

Министерство образования и науки РФ
Смоленский государственный университет
Научно-образовательный центр «Социальные трансформации»

*Библиотека международного colloквиума
«Социальные трансформации»*

СОЦИАЛЬНЫЕ ТРАНСФОРМАЦИИ

Выпуск 27

ENVIRONMENTAL COLOUR DESIGN: THEORY AND PRACTICE

Сборник научных статей

Под редакцией
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Смоленск
Издательство СмолГУ
2017

УДК 316.4
ББК 60.5
С 692

Печатается по решению
редакционно-издательского
совета СмолГУ

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С 692

Социальные трансформации: сборник научных статей /
под ред. В.М. Шиндлер, Ю.А. Грибер; отв. ред. серии А.Г. Егоров. –
Смоленск: Изд-во СмолГУ, 2017. – Вып. 27: Environmental colour
design: theory and practice. – 232 с.

ISBN 978-5-88018-433-0, продолжающееся издание

В сборнике размещены статьи, в которых рассматриваются различные аспекты теории цветового проектирования городского пространства. В формате исторического, теоретического и эмпирического анализа фиксируются философские, социологические, аксиологические, культурологические, педагогические и экономические стороны процесса.

Книга издана при финансовой поддержке Российского фонда фундаментальных исследований (проект № 15-03-00733).

УДК 316.4
ББК 60.5

ISBN 978-5-88018-433-0,
продолжающееся издание

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Social Transformations

Issue 27

**ENVIRONMENTAL COLOUR DESIGN:
THEORY AND PRACTICE**

**Edited by Verena M. Schindler
and Yulia A. Griber**

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Introduction

Verena M. Schindler, Editor

Chair, AIC Study Group on Environmental Colour Design

In 2017, the Study Group on Environmental Colour Design (SG ECD) of the International Colour Association (Association Internationale de la Couleur, AIC) is celebrating its 35th anniversary! We are delighted and honoured to mark the occasion in a very special way by publishing Volume 27 of the book series *Social Transformations* at Smolensk State University, Russia. This special issue focuses on the theme *Environmental Colour Design: Theory and Practice* and will be presented at AIC 2017, 13th International Colour Congress held on 16–20 October 2017 in Jeju, Korea.



A Fascinating Look Back

A fascinating look back to the history of the SG ECD reveals its key role in further disseminating different approaches of professionals from different geographical and cultural regions. Focused around a specific interest in colour as a means of environmental design in interior and exterior space, the range of professions of the international members of the SG ECD is extensive and includes colour designers, colourists, colour consultants, architects, urban designers and planners, landscape architects, interior architects, artists, designers, graphic designers, media and communication designers, lighting designers, art and architectural historians, psychologists, sociologists, ecologists, philosophers, scientists, educators and more. While the focus on colour is specific, the scope of research and study is broad and encompasses colour in the natural environment, built environment and socio-cultural environment. An important sub-area of this scope is the investigation of the effects of colour upon human emotion, cognition, and behaviour. The SG ECD has become a place of exchange for colour experts and a source of inspiration for present and future generations.

In 1981, on the occasion of the 4th AIC Congress in Berlin, Professor Dr. Antal Nemcsics (Hungary) proposed the creation of a study group on colour dynamics, which was consolidated the following year as the Study Group on Environmental Colour Design at the AIC Interim Meeting on Colour Dynamics held 8–10 June 1982 in Budapest. We warmly congratulate Dr. Antal Nemcsics for receiving the first AIC Colour Award in Art, Design and Environment (CADE Award) at the AIC 13th Congress in Jeju, Korea. Dr. Nemcsics received the prize in acknowledgement of his outstanding contributions in colour dynamics, colour harmony as well as arts, architecture, and environmental colour design.

As originally defined in 1981 and still maintained today, the main goal of the SG ECD is to disseminate knowledge about experience made in the process of integrating colour in the planning, design, and realization of the built environment. The activities and events of the SG ECD have opened up exchanges between experts working in diverse countries around the world. At present the SG ECD includes approximately 200 members from 38 countries (SG ECD website). The means of exchange include meetings, a website, and publications as well as collaborations with other groups and organizations to stimulate research and teaching related to the members' key interests. An SG ECD report is published in the AIC Annual Report (Newsletter).

The internationally renowned and influential colour expert Anders Hård (1922–2009) (Sweden) served as the first Chair. Psychologist Lars Sivik (Sweden) served as the first Secretary of the SG ECD. Together with Gunnar Tonnquist, all three were pioneers of what is now the NCS Natural Colour System®©. In 1989, artist, psychologist, and colour designer Leonhard Oberascher (Austria) succeeded as Chair. In the period 1998–2005, architect and colour researcher José Luis Caivano (Argentina) was Chair and Leonhard Oberascher was Co-Chair. Since 2006, when José Luis Caivano became the President of the AIC (2006–2009), Verena M. Schindler was elected and has been chairing the SG ECD with Leonhard Oberascher serving as Co-Chair during the period 2006–2011, and linguist and sociologist Prof. Dr. Yulia Griber (Russia) serving as Co-Chair since 2017.

Recognized as outstanding members of the SG ECD for their long-term engagement are: Dr. h.c. Anders Hård and Prof. Dr. Lars Sivik (Sweden); Prof. Werner Spillmann (Switzerland); Dr. Paul Green-Armytage (Australia); Prof. Dr. Antal Nemcsics (Hungary); Prof. Dr. José Luis Caivano (Argentina); and, Dr. Leonhard Oberascher (Austria).

In 2002, at the AIC Meeting held in Maribor (Slovenia), former SG ECD Chair José Luis Caivano presented a paper entitled “A History of the International Colour Association Study Group on Environmental Colour Design from 1892 to 2002” (Caivano 2002). As well, at the 10th AIC Congress in 2005 in Granada, Caivano contributed a paper entitled “The Research on Environmental Color Design: Brief History, Current Developments, and Possible Future” (Caivano 2005, Caivano 2006). Subsequently, in 2003, Caivano also established a bibliographical database on books about colour. (Caivano et al. 2004)

Environmental Colour Design: From Colour Dynamics to Sustainability

Antal Nemcsics proposed the creation of a study group on colour dynamics. At that time he believed that architectural colour had been applied in a more conscious way ever since World War II. As well, it seemed to him that many professionals such as physiologists, psychologists, anthropologists and sociologists were investigating the effects of environmental colour on humans. Further, in physics and aesthetics, the relationship between colour sensation and colour composition and harmony were being newly investigated. Nemcsics thought that this variety of points of view and heterogeneous research results should evolve into a new science that he suggested calling Colour Dynamics. The aim of

this new science was to be to gather together insights from different disciplines to create a theoretical and practical basis for the study of the relationship between colour, the environment and human response. (Nemcsics 1993:1)

Inherent in the word 'dynamics'—which derives from the Ancient Greek term *dýnamis*, δύναμις and means 'power'—is the notion of motion. Dynamics generally implies anything induced by a force that moves, flows, and changes. In mechanics to study dynamics means to explore the causes and effects of forces. In music, on the other hand, dynamics refers to the volume of a sound or note, in particular, to a sudden or gradual change. The German psychologist and zoologist Heinrich Frieling (1910–1996), who participated in the International Colour Conference in Lucerne in 1965 (Frieling and Frieling 1965), had also used the notion of *Farbdynamik* [Colour Dynamics] in his 1954 publication to refer to the psychology of colour and the strong interaction of colour with human beings and their surrounds. (Frieling 1954)

However, Colour Dynamics was not adopted as the name of the newly founded study group because there was concern that it might be misunderstood as intending colour in movement. Environmental Colour Design seemed more appropriate for describing the aims and scope of the study group (Caivano 2002:4–5). Here it is interesting to note how the concept of environmental design has undergone a change in semantics since its initial appearance in the 1940s. Originally and in the decades following its further development, the concept environmental colour design encompassed processes of human interaction with surrounding natural (e.g., geographical, solar, climatic, etc.) factors as entailed in the course of planning and building in such fields as urban planning, architecture, landscape architecture, and product design, which lead to manmade impact on the natural environment. In essence, environmental design traditionally concerned any changing of the natural environment into a physical setting for human habitation and activities. As well, it also used to refer to aims and results in the applied arts and sciences in the creation of immediate manmade environments, such as in interior design and lighting design. More recently, however, the term implies ecological and sustainable design efforts including the protection of the environment, e.g., nature-friendly strategies and means of producing energy that are non-polluting. And lately, in terms of developments in the field of colour, colour design is playing a key role in creating ambience or atmosphere in indoor and outdoor spaces. Here the aim is to improve a sense of well-being and comfort through the construction of aesthetically appealing and environmentally friendly urban and residential facilities and public infrastructures.

At the SG ECD meeting held during the AIC 2011 in Zurich, the SG ECD Chair raised the following question: "How do we define Environmental Colour Design today with respect to colour, sustainability, ecology, and well-being, to re-frame it in terms of these serious concerns of today's society?" There were many responses from the SG ECD members. Karin Fridell Anter (Sweden) and Doreen Balabanoff (Canada) related this topic to colour and health. Tatiana Semenova (Russia) raised the further question: "How do we avoid visual pollution in urban space?" Jean-Luc Capron (Belgium) was concerned about light and green econom-

ic lighting policy. Piyanan Prasarnrajkit (Thailand) shared her experience of regularly leading workshops addressing the issue: “What colour is green?” Cristina Boeri (Italy) expressed her interest in the chromatic integration of industrial sites in urban planning. Leonhard Oberascher (Austria) pointed out Barker’s *Ecological Psychology* (1968), Gibson’s *The Ecological Approach to Visual Perception* (1979), and Reed’s *Encountering the World: Toward Ecological Psychology* (1996) and the ecological attitude of industrial designers. And, María Luisa Musso (Argentina) reminded us that already in the 1980s and 1990s ecology was a major concern, quoting the example of the Earth Summit 1992. (Annual Report 2012) The SG ECD participants will further examine current and future tendencies and reflect critically on new challenges around important themes in colour at the upcoming congresses AIC 2017 Colour and Health in Jeju (Korea), AIC 2018 Colour and Human Comfort in Lisbon (Portugal), AIC 2019 Colour and Landscape in Buenos Aires (Argentina), AIC 2020 From Natural Pigments to Digital Colours in Avignon (France), and AIC 2021 Colour Congress in Milan (Italy).

Environmental Colour Design: Theory and Practice

The present publication entitled *Environmental Colour Design: Theory and Practice* includes a collection of twelve papers that discuss topics related to the overall theme of environmental colour design. The term ‘theory’ is derived from the Ancient Greek *theōría*, θεωρία, meaning ‘contemplation’, ‘speculation’, and ‘looking at things’. In this particular case, the selected papers show that a theoretical approach is always based on the visual experience of colour in everyday life. It has a lot to do with looking or *le regard* as Michel Cler used to say, and ‘opening the eyes’ and ‘making visible’, as Paul Green-Armytage claimed in his explorations dealing with attributes of colour and appearance such as matte, glossy, metallic, translucent, transparent, or textured. (Green-Armytage 2017)

Theoretical thinking implies observation, which is the process of seeing or noting phenomena in their original setting. It also means to attentively gather information from a primary source. Thereby the senses are employed to evaluate the qualitative or quantitative properties of these phenomena such as the colours of an urban space. Using instruments to measure, record, and compare colours, such as colour atlases and digital tools, often complements direct observation with the eye. And finally, collecting and analysing empirical data can be used to scientifically test and prove the validity of an initial hypothesis or assumption. In philosophical terms, a theory can also correspond to a field of study, the basis being a set of ideas describing, analysing and explaining an approach or position.

Theory is often contrasted to practice, which derives from the Greek word *praxis*, πράξις, meaning ‘doing’. Practice refers to the process or action of applying, exercising, and realizing ideas. Most theories are considered to be opposed to practice, in environmental colour design, however, theory and practice closely interact and one is never far away from the other.

This Volume 27 of *Social Transformations* is aimed at persons interested in colour and in particular at those in the creative fields of art, design, architecture, and landscape architecture as well as urban and environmental design.

Twelve papers glean answers to the question as to what role is to be attributed to theoretical approaches in environmental colour design and how theory relates to colour practices. The themes range from the relevant aspects of bio-physiological principles to the artistic ways in which colour is studied, analysed, and applied within urban space, architecture, and the natural environment. Conducted on an international level, the exchange shows that how colour is perceived, defined, and used not only depends on geographical and climatic factors, but foremost on cultural, social, economic, and political aspects and meanings.

In the first paper "The Function of Colour: An Introduction to Colour Theory and a Definition of Terms" Axel Buether discusses colour as a phenomenon that commonly shapes the living and built environments, as well as colour as a medium that conveys meaning, emotions, and functionality to things. Buether's theoretical approach as to why colour is important to the overall design process is based on bio-physiological and cognitive processes such as perception, attention, memory, thought, language, and learning, as well as evaluation and judgement. These processes can occur consciously or unconsciously. Only when it includes a systematic study of these processes—complemented by an analysis of functional, semantic, psychological and socio-cultural factors—is creative colour design deemed to be successful. Seeing is not always understanding, and vision is a complex process including many structures. Thereby colour plays a crucial role in the act of perceiving/understanding our immediate environment. Buether's approach is a holistic one in which planning a colour design project includes creating ambience by taking into account features such as illumination (light and shadow), scale (proximity and distance), aesthetic qualities (surface and depth) as well as spatiality (objects and space).

In his paper "Paris, une ville lumineuse aux couleurs discrètes" [Paris: A Luminous City of Subtle Colours], Yves Charnay develops a theoretical explanation as to why colour has been applied in French architecture in such different ways throughout history. In his particular case study of the city of Paris, traditional colours feature the distinct characteristic of discretion. Fair, subtle, and restrained hues are predominantly applied to stone and plaster façades, while darker shades determined by slate or zinc are used for roofs. Charnay claims that building materials alone do not explain these distinct colour ranges, but rather that the representation of political power in society as well as moral reasoning and ideological constraints have set a normative basis of mainstream thinking deeply anchored in French culture. In the Middle Ages treatises, Abbot Suger of Saint Denis justified the use of radiant gold, sparkling precious stones, and resplendent colourful stained glass windows in the new church. Thereby he not only referred to God as being Light, but also Beauty and Harmony. The Cistercian monk and Abbot Bernard of Clairvaux, however, regarded colour and decor as superfluous and undesirable distractions. In Charnay's view, these two tendencies not only prevailed throughout history, but also continue today. In France, good taste is aesthetically expressed by restrained or discreet colours, and administrative regulations intended to protect cultural heritage and historic

monuments have reinforced this tendency. In the 21st century, however, new tendencies applying various colours in architecture are intruding upon urban space and spreading throughout the city.

Verena M. Schindler and Michel Cler analyse colour, light, and materials applied to architecture and how they impact the built environment in their paper “New Colour-Light-Material Tendencies in Architecture and their Impact on Urban Space.” The explorations give an account of new stunning ways of making colour interact with the viewer, which can create the experience of a varying mood or fragile, ambiguous, and evanescent atmosphere to great effect in a particular place or space. Constructing their argument on the theoretical basis that façades are to be considered like skin, the exterior of buildings have become transparent glass membranes reflecting fluctuating colours. As well, such façades serve as supports for colour-specific films attaining a rainbow of effects. Or they become huge screens changing colours via digitally programmed lighting. Other such skins are conceived as dense tapestries of living vegetation or a sort of vertical greenhouse including photosynthetic bio-façades of microalgae. Colour has become a powerful design feature aimed at creating atmosphere, defining place, promoting sustainability, and infusing beauty and elegance into architecture and urban space.

Alessandro Premier argues that in the specific field of architectural façade design, most advanced developments tend to apply adaptive and dynamic façade systems. Often, however, two-dimensional static structures are employed that exploit optical effects of perceptual processes using colour to create the suggestion of movement and dynamism. Premier’s paper “Chromatic Strategies for Static Façades with Dynamic Effect” traces the origins of these structures with strong psycho-physiological effects back to art history, in particular, to Kinetic Art and Optical Art from the late 1950s to the mid-1960s. Various phenomena intensifying the colour/eye relationship were already established by colour theory in the 19th and 20th centuries, in particular, the simultaneous colour contrasts and chromatic vibrations; the after-image and consecutive colour contrasts; the interaction of neighbouring colours; the theory of complementary colours; sequences, and possible combinations of a limited number of colours or hues; and, the perceptual ambiguity created by coloured surfaces. Discussing works of outstanding Op artists including Victor Vasarely and Bridget Riley, Premier outlines a theory of strategic parameters for designing static façades with dynamic effects. Less complex from the technological point of view, these theoretical principles are explained and tested in four case studies of contemporary architecture.

Pietro Zennaro’s “The ‘Ugly’ in Today’s Built Environment” develops a theory of the Ugly as an intrinsic part of contemporary culture in order to explain the dissonant chaos and ‘vulgar’ colours that are spreading in contemporary architecture and the urban environment. He strongly criticizes the illicit appropriation of public or private space by individual or group-motivated monochrome or multi-coloured compositions such as street art, graffiti, and other forms of clandestine spray painted marks. Difficult to control, these expressive media of stylized aesthetic systems expand on any wall of an urban object or

environment that is considered as a suitable 'canvas'. Visually intriguing and provocative, these cross-cultural phenomena are seen as vandalism rather than as pieces of art. As well, according to Zennaro's point of view, hyper-coloured structures combined with hyper-technologies have made eccentric sculptures, fragmented media buildings, or insistent urban screens out of architecture, while smog and pollution fade colours and deteriorate buildings into a grey, dirty mass.

Alex Booker and Kine Angelo launch the theory of *chroma-atychiphobia*—i.e., the fear of making a wrong colour decision—in their paper "Greying Norway: Influences and Drivers Examined Through a Discourse in the Popular Norwegian Press, Social Media, and Commercial Promotion." Booker and Angelo analyse the drift towards achromatic colour schemes equally promoted by decision makers, painting companies, and media. The authors provide interesting insights from debates in printed and digital media, differentiating positions of various proponents such as developers, architects, paint producers, colour experts, academics, and the public. Underscoring the arguments are examples taken from the Norwegian city of Trondheim, which range from recently painted traditional houses to newly built apartment blocks. The authors point out that despite a variety of reasons that range from time pressure and economic factors to the complexity of colour design, the application of trendy grey is not justified as the final choice.

The second part includes papers dealing with the analysis of the site including the creation of colour palettes and practical issues of colour design.

Concrete, commonly known as a grey building material, can be modified in colour by adding pigments. Anahí López and Alejandro R. Di Sarli explore the colour of concrete in their paper "Atlas of Architectural Concrete: Coloured Cement Mixtures and Their Interaction with Wooden Moulds." They propose the study and systematization of different parameters important to the aesthetic aspect of pigmented architectural concrete. The aesthetic qualities include three components: colour as determined by hue, lightness and saturation; surface texture; and, surface finish (either matte or glossy). Important to professionals engaged in the restoration of historic monuments, sculptures, decorative objects, and urban furniture, the experiments are aimed at the development of a colour atlas with exact information as to the specific production ingredients and their mixture.

