



1. INTRODUCTION



■ "He did not wear his scarlet coat, For blood and wine are red, And blood and wine were on his hands. When they found him with the dead, The poor dead woman whom he loved, and murdered in her bed" - *Oscar Wilde (1854-1900)* ■ "Red sky a night, sailors delight; red sky at morning, sailors warning" - *Proverb quotes* ■ "Just when I had made my today secure with safe yesterdays. I see tomoroow coming with its pale glass star called hope. It shatters on impact, and falls like splinters on on cruel rain, and I see the red ol of life running from my wrists onto tomorrow's heart" - *Spike Milligan (1918-2002)* ■ "The rose is a flower of love. The world has acclaimed it for centuries. Pink roses are love hopeful and expectant. White roses are for love dead or forsaken, but the red roses, ah, the red roses are for love triumphant"



1. INTRODUCTION

“To grasp light; to dominate light; let there be light! And there was light. The most eternal, the most universal of materials is thus erected as the central material to build with, to create space.” (BAEZA 1994: 87)

If I had to teach architects – “Here is a golden rule. Use coloured pencils. With colour you accentuate, you classify, you disentangle. With black you get stuck in the mud and you are lost...Colour will come to your rescue.” – Le Corbusier (PORTER 1982: p. 98)

The purpose of this investigation is to create meaningful space through the use of colour and light in architecture; within a city environment where the urban fabric has been defragmented into an island of lost space.

A site becomes a place when the link between architecture and nature is established. This could be established by capturing the spirit of a place. Through light and colour, the joining of architecture and nature could be established, forming a distinct architectural language with a local, contextual identity.

Bearing this in mind, on the fringes of a frayed urban fabric, major roads have left an island of lost space. Situated in an area rich with pedestrian movement, a defragmented corner building is the only evidence of what once was meant to be a gateway building to announce a person's arrival in the great city of Pretoria. This building, with significant heritage value is stripped bare and stands empty and unused, almost creating an obstacle for pedestrians to and from the busy Dr. Savage Taxi rank (illus. 1).

Soil remained barren due to constant taxi movement and becomes the overwhelming character of the site, with trees planted haphazardly to provide meager shelter from the harsh sunlight prevalent on clear summer afternoons (illus. 2). This site forms an important gateway into the city of Pretoria. The roads carry tremendous traffic to Pretoria North and further townships, forming hard edges around the site (illus. 3).

With the hooting and associated sounds of traffic, a constant buzzing of activity surrounds the site, yet there is no formal gathering to celebrate the site and its significance in relation to the urban fabric.

The building should lure pedestrians and visitors to move through the site, in order to experience architectural space. Which then becomes a gathering space. It should provide a space for thinking, remembering, dreaming, wondering, learning, and celebrating. The celebration of a unique architectural identity...

The focus of this dissertation is thus to create a space which celebrates the site through the appropriate function of a building program. Thereby becoming one with nature and its inherent local context, by means of the play of light and colour in contrast. The theoretical study will investigate the use of these two mediums -colour and light. Early masters such as Le Corbusier, Louis I. Kahn and Alvar Aalto, as well as Steven Holl used these natural phenomena to create space that is meaningful.

The site analysis will attempt to choose the appropriate building program and building form for the given study area in context, while looking at the site on a pedestrian level. The main activities and movement are identified around the site. The precedent studies will look at national and international examples of buildings with more or less the same program (whether successful or not) as well as buildings, spaces and places created through the use of colour and/or light (mainly the work of EMBT). The design development is then presented from the initial conceptual phases, after which the design investigation is presented. Following the design investigation a conclusion is

reached and a detailed design resolution follows synthesizing the theoretical and conceptual work into architectural language and form, closing the dissertation.

