public welfare, Friedman and Thompson stress that:

in the realm of 'competence', advocacy planning and changes in norms of behavioural laws so that individuals can have impact on their environment, in the planning and post-planning stages, exemplify policy solutions.\(^3\)

In contrast, the planner as bureaucrat, analyzing the efficacy of available means of achieving objectives and assisting clients in the identification of their own values, works behind the scenes and is well suited to the administrative aspects of planning for and with colour.

As a state agent, the planner working for social harmony involving colour follows somewhat in the tradition of Bruno Taut during his term as Artistic Director for the Planning Division of the Berlin Housing Board in the mid 1920's. Earlier, speaking to his colleagues in a manifesto titled "Invitation to Coloured Architecture", he stressed the need:

\[
\text{to give back to architects and planners the taste for colour inside and outside houses...colour is the joy of life, and since it entails only limited resources we must insist that it be adopted."}^{4}\]

In the more utopian role of social learner, the planner's applicable talents are skills at communication and at group dynamics, for example, promoting publications and working directly with the public. British planners at the Civic Trust are among the leaders in this field, publishing guidelines such as \textit{Pride of Place: How to Improve Your Surroundings}, with a chapter devoted directly to colour, nd consultatively co-
ordinating efforts with house owners and shop keepers to bring some sense of order to the colours of selected High Streets.

Finally, as social reformer, the planner's perspective on the need for fundamental social change, especially the need for more self-sufficient social units, lends itself to considerable experimentation with colour. One of the most notable experiments with colour and social reform occurred at the French New Town of Marne la Vallee. There, as Porter explains, architect Fabio Rieti, with planning approval, is slowly 'blueing' with local hues ranging from turquoise to violet in various values. The motive, though, is social rather than aesthetic: to improve the local quality of life by providing distinction, thus encouraging residents to identify themselves as citizens of 'Marne le Bleu'.

Each professional planning role, therefore, has a special perspective and skills suited to promoting the power of colour in place. In the future, the part of planner as referee will probably grow as more cities decide to review colour use. Overall, though, the planner as advocate clearly makes the largest contribution. Even then, the process of decision making and policy formulation about environmental colour is complex, requiring further study.

(3) Suggestions for Further Research.

The complexity and diversity of environmental colour's role provides ample scope for further research in several directions leading to the development of clear criteria of what constitutes 'good city colour.' These suggestions concern studies about
colour and the public interest, exemplary colour use elsewhere, and ways of developing pertinent colour policies. In particular, further knowledge is needed, by the planner seeking to make informed decisions, regarding:

(1) Ways of discovering and applying the environmental colour preferences of the majority, with balance between private and public interests;

(2) Ways of encouraging public participation in the promotion of 'thought through' environmental colour, with particular attention to the needs of specific groups such as residents of public housing projects;

(3) The costs and benefits of an increased municipal support of large-scale environmental art;

(4) The reported successes and failures of planning experiments with colour elsewhere;

(5) The importance of colour to the 'image' of a place and the resulting sense of identity felt by residents, with special attention to new, historic or rundown environments; and

(6) The development of policy guidelines for colour use in a particular locale, with special efforts to improve the use of colour to improve environmental cognition for various groups whose 'sense of place' is weak.

Altogether, such increased knowledge will help the planner develop strategies and evaluate options about the role of environmental colour, especially if, as Eileen Marx confidently predicts:

la tâche de l'urbaniste futur sera sans doute d'approfondir les critères qualitatifs et quantitatifs de la couleure et de la lumière, en collaboration
étroite avec les biologistes, des psychologues, et des sociologues qui auront défini les besoins fondamentaux de silence, de l'espace, d'information et de communication de l'être humain. 5
Endnotes


(the task of the future urban planner will undoubtedly be to deepen the qualitative and quantitative criteria of colour and light, in direct collaboration with biologists, psychologists, and sociologists who will have defined the fundamentals of silence, space, information and communication needed to be human).
Achromatic:  
-pertaining to hues that are colourless, that in no way are reddish, yellowish, greenish or bluish. Thus, since white, grey and black have no colour, they are called achromatic colours.

Aesthetic Colour:  
-the use of a specific colour to produce feelings of pleasure.

Attachment, Visual:  
-close degrees of visual connection between an object and its setting.

Balance:  
-having apparent equal weight through synaesthesia.

Camouflage:  
-the use of colour to make objects as inconspicuous as possible or to change their apparent shape, size or identity.

Chiaroscuro:  
-light and shadow effects.