Johnny Jie Xu's "Colour Identity of Place: A Case Study of Narborough Road, Leicester, UK" presents systematic visual research combined with an ethnographic approach aimed at analysing the especially attractive and dense colourscape of Narborough Road in Leicester. Shops compete with one another through the visibility and design of their retail facilities, with the result that the brightness of colours is even further intensified. Xu gives interesting insights about the role of colour that for 80% of the population is decisive for brand recognition. As well, ranging from employing one to more than five colours, different colour strategies are applied in corporate identity design, whereby more than 40% of brand marketing strategies focus on two-colour design. Based on inter-

views, observation, bibliographical references, photography, and related colour palettes, the research results show that in a pluri-ethnic community such as Narborough Road, colours and colour combinations are not only an important design issue, but their meaning and signification can widely differ according to the shop owner's cultural origin and background.

Triggered by the interplay of the urban fabric and its inhabitants, Elisa Cordero-Jahr, Francisca Poblete, and Marcia Egert explore the relationship between spatial-architectural colours and narrations and their impact within three neighbourhoods in their paper "Territory and Colour: Case Study of Three Districts on Teja Island, Valdivia, Chile." Although the three neighbourhoods are located within the same insular territory, their developments differ significantly, whereby various origins and senses of belonging stand out as constituting dissimilar content. This diversity correlates to colour compositions within each neighbourhood whose differences are evident. The resulting colour palettes show interesting insights representing not only subjective colour choices of the buildings' owners, but also the impact of cultural and economic aspects. In one district, many house façades painted white and yellow stem from German immigrants, colours that eventually became traditional colours of the place. As well, a restricted number of colours available on the local market up to the 1990s had an impact on subjective colour choices.

The next two papers not only analyse colours on-site to develop their arguments further, but also deal with planning and realizing colour design for urban environments. The first paper represents the perspective of an environmental artist, while the second provides the viewpoint of an artist. In both papers the interaction between colour and space is made tangible.

Jem Waygood presents the colour design process for two urban projects in his paper "Colour in the Urban Environment: Responding to a Sense of Place and Creating a Sense of Place. Two Examples from the UK." As an environmental artist and colourist, and working as a member of a multidisciplinary team encompassing architects, landscape architects, lighting designers, mapping- and way-marking specialists, and quantity surveyors, Waygood conceived colour palettes for two different sites. Through a systematic examination of the place, the aim was to create a new sense of place. For the first project in Douglas, Isle of Mann, three different palettes for existing colours were conceived: earth colours, sea colours, and sky colours. The final colour plan for renewal of the town centre of Douglas resulted from synthesizing and developing these palettes of the existing colours. The second project concerned Moss Side, an inner city neighbourhood of Manchester, where Waygood encountered new challenges conceiving the colour design for social housing in which cultural diversity prevailed among the inhabitants.

Stig Evans's paper "The Use of Colour Field in the Built Environment" discusses his own artworks specifically designed to transform, enhance, and enrich urban spaces and built environments. He develops his line of thought starting from his work as a painting conservator, whose task is to identify and analyse pigments and paint layers. His artistic studio work such as *The Rav-*

ished Image and *Interventions* further explores the relationship of colour, landscape, and the environment. As a colour expert, in his collaborative work with architects he uses colour as a creative means to enhance architectural space and imbues it with a specific ambience. Evans claims that no matter how abstract the colour design is, it has not only an impact on form, shape, and space, but can also have very positive physiological and psychological effects on users of those spaces.

The last paper deals with colour in the natural environment.

Bertolt Hering describes seasonal changes of colours at Georgium Park in Dessau-Roßlau, Germany, in his paper “Die Dessauer Farbbeobachtungen: Jahreszeitliche Abweichungen der Farbzuordnung” [Dessau Colour Observations: Seasonal Variations in Colour Assignment]. Based on the atlas of the NCS Colour System®©, he develops his own colour atlas with perforations next to each colour sample in order to methodologically make direct optical comparisons. Through his systematic colour observations at different times of the year, Hering conceives colour diagrams that summarize his observations during seven sessions in winter, summer, spring, and autumn, and carefully describes the colour shifts that appear. He compares the collected results concluding that in this specific geographic location, the annual shift of the natural colours mainly happens in the yellow range, between green-yellow (G50Y) and yellow-red (Y50R) according to the NCS notation system. Another interesting insight is that subjective colour sensation often differs from the colour identified with the help of the atlas. These colour observations in the natural environment became a source of inspiration to create artistic colour installations shown on-site or in exhibition galleries.

This book is an examination of the role of colour—theories and applications—in the built and natural environments in the context of environmental colour design framed by the recognition that we are all part of the same interconnected world, although we live in different physical, geographical, and socio-cultural environments. These papers on environmental colour design not only serve to validate individual efforts and achievements, but also put these approaches in a framework of historical context, current needs, and future developments. This serves the broader aim of promoting a deeper understanding of the relevance of colour in the overall design process of the 21st century as well as aiming at a basis for transnational discussions concerning a crosscultural appreciation of environmental colour design.

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Функция цвета: введение в теорию цвета и определение понятий

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Аннотация

Цвет, с одной стороны, рассматривается как явление, которое определяет визуальное восприятие окружающей действительности, с другой – как функционально нагруженная информационная среда, наполненная значениями и эмоциональным содержанием. Освещенный цвет кажется зрителю атмосферным и рассеянным, в то время как неосвещенный материализует очертания и формы. Окрашенный свет противопоставляется тьме, и это противопоставление ярко отражается в эстетике пространственной игры теней. Сложные цветовые ощущения представляют собой результат взаимодействия света со всем человеческим организмом. Цвет и свет представляют собой две стороны одного и того же явления, поскольку цвет освещает, а свет окрашивает. Цвета определяют вид природной среды, различной с точки зрения климата и топографии. Они дают возможность разным формам жизни ориентироваться и общаться с учетом специфики их биологического вида. Цвет формирует идентичность. Биологические функции цвета влияют на эстетику культурного пространства, предопределяя возможные формы визуальной коммуникации между людьми. Экспрессивный и коммуникативный потенциал цвета изменяется по мере культурного развития как отдельных индивидуумов, так и обществ в целом. Он отражается во всех жизненных сферах: в словах, изображениях, объектах, структурах пространства и действиях. Цвет представляет собой наиболее важный инструмент дизайнера и эстетического оформления среды, позволяя перевести абстрактные линейные структуры, которые рождаются на фазе планирования, в материальную форму реального архитектурного пространства.

The Function of Colour: An Introduction to Colour Theory and a Definition of Terms

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Abstract

As a phenomenon, colour shapes how people experience the environment visually, while as a medium, it conveys meaning, emotional moods and functional information. As luminous colour it appears atmospheric and diffuse to the viewer, while as non-luminous colour, shape and form materialise from

it. The antithesis of coloured light is darkness, which shows its influence on the aesthetics and function of the phenomenal world in the spatial play of shadows. The complex sensations of colour result from the interaction of light with the entire organism. Colour and light form two sides of the same phenomenon, since colour illuminates and light colours. Colours shape the appearance of the natural environment, which varies in terms of climate and topography. They make it possible for diverse forms of life to orient themselves and to communicate in ways specific to their species. Colour creates identity. These biological functions do not only shape the natural environment – they also determine the aesthetics of the cultural space, which illustrates the forms of visual communication between people. Colour's potential for expression and communication evolves with the cultural development of individuals and societies. It finds expression in all manifestations of life, in words, pictures, objects, spaces and performances. Colour is the most important design tool for configuring the environment aesthetically, as the abstract lineal structures of the planning phase take on a physical form in the atmospheric and material manifestations of built space.

Colour as a Medium of Visual Perception

As soon as people open their eyes, information enters the approximately 120 to 250 million photoreceptor cells in a permanent exchange of information with the environment. Not even five per cent of these cells are able to transform the



Figure 1 and 2. Colour as pure form. Abstract painting by Jonas Rebbelmund, 2011 (left). Colour as a conveyor of content and meaning. Concrete painting by Linda Prüfer, 2008 (right).

spectrum of light into colour signals, and yet they determine the form of visual perception. The fact that people still see a coloured, sharply contoured environment throughout the entire field of view is a result of processing methods in the brain, whose comprehension is essential for explaining visual perception and communication.

During the perception process, viewers ask questions about the colour appearance of the environment through their eye movements and, at the same time, look for answers. Through eye gestures, a viewer asks what something is, where it is, where it comes from, where it is going, what it has done, what it is doing and what it will do. This question-and-answer process determines the formation of the object in the process of visual perception. What is not questioned, whether through words, looks or artistic representations, remains in the background of perception and is not seen. These circumstances apply to the visual arts, which have long played a role in communication, as well as to the perception of architectural space. The meaning and significance of spaces, images and text are objectively present via the existence of a culturally determined domain of language. However, they still need to be subjectively understood. The extent, content quality and evaluation of the responses are determined by the viewer's attention behaviour and previous experiences. Seeing involves the cognitive processing of visual and spatial data that exist objectively only as colour stimuli of the retina. Subjects must develop meanings and contexts autonomously via their previous experiences in the context of the use situation. Colour is therefore a medium of visual perception. For this reason, people are usually less interested in the colour itself than in the interpretations of the content that it facilitates. This difference becomes clear in the juxtaposition of abstract and concrete painting, where colour is applied as a pure form or as a conveyor of content and meaning (Figures 1 and 2). In architecture and design, colour is used in a similar way, as it can be effective as a pure form or as a conveyor of content.

A holistic view of environmental perception explains the complexity of visual communication between experts and lay people, designers and users, locals and foreigners, and between people of different ages and with different social and educational backgrounds. The perception and effect of colours can thus only be planned in relation to the socio-cultural and developmental background of the target group, which can be included in the design process as individuals, groups, communities or societies.

From a physiological point of view, the question-and-answer process of visual communication can be read through the information flows in the perceptual system. This is because more sensory motor data travel from the brain to the muscles of the eye than vice versa. Only those who actively observe and investigate the environment with an attentive gaze are able to construct complex content-related information from the distribution of coloured pixels within the field of view. At the same time, this process becomes faster with constant practice, since the brain automatically develops methods for asking the important questions by directing attention to the significant points in the field of view. In the same way that people use the tip of their index finger to touch something,

they constantly move their eyes across the temporally and spatially structured network of colour-coded areas and discern letters, shapes and spaces. The content-related information and the function of built space is therefore not interpreted from what the designer draws, but rather from what viewers construct during the perception process. It is not the pen, but rather the direction of a person's gaze along the coloured areas in the field of view that determines the aesthetics of the phenomenon. In turn, this is influenced by the perception of the emotional content and function of all its parts in relation to one another and to the whole.

Form Follows Colour

While eye movements are guided by the lines in a drawing, they follow colour in built space. The eyes' orientation movements in the field of view can be recorded via mobile and stationary eye-tracking methods that allow the neurosciences and the communication sciences to engage in the systematic study of visual perception and communication. Extensive psychological studies on user behaviour, as well as effective practical applications have evolved in the field of marketing and advertising in recent years. In architecture, art and design, the use of eye-tracking measurement has only just started, with mobile eye-tracking systems also playing a role. Such measurements can demonstrate how a specific observer sees images, objects and spaces, as it is possible to record the temporal sequence of fixations or pauses by the eyes, during which information can be perceived. The longer the eyes remain fixed on any particular element, the more intense is the interaction with the form and content of the colour composition

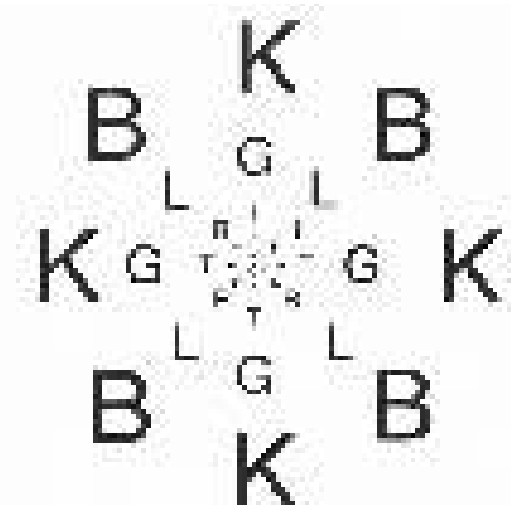


Figure 3. Schematic drawing of the distribution of the photoreceptor cells in the retina. When the gaze is focused on the point at the centre, all of the letters are equally distinguishable. Graphic: Axel Buether, 2010.

(Figure 3). Plans, drawings, prints, paintings, photographs, films, sculptures, performances and architecture are perceived in different ways. The legibility of the content and function varies with the form of representation, thus forcing the designer to select the technology and to restrict the media employed. Any change to the colour coding or contrast can influence the eye movements and thus the interpretation process. The decision on where and which surface colours are to be used in the design should therefore rely less on subjective opinions than on proven knowledge of the viewing conduct of the users or target group. Orientation in space is not random, but rather the result of messages designed in a way that can be understood. The observer's eye movements focus involuntarily on the most meaningful spatial data, through which is created and maintained orientation in the environment.

At this point, the formal effects of colour should be addressed, since they derive from the physiology of the perceptual system and can be explained using examples. Visual perception always starts with the creation of orientation in space. This involves determining the location of the elements of relevance to the content in relation to the light source, the topographic reference level and the observer. Orientation is therefore created by the brain only in so far as contents can be interpreted and located in a familiar spatial reference system. This makes clear why and when people experience problems with spatial orientation. Major infrastructure such as railway stations and airports may confuse inexperienced users just as sprawling or monotonously designed suburbs or foreign cultural spaces can. The spatial reference system in an observer's memory consists not only of striking colour features, but also, to a far greater extent, of shape and motion coding. This is also perceived via colour codes, especially when touch is not possible.¹ The larger the spatial scale and the less the other senses are able to assist in orientation, the more important colour becomes.

The Grammar of Seeing

Eye-tracking demonstrates the need for the composition of all important elements in the field of vision into a clearly perceptible and comprehensible sensory whole. Since only two degrees in the field of view can be focused on and consciously seen, the entire remainder forms the background to the perceptual situation at that moment. This background is not only important for atmosphere, but it also directs the eye to the next important goal in view. The eyes frequently do not focus on the elements, a process requiring about one second, but only look at them in a sweeping glance. As a result, many elements are not consciously perceived, although they are evaluated by the implicit memory. Optical illusions and effects provide extensive illustrative material on how the visual perceptual system works. This process can be observed particularly clearly in perimeter areas.² (Figure 4)

¹ For further discussion on the comparison of the spatial perception abilities of blind and sighted people see (Buether 2010: 183–230).

² Further reading on the topic of visual illusions, see (Nänni 2008).

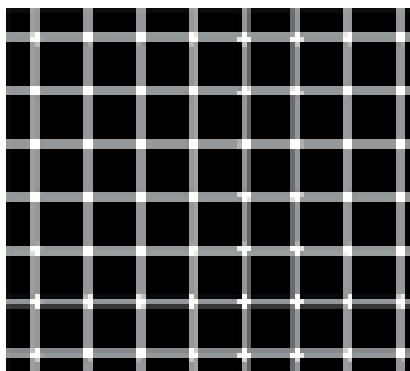


Figure 4. The Hermann grid illusion. The points of intersection in the centre of the image appear white, while at the periphery they appear black, thus illustrating the influence of interest and attention on the perception of colour and shape. Graphic: Axel Buether, 2010.

Peripheral perception is sufficient in order to identify important interior and exterior reference elements such as the sky, topography and forests or buildings, walls, ceilings, floors, doors and corridors. Individual shapes merge to form larger contexts if there is insufficient colour differentiation, as the peripheral regions of the retina can hardly recognise any details. For this reason, people can find their way around natural and urban spaces without having to recognise or remember many elements. Colour can move things into the foreground of perception or leave them in the background. It thus has a crucial influence on the culture of memory and visual education, on all visually coded information that people retain in their memories of images, objects and spaces. On the basis of colour differentiation, the brain provides

orientation in just a few seconds. However, the conscious perception of all substantive and functional components in a space calls for closer observation and considerably longer viewing time than that involved in the purely orientation process. Vision and memory follow the visualisation or explication of implicit information in the peripheral part of the field of view. A person usually only invests the time needed to do this if they are interested in interpreting the visual information or feels an emotional connection (Roth 2003a: 87, Roth 2003b: 94). Colour creates awareness and interest in the perception situation, an effect that can be heightened to fascination. If one allows oneself to be inspired by the colours of the natural or cultural realm and to pause before them in amazement, one will perceive the associated locations, content and events more intensely and coherently, as well as in greater detail, and remember them for longer.

Environmental Perception versus Plans

For planners and users, however, misinterpretations of colour perception can cause great difficulties, since these can only be detected in the transition between drawing and implementation. While colour materials are transformed in painting or three-dimensional representations using varying techniques until the desired relationships between the shapes are achieved, the operating principle of visual perception is reversed in the process of line or plan drawing. The restriction of the representation to light and shade or the palpable contrast boundaries between objects and spaces means that the relationships between the shapes emerge more strongly and become more important. This abstraction process characterises all methods of creative design that serve to direct the attention in media specific ways.

Once spaces are implemented in reality in accordance with design drawings, perception shifts from the line to the surface. Geometric and free line illustrations are based on the extensive abstraction abilities of the brain, as designers take geometry and the perspective of the boundary lines as a starting point in such drawings. The contrasting effects of luminous and non-luminous colours are deliberately neglected, so that the constructive relationships of the image space come to light more clearly. Architectural drawing requires an intensive learning process in the brain, in which the motor power of the hand movement increases simultaneously with the cognitive performance of visual perception. Contrast borders are not automatically lines, but are made visible, conceivable and representable through the abstraction of colour information in the process of environmental perception. Only a fraction of the borders of contrasting areas of colour is displayed in a line drawing. Specific knowledge and skills in representing the processes of abstraction between colour and shape determine the formation of drawing skills. Non-experts find the clarity of thought and design required by drawings or line sketches to be as difficult as reading plans.



Figure 5. De Stijl architecture creates atmospheric spatial compositions in which surface colours and materiality are important design features. Colour is used as a means of abstraction. Rietveld Schröder House, Utrecht, Netherlands. Photo: Axel Buether, 2010.

However, the acquisition of drawing skills does not mean that the implementation of the design in the reality of a built space can be equally taken into account and is mentally present in every line of the design process (Figure 5). The differentiated planning of atmospheres and material colours determines the perception of light and shadow, depth and surface, proximity and distance, and objects and space. The spatial perception of the environment is influenced by so many

factors that it can only be simulated to a very limited extent by rendering programmes. Any change of scale, lighting or surrounding colours alters the effects of luminous and non-luminous colours. In turn, this has major implications for the perception of shape and space. The abstract structure of the line drawing becomes discernible according to the rules of colour perception.