Illus. 1 Panorama of southern edge of proposed site, showing the existing Carbonatto building as an island of lost space. (Author 2007)



Illus. 2 Proposed site, looking towards Dr. Savage Road Taxi Tank. (Author 2007)



Illus. 3 Panorama showing Dr. Savage -, Du Toit -, Prinsloo -, Bloed -, Boom Street intersection. (Author 2007)



2. THEORETICAL INVESTIGATION



■ “Orange is the happiest colour” - *Frank Sinatra (1915-1998)* ■ “The majority of (painters), because they aren’t colourist, does not see yellow, orange or sulphur in the South (of France) and they call a painter mad if he sees with eyes other than theirs.” - *Vincent van Gogh (1853-1890)* ■ “He hangs in shades the orange bright, like golden lamps in a green night.” - *Andrew Marvell (1621-1678)*

2.1	COLOUR AND LIGHT IN ARCHITECTURE
2.2	MANIFESTED MEANING THROUGH COLOUR AND LIGHT
2.3	ON THE USE OF COLOUR AND LIGHT
2.4	PERCEPTION AND MOVEMENT THROUGH COLOUR AND LIGHT



2. THEORETICAL INVESTIGATION

2.1 COLOUR AND LIGHT IN ARCHITECTURE

“Colour is life, for a world without colour seems dead. As a flame produces light, light produces colour. As intonation lends colour to the spoken word, colour lends spiritually realized sound to form.” - Johannes Itten.

On a physical level, colour and light belong to a single radiant spectrum, and as such, without light the existence of colour is not possible. (MATTIELLO 2004: 190) In current architectural practice, it seems like these two aspects are dealt with separately, thus restricting the endless possibilities manifested in the combination of what ultimately is the same thing. Colour and light enriches our daily experiences, it influences our daily activities, our identity, our tastes our smells – without it, life would be a meaningless blank canvas. Yet, this canvas has the possibility to become a masterpiece of architectural form.

According to BAEZA (1994: 86) the architect only begins to understand something about architecture when he realizes that light is the central theme. Only then does he start to be a real architect. Fehrman (2004: 2) states that sunlight is the ultimate natural light source, and as such it has become the standard by which we measure colour, BAEZA (1994:

86) says that the sun does not rise everyday in vain, reiterating the notion that without light, there is no colour. Light must never be taken for granted as it is not something diffused or vague or just always there.

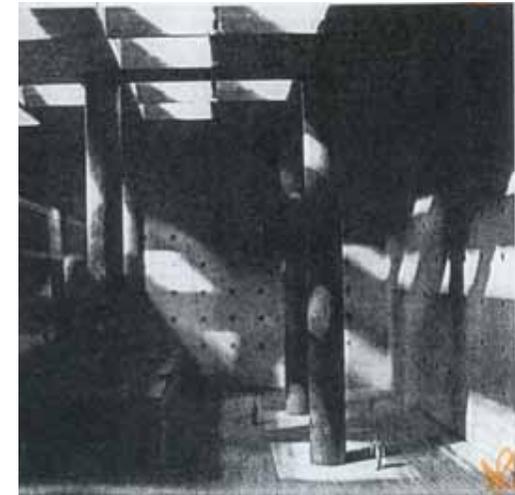
What is the importance of using light and therefore also colour, in architecture? BAEZA (ibid) states that light is matter and material, it is measurable and quantifiable and yet architects seem to ignore this (illus.4). However, the constant defiance of gravity through the current brilliance of technology is a fact the architects are happy to ignore. Yet, both light and gravity are unavoidable primitive realities. The creation of space lies in using light in its material form, as the most eternal and universal of all building materials - yet it is the only building material that has no gravitational force.

2.2 MANIFESTED MEANING THROUGH COLOUR AND LIGHT

In order for architecture to transcend into a meaningful building with an identity of its own, it needs to have an intimate relationship with the site. This relationship is formed when the phenomenological link between architecture and site is formed – when architecture and nature are joined in the metaphysics of place. (HOLL 1991: 10) This could be established by capturing the spirit of place which is defined by Christian Norberg-Schulz as the element that denotes what a

thing is or what it wants to be. (NORBERG-SCHULZ: chapter 1-Place) This joining of architecture and nature can literally be seen when a beam of sunlight falls on a facade, cascades down the wall, binding wall to floor, while reflecting back into space as architectural form. Steven Holl encapsulates this moment by saying: “We hear the music of architecture as we move through spaces while arcs of sunlight beam white light and shadows.” (ESSAYS ON LOUIS KAHN: Between Silence and Light) Lenclos reiterates this, in his philosophy on creating a sense of place, by saying that the use of strong colours could be used as a ‘humanizing’ element whenever a building is considered out of scale and devoid of colour identity. (PORTER 1982: p.120)