Chroma (saturation):  
-Purity or intensity of colour.

Chromatic:  
-pertaining to hues having a colour; that is, that are in some way reddish, yellowish, greenish or bluish.

Cognition:  
-psychological term for an organism's knowledge or understanding of an event or place.

Colour(u)r:  
-the aspect of things that is caused by qualities of light reflected or emitted by them.

Colourist:  
-professional specializing in decision-making about coloured surfaces.

Competence:  
-psychological term for an organism's capacity to interact effectively with the environment.

Complexity:  
-visual novelty resulting from a mismatch between stored material and external phenomena (antonym of pattern).
Contrast:  
-type of harmony involving colours of distinctly different hue, for example, red and green.

Control:  
-psychological term for the emotions of dominance and submission caused by an environmental stimulus.

Detachment, Visual:  
-non-conformity to setting.

Environmental Colour:  
-colour surrounding us outdoors in the built environment, especially on the large manmade surfaces of pavements, facades and roofs.

Functional Colour:  
-the use of a specific colour to meet a practical need for which it is especially suited.

Harmony:  
-colours forming an agreeable, proportionate whole. Cf. 'identity', 'similarity' and 'contrast'.

Hue:  
-the attribute by which we distinguish colour by kind, the property that makes blue different from red.

Intensity:  
-chroma or saturation of colour.

Identity:  
-(1) individuality of a surface, object or place; (2) harmony of colours of the same or nearly the same hue, for example, monochrome shades of grey.

Limbic System:  
-organs within the mid-brain and brain stem regions that are responsive to colours strong in chroma and lightness.

Lightness (value):  
-a measure of how much light is reflected from a surface in comparison to the amount of light reflected from an optimal white surface. In some classification systems, to designate a colour's lightness, a reference value of 'A' is used, which will be somewhere between A=100 for perfect white and A=0 for absolute black.

Lineal Progression:  
-aesthetic term for movement for movement through space without any discernible visual goal.

Monochrome:  
-having or using only one colour.
Neocortex:
- higher brain responsive to more subtle colours which are described as 'cerebral' or 'sophisticated'.

Pattern:
- (1) decorative design; (2) regular form or order (antonym of complexity).

Polychrome:
- having several colours.

Primary Colours:
- any set of colours from which other colours may be derived; also known as basic or principal colours.
  Three types of primaries may be discussed:
  1) Additive (pertaining to light)— red, green and blue;
  2) Subtractive (pertaining to colorants)— magenta (minus-green) yellow (minus-blue), and cyan (minus-red);
  3) Psychological (main mental pairings)— chromatic red-green and blue yellow, and achromatic black-white.

Rhyme:
- pleasurable tension between complexity and pattern.

Saturation (chroma):
- strength or intensity of colour, word taken from chemistry where it is used to describe the strength of a solution. By analogy to colour, the more pigment is carried in a medium, the stronger, darker, more saturated that colour becomes. If any other colour is added, saturation diminishes.

Scale:
- a progressive step in a classification system.

Secondary Colours:
- a mixture of either two chromatic or two achromatic colours.

Sense of Place:
- special identity of a particular setting.

Shade:
- a term for colour particularly with regard to its depth, or as distinguished from one nearly like it, or made darker by admixture of black; a gradation of colour, for instance, a dark shade of purple.

Similarity:
- type of colour harmony refering to colours linked by having a shared hue, for example, blue and blue-green.

Supergraphics:
- large-scale wallpainting, often using Pop Art symbolism, to fragment scale and mass.
Symbolic Colour:
-the use of specific colours to represent abstract ideas, values or things not present.

Synaesthesia:
-the production of a mental sense-impression by stimulation of another sense; for example, apparent colour weight or temperature.

Teleological Progression:
-aesthetic term for movement through space towards a goal or climax.

Territoriality:
-a pattern of behaviour and attitudes held by an individual or group that is based on perceived, attempted or actual control of a definite physical space, object or idea and may involve habitual occupation, defence, personalization and marking of it.

Tint:
- (1) a variety of a colour, especially one made lighter by admixture of white; (2) a tendency towards, admixture of, a different colour, such as red of a bluish tint.

Tone:
-general effect of colour or of light and shade; tint, shade of colour, degree of luminosity of colour.

Uniformity:
-unvarying sameness, consistency.

Unity:
-due interconnection and coherence of parts.

Value:
- (1) synonym for lightness; (2) worth, desirability, utility.

Variety:
-diversity, absence of monotony or uniformity.
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