The Spatiality of Retinal Projection

The first physical contact between the environment's irradiation and the body occurs in the cornea of the eye. This is where the light is broken before being

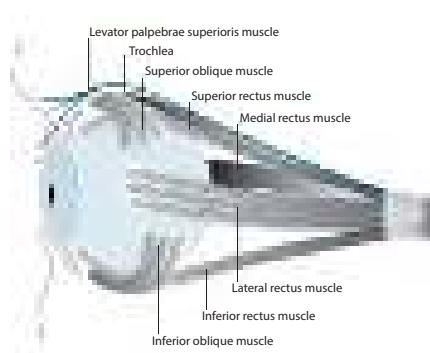


Figure 6. The optical conditions in the eye are controlled by the brain via the complex coordination of the eye muscles. A system of six muscles facilitates eye movement for fixating and tracking visual stimuli. Graphic: Axel Buether, 2010.

continuously adjusted, thus transmitting the necessary information on the colour temperature of the light source for the brain to produce a white balance. As a result of this sensory information, the brain can control all of the contrast ratios of the retinal projection and create a uniform impression of perception that is known as colour constancy. When two identical hues are suddenly perceived as different due to a change in the light source, this gives rise to the effect of metamerism. The opening width of the iris (aperture), the direction of both eyes in relation to each other (vergence) and to the focal point, and the curvature of the lens (depth) are controlled by the brain via the complex coordination of the eye muscles (Figure 6). Through these sensory-motor signals the brain receives sufficient information on depth for the spatial interpretation of the colour signals from the retinal projection (Mühlendyck and Rüssmann 1990). Because of this muscularly generated spatialisation of colour information, observers can usually distinguish very clearly between the reality of a built space and their own image. Through the intersection of the incoming rays in front of the retina's projection area, an upside-down projection of the field of view is formed, as the optic system of the eye functions like a camera obscura (Breidbach et al 2013). Those who conclude that a 'perceptual image' arises at this point are at the same level of knowledge as René Descartes, who introduced the notion of a mechanically functioning organism to the world of science 400 years ago (Damasio 1997). The optical process forms an integral part of the organic and communicative processes, whose importance for visual perception is elaborated in the following sections.

Photoreceptor Cells and the Contrast Principle

The retina acts as an energy sensor and transducer, through which the incident electromagnetic radiation is changed via a photochemical process to nerve

directed onto the retina by the circular pupillary opening in the iris and by the lens. The iris allows the pupillary opening to adapt to the energy conditions in the environment, as it functions as an intelligent, muscularly controlled 'aperture' and regulates 'exposure' to the retina. It limits the expansion and the solid angle of the incoming irradiation, thus regulating the brightness, depth of field and vignetting (the shading at the edge of the image) of the retinal projection. The terms can be understood by means of comparison with the optical system of a camera, as all parameters can be controlled by changing the aperture and focal length. The light sensitivity of the sensory elements is

arousal patterns. The light output of a single photon is sufficient to activate one of the 60 to 125 million brightness-sensitive rods in the retina; the 3.2 to 6.5 million colour-sensitive cones require 200 times as much energy. The difference in the number of photoreceptor cells is the cause of individual variations in the spatial resolution of the perceptual space; this is expressed as a percentage in eye tests.³ Due to the high response threshold of the colour-sensitive cones, people only perceive their environment in full colour and spatial resolution if there is sufficient daylight or artificial light. For the same reason, the red-orange and finally the violet-blue areas of the spectrum regularly disappear at dusk and dawn. That the world appears an intense red-orange just before sunset and sunrise is due to the shorter distance that light must travel through the atmosphere when seen horizontally. Through its reflection and absorption of parts of the light spectrum, the atmosphere's particle structure also makes the sky appear cyan or whitishgrey in colour and shows the further consolidation of the shining white and grey shadowed cloud formations.

The perception of colour stems from the nervous system's connection of three different types of cones that respond to the short-wave, medium and long-wave parts of the spectrum.⁴ The principle of lateral inhibition, which inhibits the surroundings of a source of stimulation in favour of the signal in the centre, enhances colour contrast and thus the perception of form. The orangered, green-yellow and violet-blue colour signals are not seen directly, since they are previously evaluated by the downstream retinal ganglion cells, converted and sent to the brain.

Visual Pathways and the Basic Colour Principle

The three visual pathways between the eye and the brain are referred to as the red-green channel, the blue-yellow channel and the bright-dark channel. This is because all brightness and colour signals are pre-structured in accordance with the principle of maximum contrast formation. These complementary contrasts therefore simultaneously determine the basic colour signals (black, white, red, green, blue and yellow). All other hues are derived from various mixtures of these basic colours. The composition of basic and mixed colours in the visible spectrum thus results from the specificity of receptor types and processing mechanisms. Complementary coloured afterimages are generated because the photochemical activity of the receptors continues for some time, depending on the intensity of the light stimulus. The brightness of a colour indicates the intensity of the sensation of light registered by the rods and cones alike. This can be perceived separately from the colourfulness of the spectrum and the saturation of a hue. The light-sensitive rods only react to light in the mid-green wavelength

³ Journals frequently give different figures for the number of photoreceptor cells in the human retina. These differences stem from increasingly accurate measuring methods. The information on this topic used here is therefore based on the current publication, http://www.retinascience.de/krank_kell/anatomie_physiologie.html, supervised by Professor Ulrich Keller, Centre for Rare Retinal Diseases at Siegburg Eye Centre. Accessed: 18 July 2013.

⁴ Also referred to in a simpler form as RGB mode, that is, additive colour mixing on a monitor.

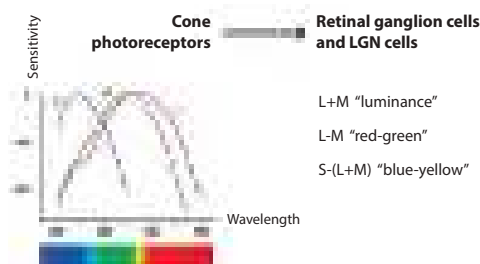


Figure 7. The spectral sensitivities of the three types of cones in the retina overlap in the central green area where humans can distinguish the greatest number of colours. Colour signals are structured according to the principle of opponent colours and are transmitted to the brain through the channels light-dark, red-green, and blue-yellow. Graphic: Axel Buether, 2010.

superimposed in the middle wavelength range of the spectrum (Figure 7). The biological function of colour is also evident here, as the visual perceptual system was developed in an environment characterised by vegetation in which a high degree of spatial resolution in the green spectrum was necessary for survival. In contrast, the spatially far more weakly resolved red area aids the perception of significant individual events such as human emotions, the degree of ripeness of fruit and the freshness of meat. The composition of the spectrum and the differentiability of individual hues are therefore not random but instead demonstrate the principles of evolution.

From the Perception of Colour to Visual Communication

Recent research in the neuroscience shows that the processing of visual information accounts for about 60 per cent of all activity in the cerebral cortex (Gegenfurtner 2005). Colour is therefore decisive in the perception of built space. Its appearance provides people with more information than all the other sensory perceptions combined. This is not to dismiss the performance of the other senses. The physical encounter with the feeling, smell and sound of architecture also contributes significantly to the overall experience of a space. However, not for nothing is sight known as the guiding sense in humans, as the brain constructs a metarepresentation of the environment from the arrangement and variation of colour-coded retinal signals. Colours refer to tactile, auditory, vestibular, gustatory and kinaesthetic experiences. This is the reason why people are more or less able to see how something feels, tastes, smells or sounds, how it moves or if something is in balance. The network of visual, tactile and kinaesthetic experiences functions in an amazingly sophisticated way. Therefore, after a period of multi-sensory experience, people can feel certain that the movement space will appear to recede as they step towards it, while the tactile space will exist when-

range, which people only perceive as brightness in the absence of a nerve connection. Colourfulness is only perceptible through the comparison of different signals. The strongest form of brightness is associated with the experience of glaring, blinding white light, while the intermediate stages of twilight are perceived as a darkening or opacity until darkness falls. The maximum spatial resolution of the colours of the field of view results from the distribution of the perception areas of all types of receptor, while the quality of the resolution is determined by the overlapping of all frequency ranges. The stimulation range of all cones is

ever something is touched. Perceptual effects⁵ (Nänni 2008) or optical illusions refer to the threshold areas of visual perception, while the survival of the human species proves the success of this principle.

During the perception process, colour signals enter the three opposing colour channels from the eyes to the brain stem, where they are compared with data arriving simultaneously via the other senses before being emotionally pre-assessed. For this reason, people cannot perceive colour without emotion, regardless of whether it involves atmospheric phenomena or a concrete object (Hansen et al 2006). A change of atmosphere or striking colour events prepare the viewer for the coming experience in a split second by altering vital bodily functions such as hormone production, blood sugar levels or breathing. A glimpse of blood-red instinctively draws the eye to the source of the colour and leads to an increase in bodily activity before the viewer is aware of what the colour entails. These involuntary emotionally controlled responses to colours can be traced back to an evolutionarily important fact. Bodily functions vital to survival are activated involuntarily in split seconds by colour stimuli. The process of visual comprehension takes place in periods of seconds to minutes. Advertising and marketing have long used these key stimuli professionally to manipulate the attention and mood of potential target groups. In architecture and design, key stimuli are used, for example, in colour guidance systems, where the aim is to warn people and deter them from inappropriate actions. Nobody runs without hesitation in the dark. Everyone's gaze focuses involuntarily on red.

Colour and Memory

After the preliminary assessment, the signals in the visual cortex are processed and sent to memory via two main processing streams. The 'where and how stream', which flows to declarative memory, is used in the perception of movement, action, place and position, while the 'what stream' that flows to semantic memory evokes the perception of meaning (Buether 2010, Gegenfurtner and Sharpe 1999). This memory structure for knowledge acquired and stored via images is thus similar to the semantics and syntax of verbal language, which enables people to perceive and describe the world in an auditory form. While the verbal form of perception functions via sounds that a listener selects from the audible spectrum and links to form meaningful entities, visual perception is based on the same principle, using colour. The selection principle follows the importance attached by viewers to a perceived event in relation to the previous experiences stored in their memory. Visual perception is therefore subjective where it reflects individual experiences and objective where it records socially accepted knowledge and empirically verifiable observations. The combination of sounds in the form of words and sentences or of colours in the form of pixels and pictures, as well as hybrids of both communication media in the form of writing and images, are the result of cultural evolution.

⁵ In a field trial, subjects were asked to change the image of a banana on the screen to a neutral shade of grey. The majority of the results showed colour shifts that went well into the complementary blue range. In contrast, an image in grey tones appeared yellowish.

The context of a perceptual situation determines the interpretation of the spatial data, which are almost always ambiguous. In verbal language, these distinctions arising from situations are referred to as denotations (literal meanings) and connotations (associative meanings). A colour code can therefore have many meanings and still be understood correctly. Blushing thus indicates a specific state of excitement that may signal emotions such as shame, anger, desire, combat readiness, interest or rejection. A colour code cannot be clearly determined without reference to the context of its use. The same applies to the perception of space—hence a building's colours can appear harmonious in one context and totally out of place in others. The legibility of the function and the qualities of usage may change as a result of changes in colours in the built context.

Colour Language. The Function of Colour in Biology

The sensations of colour that people can feel and experience particularly intensely during dramatic atmospheric⁶ phenomena such as sunsets enrich existence but do not sustain it in terms of survival. The colours of nature form a universal code system, which is used by many living organisms to convey messages that serve to preserve their species. Since many messages are not addressed to humanity, the aesthetics of the environment are often perceived as a wasteful diversity, whose ornamental beauty triggers admiration and fascination. This point of view ignores the wide-ranging visual forms of communication that take place between members of a species or form the basis for symbiotic lifestyles.

Plants thus use the colours of their flowers and leaves to communicate directly with insects and animals that are attracted by the particular shades and combinations they display, in order to ensure pollination and the dissemination of their seeds. In addition to the use of colour to attract or deter—a frequently observed process in flora and fauna—nature also understands the principle of camouflage, that is, deception and illusion. The process by which chameleons can change their body colour to serve specific purposes is particularly striking (Figures 8 and 9).

However, the greatest degree of change occurs not in matching the body colour to the background but rather in communication among a species. A chameleon is able to send complex messages to other chameleons by changing its body colour. The colour codes are used to convey intended actions such as combat readiness, submission and interest in mating. In addition, responses to received messages are sent, as can be observed when a chameleon changes its skin colour indicating whether a request to mate has been successful or not. The exchange of messages takes place over very short intervals so as not to attract the attention of enemies. Due to the brevity of these intervals, the messages are often not recognised by other species as such, which is why these communication skills were only recently discovered (Stuart-Fox and Moussalli 2008).

⁶ *Aisthetikos* in Greek, meaning 'what can be perceived.' Only developed much later, after 1735, by Alexander Gottlieb Baumgarten as a parallel science to logic for the study of the laws of beauty. Originally published in 1750, Baumgarten's *Aesthetica* remained in print until 1958.



Figure 8 and 9. Camouflage and integration are part of the chameleon's colour language. Photo: CC0 chameleon-1900815-Nandhu Kumar-pixabay, 2016 (left). Deterrence and attraction are also part of the chameleon's colour language. Photo: CC0 chameleon-885595 von free-foto-pixabay, 2014 (right).

This example demonstrates the function of colour in biology. People use its communicative potential in all artistic, sculptural and spatial cultural techniques in order to design information. Architecture and design form part of visual communication, be it in the retrospective interpretation of cultural studies or the design of the present and future.

Colour Language as a Conveyor of Culture

The cultural evolution process of colour perception and colour language is reflected in the aesthetics and function of media and technologies. Images, objects, built spaces and performances, as well as the technological developments of the information, learning, planning, navigation and communication systems of modern societies, illustrate the qualitative leap in performance in the processing of colour codes in the brain. The aesthetics of the socio-culturally designed environment does not serve to create an abstract idea of beauty but rather to communicate thoughts, feelings and action options. The colour mutations seen in nature reveal a creative principle, as living organisms of every kind use changed colour codes to tap into previously unknown communication partners, means of distribution and habitats.

An innovative colour design opens up new applications and promotes the development of aesthetics and visual perception. The variety of colours in a flowering meadow demonstrates both the rules and the variation possible within colour codes. Hence, not only the expedient, but also the experimental is aesthetic in visual culture, insofar as the unintelligible colour codes address the viewers and challenge them to develop mentally, emotionally or practically (Buether 2013, Weidenmann 2010).

The appearance of residential areas, buildings and infrastructure reflects the function of society in a clear way, thus making a significant contribution to the cultural evolution of the human species. In terms of visual perception, cultural space functions as a form of 'vivid memory storage' (Buether 2010), whose

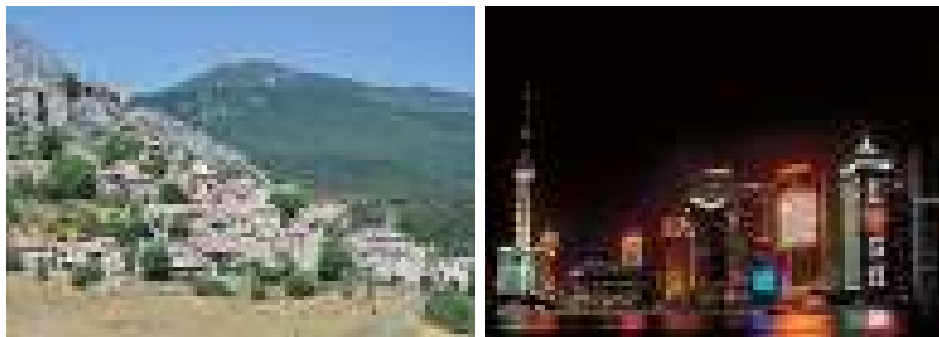


Figure 10 and 11. Traditional architecture in Trigrance, France. Photo: Axel Buether, 2017 (left). Contemporary architecture in Shanghai, China. The skyline of Pudong viewed from the Bund across Huang Pu River. Photo: CC0 shanghai-2625315-StockSnap-pixabay, 2017 (right).

formal structures and meaning content safeguard the transfer of knowledge between the generations. The mediating function of verbal language forms the basis for the rules of social coexistence inferred from the use of buildings, streets and squares, whose functions can be read in a clear way. Illustrative learning forms the basis for the archaeological reconstruction of society: for understanding the present and for planning the future. Urban spaces are inexhaustible learning spaces. The cultivation of the language of colour through the colour codes used in clothing, products, interiors, buildings and cities, creates identity and provides guidance in an increasingly complex world. The age, gender, cultural affiliation and socialisation of people, as well as the era, district formation and regional variations in appearance of places can be read through the conventional use of colour codes (Figures 10 and 11).

With the development of visual orientation skills people also acquire fundamental knowledge of the colour language specific to their cultural space. From that point on, they interpret and use the language in the same way as their 'mother tongue'. While those who live in cities recognise and use culturally specific urban colour codes that are self-evident to them, the diverse colour codes in rural regions seem like a foreign language to them. The first stay at the seaside, in the mountains or in the desert allows the urban resident a completely new perception of the phenomenon of colour, but offers little by way of orientation. For local residents, the colours and their changes signify meanings that indicate, among other things, underwater currents, impassable paths, edible fruit, sudden temperature changes and severe weather. The various colour codes of landscapes and residential areas condense to form site-specific atmospheres and generate an intuitive perceivable colour space that shapes the image of a colour home (Häberle 1999).

The most reduced form of this identification is reflected in the colour codes of national flags, clubs and folkloric elements in architecture, design and craftsmanship (Schawelka 2007). The most extensive form in terms of space is determined through atmospheres defined by geography and climate, the colours of

flora and fauna, and a region's built, deformed and depicted natural materials (Häberle 1999). The legibility and interpretation of content and function are complicated, distorted or prevented if the colour scheme focuses solely on formal effects. The natural colour of the raw materials, along with the colours of coatings and claddings, indicate the substance of the material, the manufacturing process and the intended use. The aesthetics of a colour scheme is, therefore, primarily used to designate the content and purpose of an object, as well as to create identity and representation. Nowhere are the effects of globalisation seen as clearly as in the colours of cultural spaces, where regional identity has given way to a unifying language of colour associated with social change. Colour and content form a unit; the transformation of the appearance of cultural spaces is not a new phenomenon. Even today, the extent of past empires can be detected in the uniformity of colour and shape language that was put in place and used to indicate the extent of the empire's sphere of influence. Pigments and building materials also indicate technological achievements, religious and secular systems of symbols, customs, traditions and trade routes. The question of whether the loss of colour languages of entire regions is an inevitable price of social change, like the reduction of biodiversity, is beyond the scope of this text. When it is appropriate to preserve cultural heritage and maintain a region's appearance or where space can be opened up for new ideas is an issue that can only be resolved by means of social discourse. This needs to be conducted in a new way (Sibillano and Wettstein 2014, Danzl 2014, Naser 2014).

Colour, Music, Aesthetics

From antiquity to the present, the similarities between music and aesthetics have stimulated a tremendously productive form of discourse, ranging from the classification system of harmony (Schwarz 1999) to the multimedia experience of time-based media.⁷ Tones, sounds, rhythms, overtones, beats, transparencies, dissonances and harmonies can be heard through the medium of sound and rendered visible through the medium of colour. The organising principles discussed here are explored in science, music and fine art.

In principle, any phenomenon can be investigated in terms of its formal qualities, while the contextual relationships remain hidden, thus shifting the structural elements to the foreground of perception. In the process of visual perception, the formal linking of all elements to each other and to the whole takes place via the colour structures of light, material and atmosphere. The aesthetics of architecture is determined by the arrangement and construction of spaces and forms, the rhythm of the openings and the surface structures of the material. Visual perception of architecture is based on movement of people in spaces; less on ongoing touch than on the continuous changing of surface colours and atmospheres. When viewers can perceive something clearly, the object has an impact and becomes something that can be experienced and used. Everything else remains an ineffectual intention on the part of the author. Architecture becomes

⁷ Time-based media include film, television, interaction design, 2D and 3D animation.

static via the building material, whose immobile and heavy weight can therefore be described and designed using a system of lines. Plans, drawings and photographs of buildings and objects represent momentary excerpts of continuous action, in which dynamically changing perspectives unfold for the viewer through changes in angle and atmosphere in time and space. The tension between order and momentum has led to architecture being perceived as ‘frozen music’ and described as such for more than 200 years.⁸

The biological cause of the productive interactions between music and aesthetics can be attributed to the way that the perceptual systems involved work. The ear’s sensory cells are stimulated by the auditory perception of sound events and sense-specific vibration patterns whose shape properties are interpreted by the brain.