Thus, through light and therefore colour, the building fuses with place, manifesting the meaning of the building onto the specific site. What architecture and nature thus want to be, is realized. What then, is the desire to be? Louis I. Kahn asserted in his writings on ‘Between Silence and Light’, “Silence, the unmeasurable, desire to be. Desire to express, the source of new need, meets Light, the measurable, giver of all presence, by will, by law, the measure of thing already made, at a threshold which is inspiration, the sanctuary of art, the treasury of shadow.” (ESSAYS ON LOUIS KAHN: Between Silence and Light) This can be interpreted as the desire of the building to be in between shadow and light, at the threshold of silence and light.



Illus. 4 Alberto Campo Baeza, interior of the Bank in Granadam photograph of the model showing how light enters the room. (BAEZA 1994: p.87)

“It is a decision coming from commonality that you choose a place out of all places to build, a place where others can also settle. It is a very important decision, of the same importance as the positioning of a Greek temple amongst the hills. Of all the hills, the hill is chosen for the temple, and then all the other hills beckon to it as if bowing to this decision. You do not see the hills now except as respecting the decision of the placing of this eulogizing building, which is remarkable in that it has never been there before.”

Between Silence and Light - Spirit in the Architecture of Louis Kahn by John Lobell

Kahn saw this threshold as the position (or the aura) of inspiration, and this inspiration is where the desire to be/to express meets the possible. It is the maker of presence and also the sanctuary of art where the centre of expression lies. (ARCHITECTURE AND URBANISM: p.279) The building is thus in the position of true inspiration, where it can be the sanctuary of art and expression. For the building to be what it wants to be, while realizing its spirit of place, the play of light and shadow becomes meaningful, with the threshold of inspiration, a blank canvas where the sanctuary of art lies. True expression can thus be found in art which is one with colour. The building becomes the medium of art, and through this, meaning is manifested: in the site, in the building, in the fabric of the city

2.3 ON THE USE OF COLOUR AND LIGHT

Colour is not the property of surfaces, space or objects, but mainly a sensation caused by certain qualities of light which the brain interprets, and therefore, as already stated, are inseparable. (MAHNKE & MAHNKE 1987: p.IX) There is a constant flow of urban energy (people, goods, investment) in cities, with this energy determining the distribution of intensities. (DEWAR & UYTEMBOGAARDT 1991: p.48) Just as this flow of energy is the basic function affecting our urban cities, colour, which is created by light, is also this fundamental

property which, as a form of energy, affects our bodily functions, influences our minds and our bodily functions, influences our minds and emotions. (MAHNKE & MAHNKE 1987: p.1)

Colour has always fascinated man, dating back from our Paleolithic ancestors who adorned their caves with red and yellow ochre and mud pigments. The inspiring architecture of ancient Egypt, the Parthenon, Buddhist temples, Islamic mosques, Mayan cities and medieval cathedrals all prove that colour was an important part of architectural expression. (PORTER 1982: p.6) When the monochromatic grey stone public buildings of the modern western world became the main practice in architecture, it was viewed by some, as a very bleak prospect in architecture. Yet one cannot ignore the important work done by our early masters in the field of colour and light in architecture.

In Paxton's Crystal Palace, Owen Jones (the colour consultant to the project) prescribed red, blue, yellow and white for the interior as well as exterior of the building. He claimed that only the high points in art could be epitomized by the use of brilliant primary colours. (PORTER 1982: p.10) Le Corbusier had a great fondness for colour while believing that colour can create a feeling of space. His compositions in color were based on sound geometry, using red, yellow, blue and green in a way that complemented the geometric architectural composition