The same applies to the photoreceptor cells in the retina, which are stimulated in the process of visual perception to constantly produce new patterns of activity. Colour composition is generated by the dynamic between eye movements over time and the rhythm of colour structures. Even if the environmental situation remains unchanged over time, viewers select shades in the field of view and combine them into new entities through patterns of eye movement. Viewers can follow the designer’s colour composition provided that they recognise it or are able to make their own interpretations of the formal structure. The aesthetic experience of the environment is determined by the searching movements of the body and the eyes in architectural space, of the paintbrush on a surface, of the chisel on stone, and of the camera used to film or take a picture. Without the structuring of the colours in the field of view and without the creation of soft and hard transitions, rhythms and intonations, viewers would perceive a single uninterrupted and undifferentiated shade. As a result, there would be no place

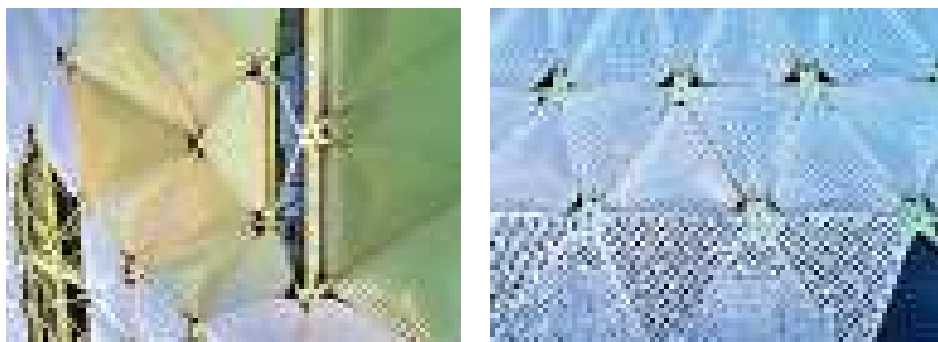


Figure 12 and 13. In high-tech architecture, the macrostructure of the façade affects the colour when seen at a distance. Photo: CC0 josecab-facade-1405953-pixabay, 2016 (left). The façade’s microstructure consisting of transparent and opaque areas has an impact on the perceived colour. Photo: CC0 josecab-facade-1405955-pixabay, 2016 (right).

⁸ First mentioned by Friedrich Schlegel in 1803, also explored by Friedrich Wilhelm Joseph Schelling, Arthur Schopenhauer and Johann Wolfgang von Goethe. Further reading (Saleh Pascha 2004).

for the eye to rest and no stimulation for the body. The minimalist aesthetic of an unstructured colour used throughout a room can be likened to a continuous tone in music.

The Micro and Macrostructure of Colour

The aesthetics of the natural environment is determined at the macro level of the field of view and at the micro level of the surface structures by colour compositions and combinations that seem harmonious. The biological reason for this intuitive assessment stems from the evolutionary adaptation of the visual perceptual system to the appearance of the environment, whose micro and macrostructures have both formal and content-related contexts. The microstructure of nature can be equated to the sound vibrations of a string and comprises a basic tone and multiple overtones, whose relationships are reflected in the macrostructure. Mineral pigments are composed of mixtures of complementary coloured crystals that are barely visible to the naked eye. Nevertheless, a unique depth of colour and brilliance can be perceived, as the countless crystals are penetrated by light, thus making the surface structure shine from within following multiple reflections (Muntwyler 2011). In addition to their particle composition, the colour surfaces of natural materials have characteristic surface structures, whose diverse nuances determine how they are perceived. This harmonious unity in diversity causes an inner connection between the whole and its details that continues up to the macro level. Looking across a desert demonstrates the inner harmony⁹ between the coloured detailed effects of the grains of sand, their wave structure and the whole landscape of wind-shaped dunes. The macrostructure of the colour is formed by the inherently harmonious arrangement of its components, creating an overall composition that can be understood in itself. Each shade produces proportional relationships to the same, similar or contrasting areas in the field of view, from which rhythmic structures, prominent figures or new formal entities are formed.

Internal consistency cannot be reduced to the formal aesthetic level of the appearance of a colour, but instead includes the content-related context. If the aesthetics of the appearance does not refer to the content, this will result in misperceptions that can animate the viewer towards creative achievements or senseless acts, depending on the context. The study of nature leads to the biological principles of colour perception, but this does not mean that these rules are equally applicable to the design of cultural space. It is therefore more important that planners deal during the design process with all levels of colour effects in terms of both the details and the overall impact, and that they develop a design position that produces aesthetic quality by means of variety and internal consistency. For discerning graphic designers, it is self-evident that their work does not end with image editing, but also includes the choice between thousands of types of paper¹⁰ and a wide variety of printing techniques, as well as the finished printed product.

⁹ Harmony: congruence, melodiousness, acquiescence.

¹⁰ The Paperwood 2014 Trade Fair in Frankfurt a. M. had 2,967 exhibitors and provided a lot of new information on this topic.

By adjusting the micro structure of the paper, the appearance of printed colours can be changed significantly and may affect the emphasis of the content. In product and spatial design in architecture, interior design and design, the search for innovative materials and manufacturing techniques is becoming increasingly important (Kalweit 2014). Each particle is equally an effective static material and an aesthetically effective colour pigment. Once a particle of the microstructure is visible on the surface, it becomes an 'ambassador of light', and provides the viewer with information that modifies the content-related and emotional effects of the macrostructure (Figures 12 and 13).

Colour as a Design Tool

Parallel to the development of Modernism, the professional design field divided into a planning/conceptual and a manual/implementation parts. For many reasons, this separation was problematic. As a result, only a few architects and designers can now base their design work on their own technical experience, which is essential for the visual design of material culture. However, colour only becomes a modern design tool if designers have extensive theoretical knowledge that they can apply in the context of their own practical experience. While it was possible to base Bauhaus training in the field of colour (Düchting 1996) on practical skills and theoretical knowledge, the Ulm School of Design shifted the focus of design training to scientific, technological and methodological strategies (Seeling 1985). The newly created specialisation in visual design included film, photography, graphic design and typography and was subsequently extended in the degree in visual communication to include product design, architecture, urban planning and art. As a medium of visual design, colour, as well as shape and writing, formed an integral part of visual communication. This semiotics-based field of knowledge has so far only become established in the visual design of image media, benefiting numerous practical applications. Professional image producers in the fields of graphics, illustration, printing, internet and film are familiar with the formal and content-related effects of colours. They are able to use these effects on the basis of practical and application knowledge in a targeted and efficient way to convey messages. Degrees in subjects such as communication design and information design still offer untapped opportunities for a holistic exploration of visual design and communication in images, sculpture, performance and space (Buether 2010). In architecture and urban design, technical training became an academic subject, and as a result, the curriculum is based on engineering subjects. Consequently, the communicative aspects of built space recede into the background. This is the reason why colour cannot be used strategically as a design tool for the visual communication of content and functional meanings. Colour's complex communicative effects must be taken into account in the same way as the technological effects throughout the design, planning and implementation process. To this end, colour must first and foremost undergo a holistic perception of its function as an element that shapes lines, areas, objects and spaces; as a communication

medium that triggers emotions; as an orientation system that forms identity; as a visual and tangible surface quality; and as an atmospheric light quality. An exploration of colour from a communication studies, cultural-historical, natural scientific, technological, aesthetic and practical point of view should therefore be undertaken in all educational institutions involved with the trades, technology, design, art and architecture. No one can avoid interacting with colour, as Paul Watzlawick's axiom can also be applied to the medium of visual design and communication: one cannot not design in colour.¹¹

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¹¹ Based on Paul Watzlawick's axiom "One cannot not communicate" (Watzlawick et al 1969: 53).

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Париж, город света и приглушенных тонов

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Аннотация

Традиционная цветовая гамма Парижа отличается сдержанностью. Городские стены чаще всего окрашены в мягкие и светлые тона. Только крыши (из шифера, цинка, черепицы) имеют темный цвет. Использование камня и штукатурки до конца не объясняет своеобразие этой палитры. В ее формировании большую роль сыграли представления власти, а также моральные и идеологические ограничения. Во Франции нормы хорошего вкуса обязательно требуют сдержанной колористики. Административные акты, направленные на сохранение исторических зданий, уже долгое время придерживаются этого же правила.

Paris, une ville lumineuse aux couleurs discrètes

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Résumé

La coloration traditionnelle de Paris présente la caractéristique d'être discrète! Les murs de la ville sont le plus souvent clairs et doucement colorés. Seuls les toits sont sombres (ardoise, zinc et tuiles). L'usage de matériaux comme la pierre ou le plâtre ne suffit pas à expliquer les particularités de cette palette, la représentation du pouvoir ainsi que des contraintes morales et idéologiques ont joué un rôle important dans sa constitution. En France, le «bon goût» s'exprime plastiquement dans des nuances toutes en retenue. Les règlements administratifs destinés à protéger les monuments historiques ont confortés longtemps cette option.

Des matériaux remarquables

Le matériau de base pour la construction en France en général, à Paris en particulier, est la pierre. On a extrait depuis longtemps des nombreuses carrières de Paris puis, plus largement de la région parisienne, une pierre calcaire, facile à travailler, plus ou moins blanche, doré ou légèrement rosée. Les romains s'en sont servis pour bâtir Lutèce.¹ On trouve aussi en abondance une roche à partir de laquelle on fabrique du plâtre, matériau très apprécié pour la construction

¹ Nom romain de Paris.

alors que la brique, à quelques exceptions près, n'aura pas beaucoup de succès. Les toits de Paris sont souvent gris sombre de l'ardoise et gris clair du zinc. Ces couleurs ont progressivement remplacé le rouge des tuiles mais pas l'or des dômes de certains palais!

Un groupe d'étudiants de l'École nationale supérieure des Arts Décoratifs, ENSAD, a réalisé des relevés de couleur dans deux rues du 6^e arrondissement, la rue Férou et la rue des Canettes situées dans le quartier historique de Saint-Sulpice. Ces rues voisines ont des usages très différents. La rue Férou était dévolue à l'habitat uniquement ; la rue des Canettes, plus complexe, mêle habitat et commerce. Les étudiants présentent le relevé des couleurs effectué sur les murs de la rue réservée à l'habitat. Ils représentent l'ordonnancement des couleurs de l'autre rue, par niveaux, du sol jusqu'au toit. Cette représentation schématique caractérise bien la couleur telle qu'elle s'est structurée durant des siècles à Paris (Figures 1 and 2).



Figure 1. Paris historique, XVII^e et XVIII^e siècles. Relevé de couleur paysager. Quartier Saint Sulpice. Rue Férou, historiquement habitat. Cartes de couleurs: Étudiants ENSAD, Paris. Études réalisées en 2007.

La puissance et l'orgueil

La pierre a bénéficié d'une image prestigieuse qui a marqué l'architecture française. Elle a été le symbole de la puissance des Romains. Leur savoir-faire dans la taille et l'appareillage des pierres leur avait permis de construire des bâtiments aux dimensions impressionnantes : palais, théâtres, ponts, temples. A la chute de l'empire, les pierres des bâtiments abandonnés servirent de matériaux de construction pour de nouveaux édifices.

A partir de la fin du X^e siècle, le monde occidental entre dans une phase

nouvelle, d'expansion démographique, d'enrichissement et de réorganisation politique. La France se couvre de châteaux fortifiés, de murailles de protection, de ponts. La pierre s'impose par la nécessité de construire des ouvrages solides. Les petits seigneurs qui édifient des fortifications un peu partout sur le territoire affirment ainsi orgueilleusement leur présence autoritaire. La pierre convient à l'architecture militaire ainsi qu'aux palais, mais également à la construction d'églises, cathédrales, monastères, à l'architecture civile prestigieuse. La pierre exprime puissance et prestige.

La lumière, le beau et le vrai

Au début du XII^e siècle, deux esthétiques s'affrontent. Le charismatique chef de l'ordre monastique des cisterciens, Bernard de Clairvaux (1090-1153), dit Saint Bernard, définissait une esthétique austère où la simplicité des matériaux naturels valait mieux que tous les ornements «signes de vanité». «Dieu est lumière», il ne sied point de la travestir par des couleurs, il faut laisser la lumière pénétrer les édifices, comme on veut quelle pénètre notre esprit. Pour cette raison, l'ordre cistercien rejetait la couleur. Ce refus de la couleur les amènera à réaliser des vitraux sans couleur (Figure 3) et à laisser nus les murs de leurs abbayes. Aujourd'hui encore, la «couleur des matériaux» reste une référence d'authenticité, de «vrai» et, comme pour Saint Bernard, de beauté.² Les centaines de monastères cisterciens qui furent créés en France et en Europe durant plusieurs siècles, suivirent les recommandations de Saint Bernard.³ Cette esthétique de la retenue a marqué la conception de l'art et de l'architecture en France.

L'écrit et l'image

Pour Saint Bernard les images colorées sur les vitraux ou les murs des églises n'ont de valeurs que dans la mesure où elles pallient au manque de culture des masses. L'écrit est plus noble et se passe de couleurs. Images et couleurs sont pour les analphabètes. L'homme cultivé, l'honnête homme, n'a pas besoin d'arborer de couleur. L'idée que la couleur est vulgaire marque encore le goût collectif. Cette esthétique se retrouve aussi en Chine dans le goût des lettrés «qui



Figure 2. Relevé de couleur paysager. Quartier Saint Sulpice. Rue des Canettes, habitations et commerces. D'en haut en bas: TOITS, tuiles, ardoise et zinc; MURS, plâtre et pierre; BOUTIQUES, VOILETS, PORCHES, peinture sur bois. Cartes de couleurs: Étudiants ENSAD, Paris. Études réalisées en 2007.

² Parmi les centaines d'abbayes qui ont recouvert l'Europe, citons : Cîteaux, Fontenay, Molesme, Noirlac, et près de Paris : Chaalis, Royaumont, Port-Royal des Champs, ...

³ La nature créée par Dieu est évidemment belle. Il n'y a rien à ajouter, ce serait comme dénaturer le message divin.

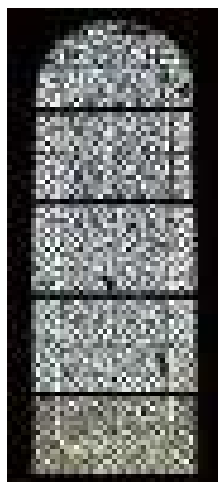


Figure 3 (à gauche). Vitraux cisterciens sans couleur. Abbaye d'Aubazine.

Figure 4 (à droite). Vitraux aux couleurs somptueuses. Abbaye Saint Denis. Photo: Yves Charnay, 2016.

abandonne la couleur pour l'encre».⁴

À la même époque, l'abbé Suger (1081-1151), à Saint-Denis, tout aussi inspiré par la lumière divine, conçoit un nouvel art de construire. Cet «art français» qu'on appellera plus tard «gothique» autorise la réalisation de bâtiments de grande hauteur. Les murs ne sont plus porteurs de voutes lourdes comme dans l'architecture romane. Le procédé de construction dit de la «croisée d'ogive» a un double effet, il diminue la poussée latérale des voutes et fait porter le poids principal sur des piliers retenus à l'extérieur par des arc-boutants. Entre les piliers, dans les espaces ainsi libérés sont ouvertes d'immenses baies par lesquelles pénètre la lumière. Dans ces ouvertures sont disposés des vitraux aux couleurs somptueuses que le soleil illumine (Figure 4). Selon Suger, la beauté incite à «passer du monde inférieur au monde supérieur». Pour Suger, les vitraux sont aussi un moyen d'enseigner à des analphabètes l'histoire sainte par des images. Cette esthétique va cohabiter avec l'esthétique cistercienne.

L'austérité cistercienne se retrouvera dans les religions réformées, luthériennes et calvinistes. Au XVII^e siècle, elle charmera le mouvement janséniste. À l'extérieur des bâtiments, même les bâtiments les plus prestigieux comme le Palais Royal (Figure 5), les murs resteront de la couleur des pierres de construction.

La contre-réforme aura peu d'influence sur la couleur de l'architecture en France.

Inspirés par les Lumières et une vision idéalisée de la République romaine,

⁴ Jian Ming Song, 1993. La couleur dans l'architecture chinoise. Paris: Étude non publiée, réalisée dans le cadre du Conseil scientifique de l'ENSAD. Une édition augmentée est en cours d'élaboration.



Figure 5 (à gauche). Façade du Palais Royal, Paris, coté jardin. Photo: Yves Charnay, 2017.
Figure 6 (à droite). Bâtiment de la Place Dauphine, Paris. Photo: Yves Charnay, 2015.

la révolution de 1789, puis l'Empire, prêchent la vertu et l'austérité. Néanmoins éclot une architecture pleine de « promesse et de magnificence » mais qui ne modifie pas l'expression colorée de la ville!

A de rares exceptions la couleur ne participe pas à la représentation du pouvoir dans la création architecturale. Sous l'influence italienne la couleur fait une timide apparition en France. La façade polychrome de Chambord, au XVI^e siècle exprime la théâtrale vanité de François I^{er}. La Place Dauphine (Figure 6) et la place des Vosges créées sous Henri IV, sont les rares monuments polychromes qui attestent que la couleur n'a pas toujours été bannie de l'architecture officielle. La façade des bâtiments qui entourent la place des Vosges est de trois couleurs, de briques rouges à chaînage de pierre aux nuances ocre et les toits bleu-violet. Sous les voutes situées au rez-de-chaussée des édifices, peintes sur le plâtre, des briques en trompe-l'œil. Cette esthétique est aussi celle de l'hôpital Saint-Louis, construit également sous Henri IV. Cette coloration sera sans lendemain. Une des exceptions, au XIX^e siècle à Paris, l'Opéra, le « Palais Garnier ». Des colonnes en marbre et des inscriptions dorées sur des plaques de marbre de couleur ornent certaines parties de la façade (Figures 7 and 8). L'initiateur du projet, Napoléon III, s'est fait volé la vedette par son architecte, mais est-ce Napoléon qui se représente par cet édifice ou la bourgeoisie qui, par ces ornements dérogeant aux règles esthétiques admises depuis des siècles, exprime de façon tapageuse sa prise de pouvoir?

Les grands travaux de Paris commencés par le préfet Rambuteau, repris et amplifiés par le Baron Haussmann, transformèrent la morphologie de la capitale, mais pas sa couleur. Les carrières de pierre nombreuses à Paris et alentour, offraient aux bourgeois des moyens relativement peu coûteux pour se créer des maisons aux allures de palais (Figure 9). Pour les nouveaux riches, avides de symboles de pouvoir, des sculpteurs dont les œuvres de leurs ancêtres avaient peut-être orné châteaux et cathédrales, inventaient des décors néo-classiques, néo-byzantins ou encore inspirés par la Renaissance.



Figure 7 (en haut). Opéra Garnier, Paris. Photo: Yves Charnay, 2017.

Figure 8 (en bas). Détail de la façade de l'Opéra Garnier, Paris.

Photo: Yves Charnay, 2017.

eux-mêmes. En architecture, cet héritage est aujourd'hui protégé à Paris par une réglementation sévère.⁵ Il est parfois nécessaire pour conserver l'homogénéité plastique des sites de peindre dans une couleur «pierre naturelle» édifices ou éléments d'architecture inconvenants.

L'usage fréquent en France du béton maintient cette esthétique de retenue et de simplicité. L'architecture contemporaine, où l'usage de l'acier et du verre est de plus en plus fréquent, ne conserve pas les nuances tonales mais la sobriété de cette palette.

La ville lumière

Paris prend le titre de «Ville lumière» grâce au lieutenant de police La Reynie⁶ qui,

Le bon goût, la retenue

Il n'est pas de bon ton de faire vaniteusement étalage de sa culture ou de sa richesse. Les signes ostentatoires ne peuvent être «de bon goût». Cette règle, généralement admise, explique en partie le refus de la couleur. Ce trait culturel, aujourd'hui encore, exprime des valeurs esthétiques et sociales issues de la tradition.

La sobriété chromatique du Louvre de Louis XIV (Figure 10) a été respectée par ses successeurs y compris lors les derniers aménagements du musée. La pyramide centrale s'inscrit dans la coloration de l'ensemble. Les pierres donnent au bâtiment sa couleur sans ajout d'un placage de marbre comme le faisaient souvent les romains. Si l'hôtel des Invalides, dans son ensemble est sobre, la chapelle, destinée à honorer Dieu est magnifiée par son dôme doré.

Durant les 2000 ans d'histoire de Paris, les styles ont évolué, se succédant et parfois se superposant, mais l'expression plastique de la ville est d'une grande constance: la couleur est, le plus souvent, celle des matériaux

⁵ En France, dès 1830 est instaurée l'inspection des monuments historiques pour la conservation du patrimoine. On doit en grande partie à Prosper Mérimée d'avoir la réussite de ce projet. Au XX^e siècle des lois contraignantes sont adoptées. Cette préoccupation est reprise par l'UNESCO en 1987.

⁶ C'est au XVII^e siècle que Gabriel Nicolas de La Reynie, premier lieutenant général de police, ap-

à l'époque de Louis XIV, équipa la ville d'un éclairage public. L'image est forte, marque les esprits et s'impose pour longtemps!

Au début du XVII^e siècle, les maisons traditionnelles à colombage présentant des risques de propagation des incendies, les entrepreneurs sont tenus de les recouvrir de plâtre.⁷ Cette façon de faire s'est poursuivie après la révolution, durant le XIX^e siècle. Tous les bâtiments neufs, lumineux, en pierre et en plâtre, contribuèrent à donner de Paris une image de clarté. La ville s'éclaircit mais se colore peu.

La coloration en évolution

Le métal utilisé dans l'architecture à partir du milieu du XIX^e siècle, exige une protection. Les couleurs des peintures utilisées à cet effet seront assez discrètes (Figure 11). Vert, brun et gris seront les teintes dominantes. C'est le vert qui sera la marque colorée des édicules qui apparaissent sur les boulevards et les avenues au XIX^e siècle. Les réalisations récentes de structures métalliques ornementales sont le plus souvent chromatiquement neutres ou, comme celle d'un bâtiment du ministère de la culture, réfléchissantes.

Au tournant du XIX^e et du XX^e siècles, une mode néo-byzantine fit une courte apparition sur les mosaïques des églises. Les couleurs ornementales des céramiques de l'Art nouveau apportèrent aussi, brièvement, un peu de couleur raffinée. Mais la publicité naissante va recouvrir les murs de grandes peintures aux couleurs disharmoniques.

Le moment de gloire de la brique comme matériau de construction a été court, mais les résultats brillants (Figure 12). Son retour en grâce chez les architectes est tardif. A partir du XIX^e siècle, la

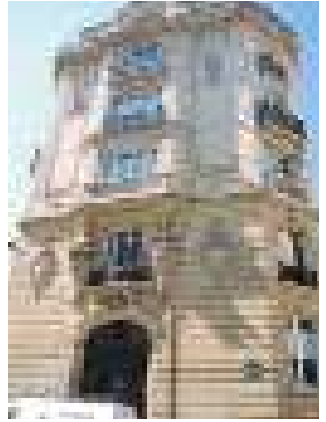


Figure 9 (en haut). Immeuble bourgeois dans le quartier de Montparnasse. Photo: Yves Charnay, 2014.

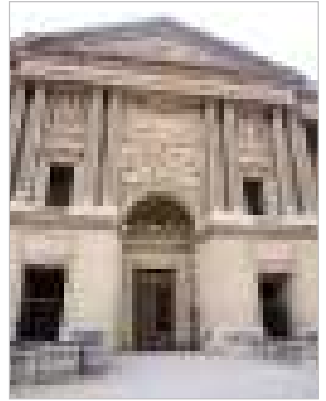


Figure 10 (en bas). Entrée principale du Louvre historique de Louis XIV. Architectes: Louis Le Vau et Claude Perrault. Photo: Yves Charnay, 2016.

porte l'éclairage public à Paris. On lui doit donc le terme de Paris « Ville Lumière », car Paris fut la première ville qui utilisa les lampadaires dans les rues.

⁷ Les maisons du Moyen Âge dite à « colombages », sont composées d'un rez-de-chaussée en pierre et d'une structure de poutres dont les interstices étaient comblés par un aggloméra de matériaux. Le plus souvent ces structures ont été recouvertes de plâtre qui masquait les poutres, ce qui donnait un aspect très blanc à la ville. La plus vieille maison de Paris existant encore est en pierre. Elle date de 1401. Elle se trouve au 51 rue de Montmorency. Elle appartenait à une personnalité célèbre : Nicolas Flamel. Une rumeur veut que sa richesse provienne de sa connaissance du secret de la « pierre philosophale » qui lui aurait permis de fabriquer de l'or.



Figure 11. Immeubles de bureaux. Rue Réaumur, dans le 2^e arrondissement, Paris. Photo: Yves Charnay, 2016.

brique, ocre rouge ou ocre jaune, très peu employée pour l'habitat bourgeois, sert à la réalisation de bâtiments industriels, puis de quelques édifices publics comme les écoles ou les mairies de la république. Son usage se répand surtout à partir du début du XX^e siècle, pour des immeubles d'habitation destinés aux classes «sociales laborieuses» (Figure 13). Ces bâtiments se trouvent surtout en périphérie de Paris, là où se trouvaient des terrains en déshérence après la démolition des fortifications, et en banlieue. On parlera de la «ceinture rouge» de Paris, unissant dans une même expression, la couleur dominante des bâtiments et la teinte politique des banlieues ouvrières qui votaient socialiste et communiste. Cette distinction sera revendiquée architecturalement pour des réalisations comme les gratte-ciel d'Ivry.

Après la seconde guerre mondiale, le béton remplace définitivement la pierre

et la construction à partir d'éléments préfabriqués une nouvelle esthétique s'impose. Des formes sobres, simples et le plus souvent sans couleur, vont accélérer la disparition des ornements. L'expérimentation de coloration de l'habitat, malgré les efforts de Le Corbusier, n'aura pas beaucoup de succès. Mais les tentatives des années cinquante et soixante ne sont pas très convaincantes, car elles vulgarisent la couleur qui s'affiche seulement, en définitive, sur les immeubles des plus pauvres, comme pour les stigmatiser. Les essais de coloration s'effectueront essentiellement sur des bâtiments hors de Paris, des logements construits avec la participation de l'état et des régions à destination des classes populaires.

«L'esthétique du vrai» remise en cause

Les dérogations à «l'esthétique du vrai» comme l'avait définie Bernard de Clairvaux, sont nombreuses aujourd'hui. La pierre agrafée revêt les murs de nombreux bâtiments (Figure 14) et notamment des édifices prestigieux comme la Grande Arche de la Défense ou l'Opéra Bastille. La rigueur, sur laquelle était fondée l'esthétique en art, semble ne plus porter l'imaginaire des architectes. Reste la sobriété des bâtiments revêtus de verre sur lesquels se reflètent les immeubles alentour et le ciel! Est-ce un geste de dérision pour renvoyer à Dieu sa lumière? (Figure 15)

Dans les années soixante-dix, des réalisations exceptionnelles semblent marquer un tournant : le Centre Pompidou des architectes Roger et Piano (Figure 16), les bâtiments d'Aillaud à la Défense ou, plus tard, les «Folies» de l'ar-



Figure 12 (à gauche). Institut de Géographie, Université de Paris. Photo: Yves Charnay, 2017.

Figure 13 (à droite). Immeubles d'habitation de la Ceinture Rouge de Paris. Photo: Yves Charnay, 2015.

chitecte Tschumi à La Villette. Ces innovations semblent avoir marqué le début d'une nouvelle conception de l'esthétique architecturale à Paris. Les constructions datant de ces dernières années présentent une diversité d'aspect qui ne correspond plus à l'esthétique traditionnelle. La cohérence plastique qui a caractérisé Paris disparaît. La zone du 13^e arrondissement où a été construite la nouvelle Bibliothèque nationale, est en chantier depuis plus de quinze ans. Les bâtiments se revêtent des couleurs les plus diverses, vert, rouge, noir brillant, bleu... (Figures 17–21)

La couleur c'est la vie

A Paris la couleur se situe toujours principalement au niveau de la rue, au rez-de-chaussée des immeubles. Les façades ornées de certains commerces sont encore visibles aujourd'hui dans le centre historique de Paris comme la pâtisserie Stohrer, rue Montorgueil. Les couleurs des boiseries comme les portes cochères (Figure 22) ou certaines enseignes de magasin, sont colorées, parfois avec éclat. Le renouvellement nécessaire de la peinture autorise des variations colorées parfois assez vives. A l'entrée des édifices publics, trois petites notes de couleur : le drapeau français. Le mobilier urbain à partir du XIX^e siècle sera à dominante verte, comme les bancs et les kiosques. Les stores des cafés sont en général de couleurs vives, parfois rouges ou bleus (Figures 23 and 24). Les moyens de transport, voitures particulières, les camions, autobus, sillonnent les rues avec leurs couleurs dysharmoniques.

Aujourd'hui, des peintures murales apportent une polychromie forte dans certains quartiers (Figure 25). Dans le quartier de La Défense (Figure 26), comme dans le Paris historique (Figure 27), les fortes colorations sont près du sol.

Reste encore tout l'univers de l'éphémère et du saisonnier, les affiches, les magazines sur les kiosques, les marchés, la végétation et, bien sûr, à partir du printemps, en même temps qu'éclosent les premières fleurs, les couleurs des vêtements (Figure 28, 29 and 30)!

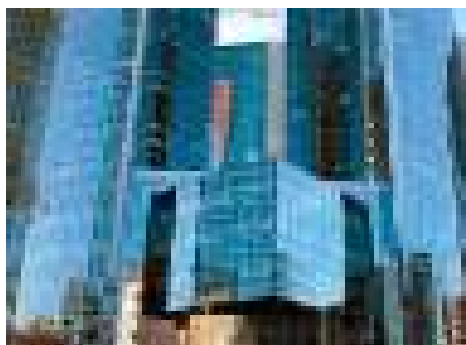


Figure 14 (à gauche). Revêtements de pierre agrafée. La Défense, Paris. Photo: Yves Charnay.

Figure 15 (à droite). Bâtiments revêtus de verre. La Défense, Paris. Photo: Yves Charnay.

Les couleurs du soleil

Depuis les années soixante, sous l'impulsion d'André Malraux, les immeubles parisiens sont restaurés et ravalés. La ville redevient lumineuse, comme elle l'était lors des grands travaux de construction au XIX^e siècle.

Le soleil, le soir, teinte à nouveau d'or et de rose les façades et les statues des parcs, fait briller la verrière du Grand Palais et le dôme d'or des Invalides.

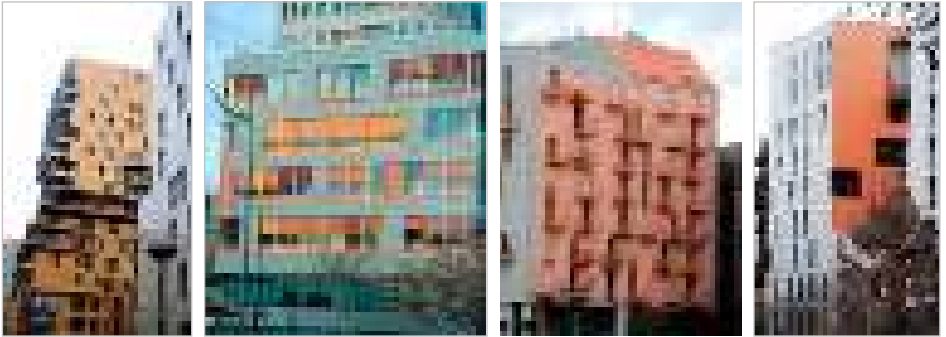
Les couleurs de l'eau

Alors que, le plus souvent, la fonctionnalité des voies fluviales fait oublier leur dimension esthétique, la Seine a été intégrée à l'évolution esthétique de Paris! Est-ce dû à ses proportions, à la nature de ses berges ou à la singularité de son parcours? Est-ce la décision d'Henri IV en créant le Pont Neuf et



Figure 16 (à gauche). Le Centre Pompidou fête ses 40 ans en 2017. Photo: Yves Charnay, 2014.

Figure 17 (à droite). Paris Rive-Gauche, 13^e arrondissement. Photo: Yves Charnay, 2013.



Figures 18, 19, 20 et 21. Paris Rive-Gauche, 13^e arrondissement. Photo: Yves Charnay, 2013.

la place Dauphine qui donna à la Seine une place si remarquable dans le paysage parisien? (Figure 31). La création du Pont Neuf a ouvert un espace d'où on voit le soir rougir le fleuve sous les feux du soleil couchant et, la nuit, se refléter les lumières des bâtiments et les scintillements de la Tour Eiffel.

Les couleurs du ciel

Le ciel de Paris lumineux parfois se voile de nuages comme «pour protéger l'intimité des habitants» disait une chanson. Avant le toilettage des façades, les rues de Paris étaient sombres, grises de crasse. La fumée des cheminées des fabriques et des habitations, puis des industries et, plus tard, la pollution automobile avait assombri la ville. Aujourd'hui, les façades nettoyées des bâtiments sont plus sensibles aux variations de la lumière. Elle illumine les toits, le gris clair du zinc, la pierre des Palais, les tours de Notre Dame,... Le ciel se reflète parfois sur les pavés mouillés nuançant la ville d'harmonies douces et vaguement mélancoliques (Figure 32). Les nuages dans le ciel de Paris ne cachent pas la lumière, ils la tamisent, ils la diffusent adoucissant les contrastes excessifs. Une lumière douce qui illumine même les rues étroites, les passages discrets où se retrouvent les amoureux, les cours pavées où les enfants jouent à «chat perché». Le ciel de Paris est un thème fort de la chanson française. Une chanson des années cinquante, chantée par Edith Piaf



Figure 22. Une porte cochère près de la place des Victoires, Paris. Photo: Yves Charnay, 2014.



Figures 23 and 24. Les cafés colorent le paysage de la rue. Photo: Yves Charnay, 2015.



Figure 25. Peinture dans le 13^e arrondissement de Paris.
Photo: Yves Charnay, 2017.

et Juliette Gréco, exprime cette douce mélancolie, son titre : «Sous le ciel de Paris».⁸

⁸ « Bluesy» (Paris sous la pluie) de Michel Fugain, «Pluie sur Paris» de Anne Vanderlove, «La pluie fait des claquettes» de Claude Nougaro, ... la plus célèbre: «Sous le ciel de Paris», chanson de 1951, auteur: Jean Dréjac, Compositeur: Hubert Giraud, chanté notamment par Edith Piaf et Juliette Gréco (extraits):

« Sous le ciel de Paris
S'envole une chanson

... »

« Elle est née d'aujourd'hui
Dans le coeur d'un garçon
Sous le ciel de Paris
Marchent des amoureux

.... »

« Leur bonheur se construit
Sur un air fait pour eux »
« Sous le pont de Bercy
Un philosophe assis
Deux musiciens quelques badauds
Puis les gens par milliers
Sous le ciel de Paris
Jusqu'au soir vont chanter

.... »

« L'hymne d'un peuple épris
De sa vieille cité

... »



Figure 26 (à gauche). Sculpture de Calder sur la dalle de la Défense. Photo: Yves Charnay, 2008.

Figure 27 (à droite). Fontaine Stravinsky de Jean Tinguely et Niki de Saint Phalle. Photo: Yves Charnay, 2016.



Figure 28 (à gauche). Colonne Morris. Photo: Yves Charnay, 2015.

Figure 29 (en haut à droite). Rue Montorgueil. Photo: Yves Charnay, 2016.

Figure 30 (en bas à droite). Toiles cirées devant une boutique rue Montorgueil. Photo: Yves Charnay, 2017.

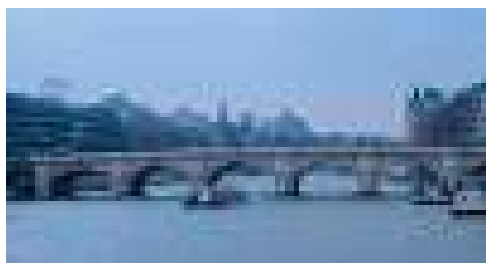


Figure 31 (à droite). Le Pont Neuf vu de la Passerelle des Arts. Photo: Yves Charnay, 2015.

Figure 32 (à gauche). Rue Saint-Sauveur, 2^e arrondissement, Paris. Photo: Yves Charnay, 2015.

Новые цвето-световые качества материала в архитектуре и их влияние на городское пространство

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Аннотация

Начиная с 1990-х годов значение цвета в архитектуре заметно расширилось за счет повышенного внимания к нему архитектурных бюро с мировой известностью, таких как Зауэрбрух Хаттон, Стивен Холл, Херцог и де Мерон, Жан Нувель, UNStudio, Фрэнк О. Гери, Заха Хадид, Жакоб + МакФарлан. Это впечатляющее развитие не удовлетворило в высшей степени избирательный взгляд современных художников и дизайнеров освещения, которые начали работать параллельно или в сотрудничестве с архитекторами, а также взыскательный вкус особых клиентов. Повторяя за модой, дизайном, фотографией, сценическим искусством, перенимая авиакосмические, цифровые и инженерные технологии, архитектурная практика все же признала новые и неоднозначные возможности цвета. Яркие, насыщенные оттенки отчетливо выразили желание соблазнить, стремление к умиротворенности, легкости, богатству, удовольствию, роскоши и свободе. В сочетании с новыми возможностями полупрозрачных и прозрачных материалов, отражающих глянцевых или матовых поверхностей, усиленный за счет использования сложных фактур и окрашенного света, архитектурный цвет теперь не просто меняет вид и создает дополнительные эффекты, он еще и расширяет семантику, семиотику и культурный смысл. Тем самым цвет существенно влияет на облик городского пространства, атмосферу жилой среды и архитектурное окружение.

New Colour-Light-Material Tendencies in Architecture and Their Impact on Urban Space

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Abstract

Since the 1990s, the meaning of colour in architecture has been extended through the refined sensibilities and research of internationally renowned architecture offices, such as Sauerbruch Hutton, Steven Holl, Herzog & de Meuron, Jean Nouvel, UNStudio, Frank O. Gehry, Zaha Hadid, and Jakob + MacFarlane. This impressive development has been underscored by the highly selective eye of contemporary artists and lighting designers working in parallel or in collaboration with architects, as well as the emerging consciousness of special clients. Borrowing from fashion, design, photography, performing arts, as well as aerospace, digital, and industrial process engineering technologies, architectural practice has acknowledged further and contradictory possibilities for colour. Distinctive, saturated colours vividly express the will to seduce as well as the desire for great comfort, ease, wealth, pleasure, luxury, and freedom. Combined with new aspects of translucent or transparent materials and reflective, glossy, or matte surfaces, as well as being enhanced through the use of sophisticated materials or coloured lighting, colour has not only been made to change its appearance and effects, but also extend its semantic, semiotic, and cultural meaning. Thereby, architectural colour substantially impacts the appearance of urban space, the atmosphere of living surrounds, and the built environment.