(illus. 5). (MAHNKE & MAHNKE 1987: p.68) Le Corbusier's essays on colour was an attempt to return colour to architecture after it had been purged by a reaction against 'bourgeois taste' in the 1920's (in which he was himself greatly involved) (DAVEY 1998: p. 2) He wanted a standard system of architectural colours which could be found in all civilizations and folklore, and which in the end were similar to the colours for which Vitruvius gave elaborate recipes. Le Corbusier used colour to emphasize the nature of walls as planes, and by doing this he either subverted or emphasized the spatial and formal qualities of space and form. He believed that colour modifies our appreciation of space. To him, blue distances a wall and removes its quality of solidity, while red fixes a wall and affirms its exact position and presence. (Ibid) Le Corbusier used detached and sculptural primary colour against external planes of white, while inserting strong hues into indentations to scoop out space in colour seemingly left behind after the overall modeling of the form. (PORTER 1982: p.116)

To Le Corbusier, light was also intrinsic to architectural composition and formed a big part of the architect's vocabulary. He supported his architectural expression by the play of light and shade. (VAN RENSBURG 2003: p.18)



Illus. 5 Unite d'Habitation, Marseilles, Le Corbusier, 1952-55, showing his use of exterior colour in his insertion of primary hues into recesses and around apertures in the facade. (PORTER 1982: p.20)

"All material in nature, the mountains and the streams and the air and we, are made of Light which has been spent, and this crumpled mass called material casts a shadow, and the shadow belongs to Light."

Louis Kahn

Primary colours formed an integral part of the de Stijl movement in architecture in Holland during the 1920's. Piet Mondrian attempted to tame pure colours on canvas, containing them in a grid-plan abstraction. Gerrit Rietveld projected primary colours as a means of spatial control on to the internal and external planes of his architecture. The articulation of the visual 'pushing' and 'pulling' qualities of colour were used by him to induce illusions of increased depth (illus. 6). (PORTER 1982: p.18)

The orchestration of light is obtained through the use of colour by means of colour's ability to reflect light, thus emphasizing or modifying our impressions of form and space. Colour can also be used to intensify the boundaries between planes. (PORTER 1982: p.90)

When the building fuses with place through the use of colour and light, as was done by these architectural masters, it enters the threshold of true inspiration and expression as already mentioned. Colour and light is the true medium with which architectural expression could be achieved. Light as architectural form is inseparable from architecture's characteristics, (VAN RENSBURG 2003: p.19) and thus vital for the building to realize its true potential of being. This use of light in architectural form to fuse building and nature to place can be seen in the work of Louis I. Kahn (1909 - 1974) He declared that architectural space can only exist where it is revealed in natural light. (DEVILLERS

1992: 151) Kahn asserted that the plan of a building must read like a harmony of spaces in light, and that each and every space must be defined by its structure and the character of natural light. (ESSAYS ON LOUIS KAHN: Between Silence and Light) To him it was a great architectural event when, centuries ago, the walls parted and the columns became. He saw the column as the greatest event in architecture, where the play of shadow and light produces infinite mystery. The wall therefore opened, and the column became the giver of light. This experience was where Kahn discovered the power of the gift of light. As the building fuses with nature, the column can be seen as the tree in nature. (DOAN 2003: p. 1) As the tree grows from the earth and reaches to the heavens, so the column 'grows' from the floor to support the roof. As the sun light filters through the trees in an ever changing movement, binding the site to the context, so sunlight filters through the columns creating a harmony of spaces in light. This is also the quality which provides every site and situation with its own architectural language, unique materiality and form. (JEFFERSON 2005: p. 83)

Light and the mastery of its manipulation played a crucial role in the work of the Finnish architect Alvar Aalto (1898-1976). (GROAK 1992: p.217) Aalto used a great variety of materials for its composition of line and plane, yet it was the ambiguity of form by the dynamic behaviour of light on these

material surfaces that intrigued him. To him light unites with material in animating site and function. (Ibid: p.226) Aalto placed architecture and planning at the opposition between Man and Nature. In other words, man being the rational order as opposed to the natural order. To him light represented Nature, and therefore, by controlling light, nature is controlled. His view on sunlight was that it is the animated form of natural light, and when the architect controls and mediates sunlight, life is brought into the building. Aalto was preoccupied with this flow of nature, and as such, the flow of space in and around buildings. (Ibid: p. 228-229) The animator (sunlight) thus becomes the medium through which space and therefore architecture is perceived.