The Search for Atmosphere

Dealing with daylight in architectural environments has always been a main objective of architectural practice; however, in contemporary architecture this seemingly everyday concern has become underscored by the expectation of novelty and innovation. Architects and artists, often in collaborative works, e.g., the Novartis Campus Forum 3 (2005) in Basel, Switzerland, by Diener & Diener or Forum 2004 Building and Plaza (2004) in Barcelona, Spain, by Herzog & de Meuron use traditional or innovative surface textures and specific material qualities in order to deal with daylight and colour in a dynamic way. Seemingly paradoxical means—such as transparency and opacity, glossiness and roughness, reflection and superposition—shape daylight and make colour emerge, space appear or disappear, and appearance change, giving a varying ambience to a particular place or space (Schindler et al. 2011).

In developing the concept for the façade of the Novartis Campus Forum 3, architect Roger Diener chose to work with coloured glass as a means of addressing the origins of the Novartis firm in the synthetic dye industry. The result of a collaboration with artist Helmut Federle, together with architect Gerold Wiederlin, the façade entails three vertical layers of 1,200 superimposed differently-coloured and -dimensioned transparent glass panels (twenty-one different hues and twenty-five different dimensions) supported by a complex metallic structure. The frameless panels mirror the landscaped surroundings and reflect the fluctuating sunlight, whereby direct illumination causes the colours to completely dissolve under the blazing white light; at the same time, the lucent colours and multiple reflections of panels in the shadows appear mysteriously



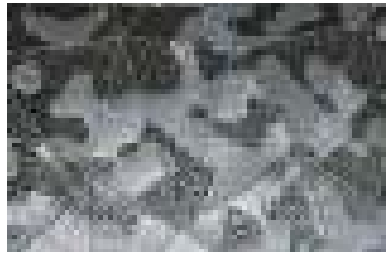
Figure 1. The complexity of the threefold glass panel structure wrapping the volume's façade blurs the virtual and the real. Novartis Campus Forum 3, Basel, Switzerland, 2005, by Diener and Diener. Colour Concept by Helmut Federle and Gerold Wiederlin. Photo © Verena M. Schindler, 2008.

intriguing and emphasize the complexity of the façade's intricate structure (Figure 1). The appearance is like the fragile shimmering scales of a butterfly's wings. In effect, the skin is much more than a simple protective wrap or barrier. It is a permeable membrane allowing passage between inside and outside. On the one hand, the scaled, subtly coloured envelope is wrapped around the building in a refined manner like a water-coloured and translucent garment substantially transforming the Novartis Campus Forum 3's exterior appearance. On the other hand, tinged daylight enters the interior spaces, drastically changing their ambience. Transparency is here constructed by dissolving materiality into colour.

The Forum 2004 Building and Plaza (2004) in Barcelona, Spain, by Herzog & de Meuron demonstrates how traditional techniques (rough coating) combined with new ways of dealing with materials and finely tuned nuances produce a unique and enigmatic atmosphere. Combinations of smooth glass cladding and rough coatings, glossy and matt materials, plain and fragmented surfaces enhance or soften the pleasurable play of light, shadow, and colours in space and time. The Forum 2004 Building and Plaza was built on a so-called '*terrain vague*', a no-man's land with industrial facilities, and was intended to integrate a newly planned urban area of the city. The elevated flat triangular volume of the Forum 2004 Building and Plaza is located on an open public space at the very end of the Avinguda Diagonal where it meets the Mediterranean coast. The exterior

of the Forum 2004 Building itself has been sprayed in a surprisingly thick and rough way. This kind of extremely coarse-textured coating, also used in tunnel construction, contains luminous blue-coloured pigments that change the appearance of the building from ultramarine blue to blue, violet or almost black, depending on the incidence of light (Circa Drei 2005). The public areas on the ground level covered by the elevated volume are conceived as partially walk-through spaces (Figure 2). Extensive glazing forms transparent and reflective sidewalls combined with walls clad with stainless steel panels. The embossing pattern on the panelling structure, derived through photography of a glittering surface of water, is also found in the interior and exterior ceilings as well as in some irregularly cut light wells open to natural light from the sky (Figures 3 and 4). Colours, patterns, materials, and light reflections fragment the spaces, blurring all reference points of orientation, which submerges the visitor in a mysterious underwater-like environment.

Although it seems apparent the colour and light certainly contribute to creating the atmosphere of the built environment (Schindler 2017, Cler et al. 2012), how exactly is this atmosphere constituted? What is it, what touches us most of all? Raising the question of this often neglected topic, Peter Zumthor asks himself: "Is it the atmosphere, the magic of a place, the energy of colours and lights that affect and put people in a particular mood?" In response to his own question, Zumthor answers: "Everything! Everything! Things, people, the quality of the air, the light, the sounds, tones and colours." (Zumthor 2005: 19) In fact, all things together constitute the living environment, the human habitat. The architect, however, states that colours and lights are only magic for a place if they are able to enhance and inflame human sensations: "For me, the magic of the real is this 'alchemy' of transforming real substances into human sensations,



Figures 2, 3 and 4. View to the partially walk-through spaces on the ground level and the blue-coloured elevated volume (top). Light well in an ambient, aquarium-like space at the coastal location (centre). The embossing pattern on the panelling structure, derived through photography of a glittering surface of water (bottom). Forum 2004 Building and Plaza, Barcelona, Spain, 2004, by Herzog & de Meuron. Photo © Verena M. Schindler, 2008.

this specific moment of emotional appropriation or seizure of material, matter and form in architectural space.” (Zumthor 2005: 20) This specific moment experienced physically in a spatial environment represents indeed a magic moment in which the immediate reality is perceived filled with sensorial qualities, and evoking emotions or feelings such as harmony, coherence, comfort, or well-being. Through identity, memory, culture, imagination, presence, the encounter of the viewer’s mind with qualities of the architectural body through light, colour, material, texture, scale, temperature, odour or sound results in an interaction, which can create the experience of a mood or an atmosphere.

Material with New Chromatic Qualities

During the 1990s, newly introduced opalescent materials with a metallic shimmer generated an appearance of the architectural façades whereby light interacted with colour on the surface to making the image of the façade fluctuate depending on the viewer’s position. Ranges of saturated colours combined with polished or matte surfaces of solid or transparent materials resulted in striking architectural exteriors.

Subsequent developments over the following years have led to new materials with optical properties that not only increase the effects of light, but also create a fluctuating palette of different hues. So-called ‘effect pigments’ with pearl and iridescent qualities lend a characteristically illusive depth to the coloured surface, which achieves full effect when the viewer is in motion. Depending on the angle of sight, hues shift and the building changes its colour. In this sense movement has become an essential element structuring the chromatic perception of the built environment (Cler et al. 2011).

An example of new materials causing an array of colours is the façade of the office complex La Defense (2004) in Almere, Netherlands, by UNStudio (McLachlan 2017: 33). Integrated in a larger urban plan, the façade framing courtyards (i.e., not those facing the streets and public space) are clad in glass panels integrating thin films that filter natural illumination to produce a quality of light that is perceived as highly saturated and multi-coloured. Depending on the intensity and orientation of sunlight, daylight, or so-called natural light, illumination and reflections are captured and modulated. The resulting effects of such ephemeral and transient aspects not only enhance the intensity of the colours of the architecture and its environment, but also the fragility, ambiguity, and evanescence of the ambience. In this project daylight is used to derive great effects, which have been achieved by expressively activating and energizing colours.

Another case of attaining a rainbow of effects by applying new materials in a striking way is I’M Architecten’s employment of 3M™ Dichroic Glass Finishes at a façade forming a kind of courtyard of the L’Arc-en-Ciel office building (2004) in Deventer, Netherlands (Figure 5). Especially since the street façade is executed in commonly used red brick, the glass façade has an amazingly brilliant effect, its saturated colours shifting depending on the viewing angle. The reverberating colours also strongly impact the immediate surroundings. Contemporary architecture is far from the premises of Le Corbusier, one of the most

influential thinkers about natural light and colour in Modern architecture, who thought architecture to be “the masterly, correct and magnificent play of masses brought together in light” (Le Corbusier 1927: 31, Schindler 2003).

A contemporary interpretation of Le Corbusier’s premise can be found in the Youth and Cultural Centre (2009) in Herblay, France, by Quintet Architecture and Urbanism, Patrick Ben Soussan and Flore Bringand. The building’s volume is brought together through a colour concept of distinctive, saturated colours combined with aspects of reflective, glossy, and matte surfaces. The magnificent play of light with the chromatic and polished surfaces substantially impacts the architectural volume, changing the appearance and varying the ambience of the particular place and surrounds.

The Youth and Cultural Centre (2009) is not a building that imposes itself on the landscape, but rather an interactive surface-volume with neither windows (on two sides) nor traditional roof created by the architects to be highly responsive to the surround. Like sculpture in a park, the building dissolves into colours and the surface-volume becomes a form of abstraction. This effect, however, was not achieved so easily. As the architect explains, “We [decided to] work with a colour consultant because choosing the particular shades proved to be difficult, and we found ourselves hesitating to decide. They [colour consultants] have knowledge of technical aspects that were absolutely critical to the project... of colours, usage, and aging.” (Hugron 2009) The final colour concept of the building was refined in collaboration with Atelier Cler, Paris (Figure 6). The main façade is composed of a vertically striped cladding with a pattern created by shiny stainless steel alternating with varnished steel in eight carefully selected colours: plain red, orange, golden yellow, lush green, saturated green, blue, dark blue, and grey. Grey is used to render a matte quality in contrast to glossy mirroring surfaces. The coloured stripes of irregular length, but even width, are playfully and rhythmically positioned like keys of a huge piano. The corners of the building are accentuated with continuous reflecting metal cladding lending visual lightness to the volume. Through the subtly varying play of light and colours, sometimes the building dissolves into the landscape. At other

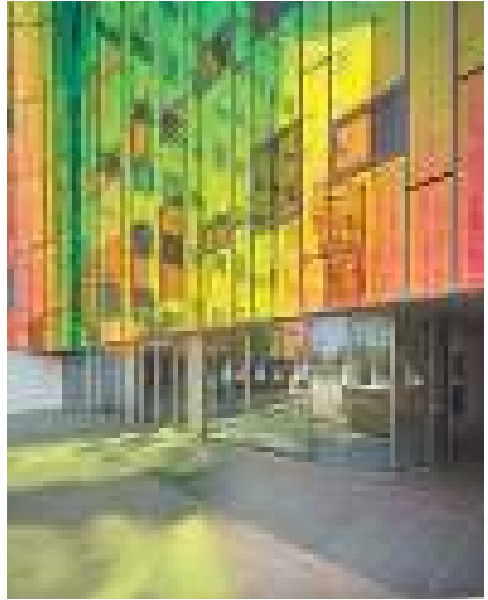


Figure 5. L'Arc-en-Ciel office building, Deventer, Netherlands, 2004, by I'M Architecten. Photo © Norbert van Onna, Architectural Photography, Archehov Publishers, 2004.



Figure 6. Youth and Cultural Centre, Herblay, France, 2009, by Quintet Architecture and Urbanism, Patrick Ben Soussan and Flore Bringand. Colour concept designed in collaboration with Atelier Cler, Paris. Photo © Luc Boegli, 2009.

times, the shiny surface turns blue or reflects the immediate ground, vegetation, and sky. The two accesses to the building are enhanced through the application of strong, luminous red.

Colour-Light Environments

LED (light emitting diode) lighting technologies as well as digital screens and smart light art covering the complete height of building façades have completely changed the presence of architecture at dawn, dusk, and in the night. A truly trend-setting architectural project featuring colour animated by the application of LED lighting is the new façade (2004) of the Galleria Department Store in Seoul, Korea, by UNStudio (Schindler 2016a: 18). Mounted on the building's pre-existing concrete façade, a total of 4,330 non-translucent glass discs include special dichroic thin-film filters that generate a mother-of-pearl effect during the day, while during the night each glass disc is lit by LED lights that have been digitally programmed to create a variety of astonishing changing colour-light effects.

Over the past fifteen years investigations exploring LED as well as flexible plastic-based OLED (organic light emitting diode) technologies have revolutionized screens and displays of all sorts. The first such gigantic urban screen and outdoor media stage is integrated into the façade of the seven-storey cylindrical NASDAQ MarketSite tower (1999/2000) by Fox & Fowle at the northwest corner of the 48-storey Condé Nast Building by the same architect at Times Square in Midtown Manhattan, United States (Gasparini 2017). The façade screen of NASDAQ MarketSite broadcasts market quotes, financial news, and advertisements. A television studio with a wall of monitors and an arc of windows looking out onto Times Square at the ground floor of the tower adds to the overall ambience. Becoming a major trend, dynamic lighting systems, smart lighting, media façades, and interactive screens have become both a commercial tool as well as a

media-driven obsession. Often irritating and overwhelming the senses, now such artificial colour-light applications are commonly part of urban life experience. Not only installed for fixed commercial advertisements, they are used as well in temporary large-scale events, e.g., *Nuit Blanche* (e.g. in Paris), Light Festivals (e.g., *Fête des Lumières* in Lyon), New Year's Eve celebrations or for demonstrations of solidarity and other mass events performed in public space outdoors. The commercial or entertainment factor calls for rapid change effects and intense, short interventions: slick advertisement and fashionable fun are combined in the tradition of Las Vegas. As a result, urban space is visually de-constructed to the point of annihilation being used as a media-imposed stage for fluctuating screens rather than a background and platform for human presence and exchange. Often architectural façades are used as screens for digitally programmed gigantic performances and projections whereby original colours are either masked or distorted by artificial coloured lighting to the extent that they are no longer recognizable (Schindler and Cler 2009).

Artists have also been applying colour-light installations creatively in open spaces and on the façades of buildings. One such example is Yann Kersalé's light sculpture *L'Ô* (2006), which is located in the garden of the Musée du quai Branly – Jacques Chirac in Paris, France. Plexiglas tubes with light LEDs are guided by a digital thermometer so that as night falls and the light evaporates from the glass stems, the white colour changes from blue to green according to shifts of temperature. Anchored to the ground and scattered throughout the vegetation, at night, the tubes' light scatters over the vegetation and projects luminous bluish, greenish, purplish halos onto the underside of the building (Schindler 2014). The light sculpture irradiates a mysterious aura onto the place, transforming it to an imaginary damp, cool grotto.

Coloured light installation artist Nathalie Junod Ponsard aims to disturb common perception of familiar objects or buildings in order to disrupt the automatism of everyday life experience. The forceful poetry of her work inflames potentialities for the rediscovery of a new sense of place. *Crépuscule persistant* (2010) at Place André Malraux in Paris, France, is integrated into an existing water fountain built in 1874 that embellishes the public square in front of the Comédie Française (Figure 7). Water pours into a small basin, intermingles with coloured light to flow as a waterfall down into a main basin and further to the ground basin. The effect is dramatic when the underwater green-blue and red

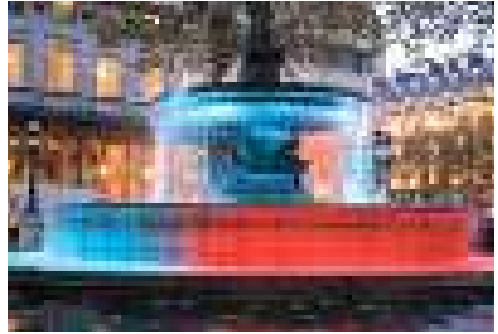


Figure 7. *Crépuscule persistant*, permanent light installation, Place André Malraux, Paris, 2010, by Nathalie Junod Ponsard, integrated in an existing water fountain built in 1874. Photo © Nathalie Junod Ponsard, 2010.

lights perform their dance turning in a dual circular movement, rapid at the top and slow at the bottom. Motion and coloured lights mark time and literally manifest a clock-like persistent rhythm from dusk to dawn, creating an atmosphere of transition, evanescence, and fugacity. The coloured light installation breathes new life into an urban fixture, which with time had become uninteresting, irrelevant, and almost invisible, and has been revealed to be rather poetic, strange, and extraordinary.

The Skin as an Architectural Concept

As interpreted and applied in architecture, the notion of the skin has led to new understandings and treatments of the façade today. Contemporary architects, in collaboration with manufacturers of new materials, structural engineers, heating and cooling technology specialists, lighting designers/engineers, graphic designers, botanists, and artists, demonstrate in a wide variety of exciting ways how these new treatments essentially concern colour.

Considered like skin, the colour effects of new façades have become, e.g., huge screens changing colours via digital programmes, transparent glass membranes reflecting fluctuating colours, and dense tapestries of living vegetation. Are the colours and effects of new skins in harmony or at odds with the geographical, cultural, and social context? What properties of façades do decision-makers currently privilege? Are materials and effects of the façade understood in terms of colour range choices and their implicit and explicit identities? What are some arguments for justifying the transformation of the simple, traditional façade into a costume, mask, mirror, or membrane? Are these possibilities addressed as mere phenomena of appearance, i.e., as illusions that amount to misleading statements about the importance of context and performance in the lived experience of everyday life in the city?

Like a skin, the colour of private and public buildings forms part of the city's identity. And, every city has its own dominant colour appearance. Some cities are built with local materials revealing a specific chromatic appearance. In France, Aix-en-Provence appears golden ochre, Clermont-Ferrand is dark purplish, and Thionville, rosy, being constructed with rosy sandstone from the Vosges. As well, Paris has its own chromatic appearance, which ranges from whitish, pale to middle yellow ochre due to the limestone building material taken from the quarries underneath the city or to 'fake' materials aiming to imitate the natural stone (Cler 2011: 188).

For a number of years now the city has served as an open-air showcase for novel ways to intensify the relationship between architecture, colour, and urban greenery. Jean Nouvel's Musée du quai Branly – Jacques Chirac (2006) in Paris, France, is a key such project because of its exceptional chromatic palette ranging from dense browns and warm earthy reds to light ochre yellows. Applied in the middle of limestone Paris, the façade facing the garden—and further beyond, the Seine River—includes fully glazed infill walls covered with translucent jungle-green sheet films that alternate with the coloured boxes (Schindler 2010: 33). As well, a new trend in contemporary architecture is to integrate more and more

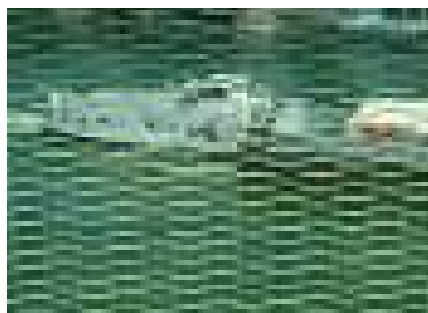
green vegetation, not only as an element of composition, but also on walls and roofs. Thereby architecture blends with its surroundings or becomes a piece of nature itself. Developed by French botanist Patrick Blanc, his 'green walls' (*murs végétaux*) are sophisticated pieces of natural 'artwork' combining the notion of micro-biotope with scientifically arranged and systematically irrigated plants on a wall. One such remarkable example of Blanc's 'green walls' in architecture is the 'vertical garden' in the riverside façade of Musée du quai Branly – Jacques Chirac directly facing the street (Figure 8).

Here vegetation does not undergo substantial rhythmic chromatic variations in accordance with the season; rather these vegetal compositions on buildings are artificially maintained. As 'evergreen' coverings they have become constant elements of the architecture itself, as well as a permanent part of the urban landscape as a whole.

The underlying strategies of the investigation of 'green' in architecture range from using plants as the inspiration for form and colour—including as a simile and even a metaphor fuelling the very design concept—to literally using the living vegetation as a constituent material in the architecture. Under the label of sustainability, the roof is considered as the fifth façade and turned into a green space or prairie, as, e.g., at Les Docks – City of Fashion and Design (2008) by Jakob + MacFarlane architects (Jakob + MacFarlane 2007). Located on the left bank of Paris (Paris Rive Gauche) bordered by the Seine and echoing the vegetal façade of the Musée du quai Branly – Jacques Chirac, Les Docks extends along the riverfront through a new structure, which the architects call a 'plug-over' and grips the sides and top of the concrete structure of an existing industrial warehouse originally built in 1907. An important source of inspiration was the green-coloured, undulating river. The architects also referred to the beautiful green foliage of the trees along the Quai d'Austerlitz. Their aim is to enhance a continuous green landscape, not only through the colour concept of the building but also by incorporating a vegetal roof designed by landscape architect Michel Desvignes, which affords superb panoramic views of Paris. In any case, the green colour of this new architecture contributes to its strangeness. During the day at times it appears to be a kind of olive green, but at other times the appearance changes to a dazzling green. In the interior the 'plug-over' constitutes a huge, high, and irregular vault of a simulacrum of greenery embedded in a



Figure 8. Vertical Garden, 2006, by Patrick Blanc. Musée du quai Branly - Jacques Chirac, Paris, France. Photo © Patrick Blanc, September 2013.



Figures 9 and 10. 'Plug-Over' Interior (top). The green pattern of lozenge-shaped elements is inspired by the reflections as seen on water surfaces (bottom). Façade, Les Docks – City of Fashion and Design, Paris, France, 2008, by Jakob + MacFarlane. Photo © Verena M. Schindler, 2014.

green-coloured illumination (Figure 9).

This mysterious green building provoked a great deal of criticism and had great difficulty in establishing a positive relationship with its neighbours. Yann Kersalé's lighting design transforms the architecture into an even more lively spectacle. At night, the 'plug-over' mutates into a mysterious glowing fire-worm, flooding the river surface and its movements with luminescent green. At dusk, the effect is fluorescent.

Opened to the public in 2012, the green envelope is composed of a glazed, green metallic structure. Invisible from a distance, the glass surfaces are covered with a serigraph showing a mesh pattern of green lozenge-shaped elements inspired by the reflections as seen on water surfaces (Figure 10). The overall effect created expressly by the architects is achieved by a dynamic and disturbing skin with associations to water and nature.

Especially revolutionary, however, is a new ecological approach based on green algae. XTU Architects use living green microalgae to create bio-reactive façades. The projects by the Paris-based office, founded by Anouk Legendre and Nicolas Desmazières, can be considered as ultra-futuristic and utopian. They imagine that in the near future entire floating cities will exist as environmentally friendly, non-polluting, and self-sufficient eco-systems. XTU proposes a bionic concept, a synthesis of architecture and agriculture, for sustainable cities (Schindler 2016b). Being the niece of agronomists and mother of a biologist, Anouk Legendre has conceived the photosynthetic bio-façade, a sort of vertical green-

house where CO₂-absorbing planktonic algae are cultivated, providing an oleaginous biomass rich in oxygen. In the intermediate cavity of the glazing units of the photo-bioreactors, there is not only flowing air but a microalgae culture. The Algo House, a building with a 1,000 m² laboratory open to residents, entrepre-

neurs, researchers, artists, or otherwise, will feature such a bio-façade with photo-bioreactors, developed by XTU and the SymbIO2 consortium. The Algo House is one of three buildings at the site for the In Vivo project master plan. In 2016 In Vivo won the Réinventer.Paris (Reinventing Paris) competition for the Paris Rive Gauche site M5A2 (Figure 11).

Exposed to light, the double-skin façade serves as a vertical farm of living micro-organisms. They also act as thermal regulators optimizing energy performance in the building. Depending on the time of day, they are more or less opaque according to the density of the biomass, and thereby serve as a dynamic solar shading device. In this system, the curtain wall forms a symbiotic connection with the building. Collected daily in the late afternoon, the living biomass from algae can then be used for commercial purposes, e.g., in pharmaceutical, cosmetic, and food processing, as well as biofuels and bioenergy industries. The non-polluting city of the future imagined by XTU is composed of two different types of buildings. The first type is built with photosynthetic bio-façades of microalgae, as described above. The second is made using special green concrete, whose surface can be used to grow CO₂-absorbing vegetation.



Figure 11. Algo House (foreground), In Vivo Green Project, Paris, France, 2016. Rendering © Anouk Legendre and Nicolas Desmazières, XTU Architects, 2016.

Colour: the Essence of Architecture After All

Demarcating the surfaces of building façades, saturated, bright, vivid colours arranged in combination with the selective hues of building materials have led to a change of meaning: Colour is no longer considered as a feature of underdevelopment, poor conditions, commercialism, exoticism, or attracting tourists. Colour has become a powerful design feature aimed at creating atmosphere, defining place, promoting sustainability, and infusing beauty and elegance into architecture and the urban environment. Carefully selected colour ranges vibrantly express the desire for great comfort, ease, wealth, pleasure, seduction, luxury, and freedom.

The office building Am Rietpark (2014) in Schlieren, Switzerland, by SLIK Architekten, is located along the railway line connecting the city of Zurich with Bern, Geneva, and Basel. The predominant but noisy location called for a special solution. While insulating glass façades have proved to be highly effective in reducing sound, such a solution would have produced an unremarkable, common building. What is notable about the final design is the colour concept *Iris* created by artist Kerim Seiler (Figure 12)



Figures 12 and 13. Colour concept *Iris* by artist Kerim Seiler (top). The colours of the lamellae shutters create a poetic atmosphere in the interior space (bottom). Am Rietpark D office building, Schlieren, Switzerland, 2014, by SLIK Architekten. Photo © Tobias Madörin, 2014.

whereby colour was made part of the architectural project. Free to move and be arranged, this outer skin of lamellar shutters painted in saturated colours not only provides a special effect, but also the flexible means of accommodating fluctuating individual needs and desires. Seen from the outside, colour transforms the façade into an interactive membrane with its own autonomous look. On a sunny day, the building turns into a rainbow, an attractively polychromatic volume attracting the attention even of passengers on a passing high-speed train. To protect the artwork from stormy hail and winds, a special control system is directly connected to current meteorological data and would automatically raise the blinds (Arnet 2014) if need be, leaving the volume in its natural, 'naked' state. Depending on sunlight and the inclination of the coloured lamellae, the interior space is entrenched in an unparalleled poetic atmosphere (Figure 13).

As has been summed up by Herzog & de Meuron: "Architecture cannot be neutral" (Ursprung 2002).

Colour not only defines the surface, but makes it dynamically expressive and responsive, like the skin of the human body, i.e., colour not only establishes the surface of a building as a spatial zone, but extends beyond, like a membrane, as an expansion or contraction of the building's periphery. Colours, inevitably not only evoke associations, but affect and challenge individual perception.

For Herzog & de Meuron, a work of art expresses 'creative vitality' and 'perceptual energy' much more than is entailed in the usual mode of perceiving things in everyday life. Why do the architects collaborate with the artist to establish a special colour concept and effects? Jacques Herzog answers, "We are believers of professionalism. Ideally, the 'professional' for words is a poet. Others simply make technical or technocratic use of language, although some are more gifted than others. The same is true of colour. When an architect selects a colour, he does so according to his own taste. There is nothing worse than such recourse to individual taste. If the choice of a given colour (all colours are marvellous) is not conceptu-

ally grounded, what will be missing is forcefulness, precision: all the things that make architecture interesting" (Herzog & de Meuron 2006).

Conventionally, seven colours are attributed to the rainbow, according to Isaak Newton's in association with the musical scale. The French architect and Associate Professor at the Tohoku University of Art and Design Emmanuelle Moureaux, however, endows the rainbow with '100 colours'. Living in Tokyo since 1996, her source of inspiration is



Figure 14. Shimura Branch, Sugamo Shinkin Bank, Tokyo, Japan, 2011, by Emmanuelle Moureaux, emmanuelle moureaux architecture and design. Photo © Daisuke Shima / Nacasa and Partners Inc., 2011.

the dense and complex Japanese city with its multiple layers and colours as well as the Japanese traditional spatial elements such as sliding screens used for dividing spaces. She created the concept of *shikiri* as a basis of her projects, understood by her as 'dividing (creating) space with colours'. In a series of buildings for the Sugamo Shinkin Bank, Moureaux composes with colours in a way like others use musical notes. For the Shimura branch (2011) in Tokyo, Japan, she creates a volume whose exterior looks like a stack of disorderly and horizontally piled layers, that overhang irregularly. Each of the twelve underside surfaces is painted a finely tuned colour that is reflected onto the white surfaces (Figure 14). Beginning with yellow on the ground, her concept 'rainbow *mille-feuille*' develops with orange and pale rose passing over into delicately light green and lush yellow-green and ending up with dark blue and celestial nuances that aim towards the blue of the sky on a sunny day. Enhanced by a 'blue sky thinking', Moureaux designs creatively breaking away from conventional and confined ideas. In this project every nuance has been carefully selected. Plain reds and violets have been avoided, which results in a subtle, elegant, and striking colour harmony that imparts a refreshing atmosphere to the urban surrounds.

Commissioned by the New Taipei City Government in Taiwan in 2011, Moureaux is now realising her colour design 'shine' at an urban and landscape environmental scale on a section of fourteen kilometres of the Circular Line of the Mass Rapid Transit (MRT). Thereby five shades of yellow profound the basis, expressing the reflecting and bright sunshine spreading out across the country.

The use of horizontal stripes is an elemental design feature. A visual variety can be achieved by changes in colour, weight, rhythm, and density. In the work of



Figure 15. Entrance to kindergarten and wing located in the valley. Nanyang Primary School Extension, Singapore, 2015, by Melbourne-based studio505 and local LT&T Architects. Photo © studio505, 2015.

prominent Op Art artist Bridget Riley stripes are recurrent over the past fifty years. Her new series of paintings of horizontal stripes has been exhibit at the Gallery David Zwirner in 2014. An art critic writes: “[...] there is a new series of paintings of horizontal stripes. Predominantly red (though ‘red’ is such a blunt word to describe the cascading tints from coral to violet that we encounter in these pictures), this suite of oil-on-linen panels is much denser and more saturated than her earlier work. They may have less shape-shifting dazzle than paintings such as *Prairie*, but they are arguably more intense, since they contain no ‘still’ or neutral points of black or white upon which the eye can rest. They also feel somehow faster: the stripes appear to swoosh from side to side with great acceleration.” (Sooke 2014)

Bridget Riley describes how she began using colour in her painting in 1967: “Earlier I chose form, and later colour, which I believe to be more precise because it is closer to our experience of the real world. Unstable and incalculable, it is also rich and comforting. For a painter it is an ideal vehicle because it can be both a revelation and merely the surface of things.” (Riley and Kudielka 2009: 126) In 1983, at the time when Riley was exploring the visual effects of horizontal stripes on a canvas, she worked on a commission for the corridors of the Royal Liverpool Hospital. Using a limited palette—dark and light blue intermingled with yellow, white, and shades of red—she created an ambience of light and sun associated with pleasurable sensations that she had experienced while visiting the underground tomb paintings at Luxor in the early 1980s. Recently, Riley received the commission for a new project at St Mary’s Hospital in London, which she completed in February 2014. Here she also used horizontal stripes, changing the density and the rhythm and using a limited palette of purer and brighter colours. As with Herzog & de Meuron, she is interested in the ‘dynamism of visual forces’ created when persons move, walk through the architectural space.



Figure 16. Courtyard of the new wing on the hilltop. Nanyang Primary School Extension, Singapore, 2015, by Melbourne-based studio505 and local LT&T Architects. Photo © John Gollings, 2015.

The presence of horizontal stripes of luminous colours applied to the exterior of the buildings has become representative of an aim towards renewal, dynamism, and rhythm, as in the case of the Nanyang Primary School Extension (2015) Singapore, by Melbourne-based studio505 and local LT&T Architects (Figure 15). Monochrome yellow columns support the bridges that fly over the central courtyard and facilitate easy connections between the two parallel wings of classrooms (Figure 16). The interior of the white classrooms dramatically contrasts with the colourful world of fluid curvilinear shapes covered with seemingly endless horizontal stripes. The colours vivify the building and completely alter the space and the environment (Figure 17) creating a stunning and refreshing atmosphere in which natural greenery adds to the cheerful and pleasant atmosphere.

Concluding Remarks

Are not such colours too powerful to be endured during the whole day? How did it happen that colour has been given such a primordial role? How has the point of view of clients changed so as to accept architects' and artists' proposals for bright, luminous colours? And why? As the architectural photographer Heinrich Helfenstein states, "...the gods are smiling kindly on colour's desire for freedom. For years now, colour has been debated and used in architecture with ever-increasing intensity. Moreover, it is apparent just how open-mindedly, non-dogmatically, and perhaps also light-heartedly, people have proceeded in many cases...." (Helfenstein 2005)



Figure 17. External corridor of the new wing on the hilltop. Nanyang Primary School Extension, Singapore, 2015, by Melbourne-based studio505 and local LT&T Architects. Photo © studio505, 2015.

Because of the capability of colour to surround us fully as we move in it, step out of it, walk through and around it, people are particularly sensitive to colour and the energy that it represents and signifies.

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Хроматические стратегии для статических фасадов с динамическим эффектом

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Аннотация

Современные исследования в области архитектурного дизайна фасадов направлены на развитие активных, адаптивных и динамических фасадных систем. Эти системы отличаются высокой перформативностью, но в то же время являются относительно дорогостоящими и требуют больше обслуживания, чем статические фасады. Иногда динамический фасад невозможно использовать в проекте по экономическим причинам, однако дизайнер хочет добиться динамического эффекта. В этих случаях проектировщики применяют различные замещающие стратегии, например, полагаются на цвет, чтобы получить желаемые эффекты. Цель состоит в том, чтобы с помощью цветовых технологий создать фасад здания, обладающий хроматическим эффектом движения или динамизма, несмотря на то, что его элементы статичны. Культурной основой данного вида дизайна, по всей видимости, является искусство, в частности, оп-арт. Цель статьи – предложить классификацию хроматических стратегий, используемых дизайнерами для достижения динамических эффектов на статических фасадах. В статье будут представлены характерные примеры зданий.

Chromatic Strategies for Static Façades with Dynamic Effect

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Abstract

In the field of architectural façade design, the most advanced research seems to be directed towards the development of active, adaptive, and dynamic façade systems. These are highly performative, but, at the same time, relatively expensive requiring more maintenance than static façades. Sometimes, for economic reasons, a dynamic façade is not really feasible, but the designer still wants to pursue a dynamic effect. In these cases, designers use different strategies, e.g., relying on colour to get the desired effects. The goal is to create building façades that exploit colour technologies to obtain a chromatic effect of movement or dynamism even though they are to be built with static elements. The cultural references for this kind of design seem to be drawn from art, and, in particular, from Optical Art. The aim of this paper is to propose a classification of the chromatic strategies used by designers to achieve dynamic effects on static façades. Significant examples of buildings will be presented.

Introduction

As we all know, colour combinations and contrasts can confer specific effects to an object. You can highlight some parts of it, you can smooth other parts, or you can make it vanish in the context. There are a lot of 'chromatic strategies' used by designers to obtain certain effects. As I stated in other publications (Premier 2012) colour contrasts or colour combinations can be used to create specific effects within the façade of the building, but they can be used also to create a contrast between the overall building and the environment or to harmonize them. One of the most effective examples is represented by a red building in contrast with the blue sky (blue-red: contrast of pure colours) and a red building in contrast with a green lawn (red-green: contrast of complementary colours) (Itten 1973). Another frequent solution is what we call the 'dematerialization of the building envelope': some cladding materials like stainless steel and glass that have highly reflective surfaces can contribute to blend or merge the building into the surrounding environment (i.e. mirror buildings).

These simple strategies are easily suitable for static façade design, but when we deal with dynamic façades the situation is a bit more complicated. Considering only the aspect of the expressiveness of the façade, the movement of the elements is used to create dynamism and the feeling of flux that recalls the concept of liquid modernity (Bauman 2000). The building is constantly changing as well as the society in which we live. For example, we have pixelated dynamic façades like the Pharmacological Research Labs in Biberach (Germany) designed by Sauerbruch Hutton (Sauerbruch Hutton 2012). The façade of the building is composed of adjustable glass louvers like 'pixels' of different colours changing continuously according to their movement. The movement then introduces an increasing chromatic complexity we do not have in static façades.

As stated before, in the specific field of the architectural façade design the majority of the advanced research seems to be directed towards the development of adaptive systems. They are highly performative in terms of shading and heat control and necessary for buildings with large glass envelopes. As it can be easily guessed, dynamic façade technologies are quite complex, relatively expensive and sometimes require much energy to operate. Sometimes, for economical reasons, the solution of a dynamic façade is not really feasible, but the designer wants to pursue a dynamic visual effect through other means. Therefore, in these days we see more and more building façades that exploit colour technologies to obtain a chromatic effect of movement or dynamism even if they are built with static elements. The cultural and visual references seem to be drawn from art, in particular from Optical Art.

Dynamic Façades VS Static Façades: Cultural References

Adaptive systems are necessary to create a building envelope, which is able to react to external environmental stimuli. The building itself has to be able to adapt to different environmental conditions to optimize its performances. The result is that different weather conditions can mean different façade configuration. In the most technologically advanced buildings this goal seems to be achieved mainly

with the façade design. One of the most frequent solutions is represented by 'dynamic façades'. Dynamic façades are characterized by moving elements of different shapes, materials and colours that can be put into action by different technologies such as electrical, mechanical, and smart, or combined together. The effect perceived by the observer is a surface in constant change. Elements of different colours, depending on their combinations, may increase the complexity of the façade. This can be very important, for example, in peripheral or industrial contexts, where the grey tones dominate the environment. A proper sustainable colour design must deal with this problem, creating man-made artifacts able to enhance environmental quality through the use of special colour strategies.

Sometimes, to reduce costs, it is necessary to adopt less complex technological solutions, but the designer could be interested in keeping the perception of movement and dynamism. The effect of movement (or dynamic effect) can be very important because it can bring 'life' into grey neighbourhoods. It can be achieved also using cheap technological solutions. In these kinds of façade, colour design and the shape of the cladding elements are the most important features.

Colour combinations can create vibrant contrasts that are able to generate certain effects of dynamism. This can be viewed both in 2D (flat) façades and in 3D façades. The cultural references for this type of design solutions seem to be drawn from Optical Art (Op art) or Kinetic Art. "Optical art is a style of visual art that uses optical illusions" (Atkins 1997). Typically, Op Art paintings and drawings give the viewer the impression of movement, hidden images, flashing and vibrating patterns, or of swelling or warping. Generally these effects are achieved on 2D static surfaces. These effects were explored mainly during the 1960s, but many optical paintings were created already in the 1930s. Some principles are applied today in architecture. According to Op Art techniques, designers can use contrast of black and white or colour contrasts to achieve their goals.