2.4 PERCEPTION AND MOVEMENT THROUGH COLOUR AND LIGHT

With the theory of evolution which developed simultaneously by Alfred Wallace and Charles Darwin, the living world was perceived differently because it was seen to be a world in movement. This reinforced the notion that the creation is not static, but changes in time. (BRONOWSKI 1973: p.309) Our visual perception of the world and therefore architecture, as well as nature, changes daily through the constant rotation of the earth. Colour and light contributes vastly to a person's perception of his environment. With this notion comes subjective
Illus. 6 Schroder House, Utrecht, Gerrit Rietveld, 1924, showing how he uses colour to give the affect of advancing and receding planes to define space, influenced by the paintings of Piet Mondrian. (PORTER 1982: p.19)



colour perception and the psychological effect of colour and light on the human being. But what remains constant is that light and colour are inseparable mediums through which perception is stimulated even though they are in a state of constant flux. In terms of the perception of time, the datum in architecture's record could be seen as sunlight, where the constant movement of the sun is analogous to the passing of time. The experience of movement through a space is enhanced by the way architecture is aligned with the sun, while the latter continuously animates the space, as mentioned before. Steven Holl sees this as movement that transcends architectural beauty. (HOLL 1991: p.10) Holl also explains time in terms of the movement of a projected beam of sunlight, which he calls Absolute time in his design for the Palazzo Del Cinema, in Venice, Italy (illus. 7). Through the use of light in space, light in shadow and light in reflection he solves the program of the building and the functional aspects thereof simultaneously (Ibid: 156)

The movement of the sun through architectural space is also a literal recognition of time, which can be seen in Steven Holl's D.E. Shaw and Company Office, 1991. Projected colours appear at certain moments in time based on the alignment of the sun. You know what time it is when you see the blue streak of light. This in turn realigns you with your subjective architectural experience. You sit and just watch the ,

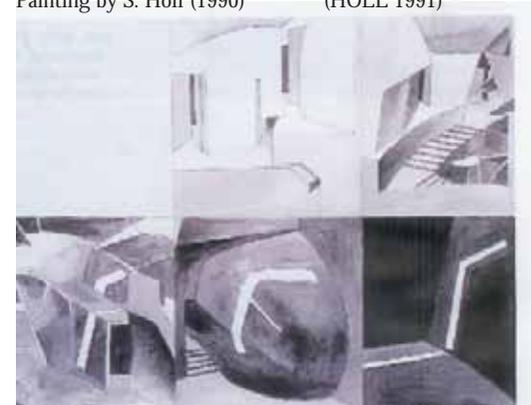
blank wall, while thinking, remembering dreaming, wondering. (COOLEY 2004: p. 4)

The notion of preference in perception plays a vital role in the way a person experiences space and therefore architecture. According to this notion, an aesthetic theory could be deduced. In terms of colour preferences, a vast amount of research on the subject exists, therefore this will not be elaborated on. Principles on the psychology of perception can be applied to architecture as well as to graphic art, which originates from empirical experiments on vision. (VON MEISS 1991: p.21) These principles will bring about phenomena which are relatively more permanent than taste or style. While Christian Norberg-Schulz made a first attempt at proposing a theory of architectural form which would be based on the principles of perception, even partially so, (Ibid: p.22) we could reason that without the gift of light, there would be no gift of seeing, and therefore, one's experience of the physical environment, as well as architecture, would be quite different. The readability of forms and figures is one of the most important objectives of the architect, and by the use of colour and light, the language of the inherent architectural form becomes evident. Through colour and light, these forms become autonomous figures in front of ground, and therefore, the figure/ground phenomena, after Noli, plays a fundamental role in visual perception (illus. 8). Figure finds its autonomy by its edges, its contours, and

therefore by the contact it has with its exterior, thus the rest of the world. (Ibid)

Therefore, through the use of colour and light - form and figure in architecture is perceived. This perception changes our experience of the physical world and can either binds us with nature and therefore with the spirit of place, or leave us without any identity and the feeling of not belonging.

Illus. 7 Palazzo Del Cinema - Light in time.
Painting by S. Holl (1990) (HOLL 1991)



Illus. 8 Figure/Ground map of Pretoria City, showing the figure/ground phenomena after Noli. (GAPP 2006: TICP SDF)