To generate the perception of images in movement like in Bridget Riley's works, the contrast of black and white can be used to increase the effect. An example of 'perception of movement' can be her famous painting *Movement in squares* (1961) (Riley 1961) which is composed of a black and white square pattern (chessboard) that simulate the rotation of two cylinders. An example of 'hidden image' is the famous painting *Zebra* (1950) by Victor Vasarely (Vasarely 1950) in which black and white diagonal lines change their shape creating the image of a zebra.

Victor Vasarely also used colour contrasts to enhance certain shapes, generate warping or create the perception of movement. An emblematic example of enhanced shapes/warping could be the painting *Vega 200* (1968) (Vasarely 1968). It is a composition of a circle pattern that uses the contrast of complementary colours (red-green). By increasing the size of the circles that make up the pattern, he creates the feeling of a sphere that seems to break through the painting. An example of perception of movement can be the painting *Zett-KZ* (1968), also by Victor Vasarely. It is another composition of circle and square pattern using shades of blue and green. The specific use of colour gives us the sensation of a square floating over a moving background.

The sensation of tension and movement can be achieved also with other types of patterns. In Bridget Riley's *Nataraja* (1993) the tension is created by a dense network of diagonal polygons of various colours. It looks like a sort of 'rain of colours', using mainly red, green, blue and yellow. In Bridget Riley's *To a Summer's Day 2* (1980) the sensation of movement is created by a flow of undulated lines of different colours over a white background.

Designers can also take inspiration from Kinetic Art. Kinetic Art is obtained from any medium that contains movement perceivable by the viewer or depends on motion for its effect. Canvas paintings that extend the viewer's perspective of the artwork and incorporate multidimensional movement were the earliest examples of Kinetic Art (Popper 1968). Kinetic Art is a term that today most often refers to three-dimensional sculptures and figures such as mobiles that move naturally or are machine-operated. The moving parts are generally powered by wind, by water, by a motor or by the user like in Ned Kahn's works (Kahn). There is also a portion of Kinetic Art that includes virtual movement, or rather movement perceived from only certain angles or sections of the work. This type of Kinetic Art is what we consider in this paper. According to this vision of Kinetic Art pursuing 'virtual movement', designers can use particular combinations of shapes to simulate movement. The series of silkscreens on canvas-paper of the Italian artist Getulio Alviani called *Tensione* 'Tension' (1964-66) represent a significant example of this kind of art. The silkscreens are made of fine lines ranging tapering on a black background. They can start from the centre of the paper toward the edges or vice-versa. They can also be combined together as modules to create a canvas with a pattern made of horizontal and vertical elements. The goal is to create tension and produce a vibrating effect: they look like vibrating sculptures made of metal wires (Alviani 1964-66).

My research concentrated on the analysis of examples of static architectural façades with the aim of finding a classification of the effects of movement that can be obtained by the designers pursuing these artistic solutions and other means.

Methodology: Study of Case Histories and Emblematic Examples

Different architectural projects have been studied following a precise scheme: a) façade technology, b) components, c) pattern, d) colour strategy, and e) final effect.

a) Façade Technology. It is important because its choice is strategic for the realization of the cladding, which is the fundamental part that generates the relationships between the building and the environment. For example, in the Barak Building in Melbourne (described below) the glass cladding is strategic for the final effect of the façade because it constitutes the black background on which the white balconies are fastened and together they realize the final artistic design of the façade.

b) Components. They are important because, as single elements, they form together the façade pattern, which is one of the most important things in a regular composition. Components can be the same or different from each other (in

shape, colour, etc.). Their colour and surface finish can be very important for the relationship between the façade and natural light. Light reflection and absorption, shadows and shades can completely modify the appearance of the façade. This feature is clearly visible in the Parking Structure Art Façade (described below) in which the metal components are folded in different ways and coloured in yellow and blue to obtain a specific effect on the surface of the building: the changing gradient of colour.

c) Pattern. According to Rudolf Arnheim patterns are repetitive models (Arnheim 1954). They are important in art as in the architectural design, especially in the façade design. They create hierarchies in a composition and specific visual effects. In the façade, design patterns are created by the repetition of the components of the façade itself. Sheets and panels, etc., of different materials and colours are the components of a façade and their combination (the pattern) creates the rhythm of the cladding. An example of geometric pattern is the envelope of the public toilet designed by Gramazio Kohler (described below) where lozenge metal strips produce a vibrant effect in the eyes of the observer.

d) Colour strategy. Itten's colour theory is always very effective in the study of the colour strategies used by an artist or an architect. The 'seven colour contrasts' to enhance a building or certain parts of it, colour agreements (chords) to harmonize it within the context, or both to create specific graphic or artistic effects on the façade: the last solution is what we are trying to describe in this paper. Colour is the most important feature of a static façade with dynamic effect, because the effect is generated using mainly colour. In all the buildings we have analyzed, colour is strategic. For example, in the Museum at Prairiefire (described below) the colours of metal sheets and dichroic glass panels are calibrated to reproduce the appearance of fire.

e) Final effect. It is what we perceive looking at the building. Visual perception in architecture is determined by different variables. Some of them are: the weather conditions (especially light conditions), the point of view of the observer, the mental conditions of the observer. All the projects we have analyzed seem to take advantage of these aspects. In a certain way, the final effect is not only the sum of parameters a, b, c and d, but also what the building can produce in the mind of the observer: in this sense this reading has the ambition to represent an average vision of the actual situation.

According to these strategic parameters, subsequently some of the most significant and recent examples of static façades with dynamic effect are presented.

Parking Structure Art Façade

The first selected example is the Parking Structure Art Façade (2014) designed by Urbana Studio, located in Indianapolis, USA. It is a shading façade with a geometric pattern created with a very complex scheme. The peculiarity of Eskenazi Hospital Parking Structure Façade lies in having a dynamic appearance despite being made up of static elements. The "project began with an interest in challenging the typical notion of the parking structure as an unappreciated infrastructural typology by transforming the new Eskenazi Hospital parking

structure into a binary, synthetic terrain” (Ley 2014). Binary Terrain is a technology that was developed for a DEM (digital elevation model) that allows the representation of the distribution of the altitudes of a territory, or another surface, in digital format. This technology has been used by Rob Ley, Urbana Studio, to create the façade pattern.

The effect of a field of 7.000 angled metal panels in conjunction with an articulated east/west colour strategy creates a (virtual) dynamic façade system that offers observers a unique visual experience depending on their vantage point and the pace at which they are moving through the site. In this way, pedestrians and slow moving vehicles within close proximity to the hospital will experience a noticeable, dappled shift in colour and transparency as they move across the hospital grounds, while motorists driving along W. Michigan Street will experience a faster, gradient colour shift which changes depending on their direction of travel. (Ley 2014)

The façade design was developed through “rigorous examination of digital image manipulation and reproduction techniques, such as error diffusion, dithering, half-toning, and lossy-compression quantization, a strategy for the articulation of complex arrangements of patterns and edges across” (Ley 2014). The façade is composed of approximately 7,000 angled metal panels ranging from 0.3m tall by 0.6m long to 0.3m tall by 1m long and creates the effect of a vibrating field. The angles alone create the illusion of different hues. From the chromatic point of view, the colour scheme is relatively simple since the west side has a deep blue colour and the east side has a golden yellow colour. The different angles of the panels are already sufficient to create the illusion of many different shades (Figure 1). To achieve the desired effect, the designers had to work on the repeatability of the pattern, or through combinations of the same



Figure 1. Parking Structure Art Façade, by Urbana Studio, Indianapolis, IN, USA. Photo © Serge Hoeltzsch, 2014.

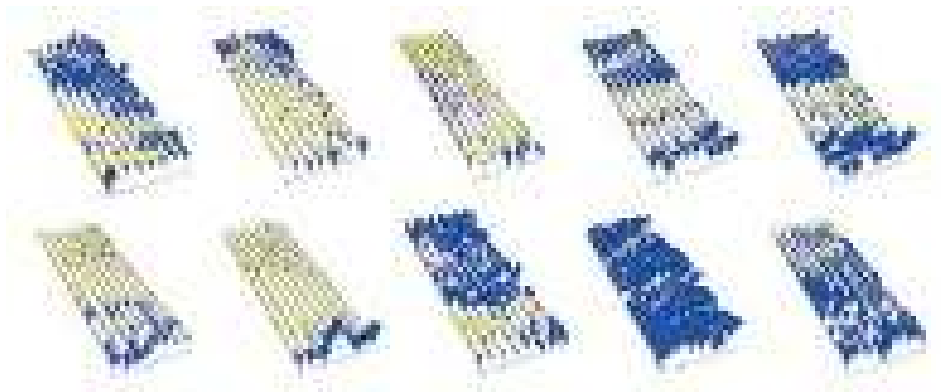


Figure 2. Parking Structure Art Façade: façade design process. © Rob Ley (Urbana Studio), 2014.



Figure 3. Parking Structure Art Façade: study of the pattern. © Rob Ley (Urbana Studio), 2014.



Figure 4. Parking Structure Art Façade: view from the left. Photo © Serge Hoeltschi, 2014.



Figure 5. Parking Structure Art Façade: view from the center-right. Photo © Serge Hoeltschi, 2014.



Figure 6. Parking Structure Art Façade: view from the right. Photo © Serge Hoeltschi, 2014.

pattern, in order to find the correct alternation, necessary to have the perception change from viewed from various angles (Figures 2 and 3). From the perceptual point of view the main façade when viewed from only one side appears completely yellow and from the other completely blue. As the viewer moves from the yellow side to the blue side the viewer has the perception of a domino effect: first the metal plates appear blue, then yellow and then they seem to disappear against the dark background of the building, in a continuous play of contrasting colours (yellow-blue) (Figures 4, 5 and 6).

Barak Building

Another significant case study is the Swanston Square Apartment Tower (generally called the Barak Building) (2015) designed by ARM Architecture, located in Melbourne, Australia. The peculiarity of this building is the face-façade: a face is represented on the façade (ARM Architecture 2015). The face curves from the southern to the eastern façade and it looks clearest if you directly face the corner that points along Swanston Street. It is the face of William Barak, the last traditional *ngurungaeta* (Elder) of the Wurundjeri-willam clan. William Barak (1824–1903) was an artist, an influential crusader for Aboriginal social justice and an authority on Wurundjeri cultural lore. When he was 11 years old he witnessed John Batman meeting the tribal Elders and purchasing Melbourne. The main façade of the building is a tribute to this important figure. During the design process, the architects consulted closely with Barak's family and the wider

Wurundjeri community, but despite this noble gesture the building is the subject of perplexity. Christine Hansen, researcher on Environmental Humanities at the University of Gothenburg wrote:

The problem I have is not with the idea that Barak should have a place in the consciousness of the city, but with the overt association between the 530 luxury apartments that are the Portrait building's actual purpose, and the lifelong dedication of William Barak and the entire Kulin nation to the struggle over land. To place high-end CBD real estate and an image of the most famous of 19th-century land rights activists in the same frame is a cruel juxtaposition if ever there was one. This unconsidered conjunction exposes our blindness not just to history but to its contemporary consequences in institutionalised racism and unequal power relations. (Hansen 2015)

"The image comes from a photograph of a sculpture of Barak by contemporary artist Peter Schipperheyn. First, we reduced the photo to a binary black-and-white image. Adobe Photoshop turned the image into horizontal bands of black and white varying in vertical thickness. Next, we converted the bands into vector-based line work to import into 2D and 3D CAD files to determine the measurements for fabrication" the architects said (ARM Architecture 2015). The image on the façade is realized with white panels bolted onto black balcony slabs. The panels (up to 6 meters long and 2 meters high) are an engineered surfboard-like composite material 140 mm thick: a PET foam core with fibre mesh and vinyl-ester external coating. The panels are white and they are superimposed to the glass envelope. From a certain distance the glass envelope is perceived as black. So the scheme is an image created by the contrast of black and white lines, exactly as in the black and white works of Bridget Riley. The tower's ideal viewpoint is the Shrine of Remembrance, which marks the southern end of the Swanston Street axis in Melbourne. This point of view is 2,8 km away from the building: from that distance the face is clearly visible. As the observer moves closer, the face fades from his view and the lines that compose it reveal themselves as balconies. On the contrary, the northern and western façades are an interpretation of a topographic map, as stated by the architects. They also look a little like a heat map. They are pixelated: the colour of the background is dark grey and there are large multicoloured spots in white, red, yellow and green.

Public Toilet

An example of building skin with a regular geometric pattern is the envelope of the public toilet designed by Gramazio Kohler Architects. The toilet has been developed for the city of Uster, Switzerland, in 2011. It is a prototype for a new typology of urban infrastructure that will be installed, in different variations, at several places on the city territory (Figure 7). The parametric design of its façade, consisting of folded, vertically arranged coloured aluminium strips, can adapt to changing building sizes and shapes due to its modularity (Gramazio and Kohler 2011). The colour scheme is conceived to adapt to different surrounding contexts. "The depth of the folded structure and the varying reflection angle of the light on its structure, in combination with the slight-

ly different colours of the single strips (shades of green), generate a shimmering effect that changes depending on the sun as well as the observers' position" (Gramazio Kohler Architects. 2011). The façade is composed of 295 folded aluminium strips. "Each strip is laser-cut and hand-folded. The strips are clipped and bolted onto 18 laser-cut aluminium sheets that are mounted to the façade of the prefab module called 'City'" (Gramazio and Kohler 2011). Similar to prismatic surfaces, the variations of green are transformed by sunlight as well as the angle of view. The envelope of the building, although formed by static elements, thanks to the shape and colour of the components, seems to have the ability to change its colour depending on the point of observation. The design seems to take inspiration from certain works of Op Art. The goal seems to create a visually vibrating object: the folded metal strips are coloured in three different shades of green (Figure 8). The lozenge pattern of the metal cladding is suitable for the play of natural light on it. In this way the colour 'play' is amplified by natural light over the metal surfaces. The building envelope has a vibrating colour that recalls Bridget Riley's works of the 1990s.

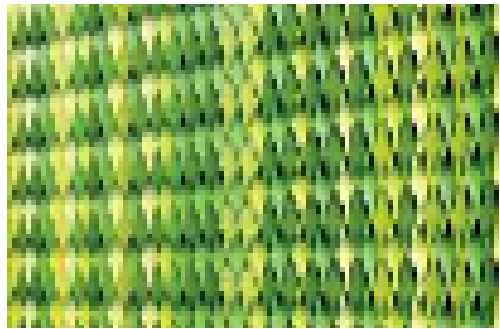


Figure 7 and 8. Public Toilet. © Gramazio Kohler Architects, 2011.

Museum at Prairiefire

Another example of vibrant colours is the Museum at Prairiefire (American Museum of Natural History) (2014) designed by Verner Johnson Architects at Overland Park, KS, USA. "The building concept is designed to reflect the imagery of the tallgrass prairie, including one of its most unique aspects: the prairie fire burns" (Verner Johnson 2014). Fire is one of the most important factors for American prairie maintenance. Trees create shade as they grow and cause even further restrictions in sunlight available to plants that need full sun. Fire is nature's way of starting over. Fires are started naturally by lightning igniting flammable material or by man, both accidentally and intentionally. The Plains Indians started fires to attract game to new grasses. Ranchers today start fires

to improve cattle forage and for prairie health. “The expansive lobby (of the building) is enclosed by ‘lines of fire’, faceted vertical planes composed of tinted vision glazing, dichroic glass, and iridescent stainless steel panels, set in a composition invoking flames” (Verner Johnson 2014). In fact, the architects wanted to create an envelope that embodied the colour, the movement and the regenerative power of fire. Verner Johnson Architects paired dichroic glass with a second shape-shifting material: Light Interference Coated (LIC) iridescent stainless steel, ultimately applying panels in a variety of colour and finish combinations. Glass panels are integrated with a dichroic film produced by 3M. The façade pattern is divided into large trapezoidal pieces (transparent and dichroic glass) and small rectangular pieces (iridescent stainless steel) on top. The colours are yellow, orange, green, blue and violet but they vary during the day, the changing of light conditions and the point of view of the observer: this is the typical effect created by dichroic technologies. Put together they create a contrast of hot and cold colours that simulates the flames of fire and create a dynamic effect of movement. The composition of the lobby’s façade recalls again Bridget Riley’s works of the 1990s. The trapezoidal panels in different colours are positioned vertically and not diagonally but the effect is vibrant and very similar.

The lobby connects two building wings set at angles in the site to create a plaza at the northeast entry side and protected terraces at the west park side. These wings are stone clad with contoured parapets evoking the softly curving sculpted hills of the prairie. The stratified stone forms a gradient, from darker ‘charred’ stone at the base, to near white stone at the parapet. The entry plaza and park side terraces are paved in dark stone and edged in dichroic illuminated with LED lighting to recall the singed ground and fire lines seen during the prairie burns. (Verner Johnson 2014)

Results: The Classification of the Chromatic Strategies

The study of the case histories, following the parameters described above, has conducted to the identification of eight different chromatic strategies used by the designer to obtain specific dynamic effects on static façades. We may say that these strategies can be used both in 2D façade and in 3D façades where the complexity of the form is another element that affects the overall design and perception of the building itself. In fact we may find flat surfaces like the ones of the Museum at Prairiefire and 3D surfaces like other case histories described before: Parking Structure Art Façade, Barak Building and Public Toilet.

The identified chromatic strategies are:

1. Images created by contrast of black and white or light and dark;
2. Patterns created by contrast of black and white or light and dark;
3. Effects created by colour contrasts;
4. Figures created by colour contrasts;
5. Effects created by variation of lightness and saturation;
6. Changes of colour gradient made with elements of different shapes;
7. Tension created by particular shapes combined together;
8. Movement simulated by gradient of reflection.

1 Images created by contrast of black and white or light and dark

It is the typical solution inspired from Op Art. Black and white patterns or lines are used to create drawings and images. The façades are composed of panels, fins or louvers shaped so as to create large hidden images on the external surface. The example in which we may find this technique is the so-called Barak Building, described above.

2 Patterns created by contrast of black and white or light and dark

We may find this solution in perforated or laser cut claddings. A typical example is the Bent Façade (2012) in Amsterdam. The façade was designed by Chris Kabel for a residential building conceived by the architectural firm Abbink X de Haas in the centre of Amsterdam.

The external cladding is composed of aluminium plates perforated by using a special punch, which folds the cut plate upwards or downwards. The small bent hexagonal surface may reflect light or create shadow. This 'pointillist' technique allows creating drawings on the metal plates avoiding the high costs of the laser cutting technologies (Figure 9).

3 Effects created by colour contrasts

We may find this solution looking at the lobby's façade of the Museum at Prairiefire. The 'fire effect' is created by the colour contrast in the pattern of the cladding. The panels of dichroic glass are yellow, green and orange while the metal cladding is golden and purple, and they change according to the weather condition and the point of view of the observer: the overall effect is generated by the contrast of hot and cold colours.

4 Figures created by colour contrasts

With colour contrast particular shapes and figures can be created on the building's façade. An emblematic example is again the Parking Structure Art Façade (Figures 1–4). Looking at the façade from a frontal position the observer may see flowing figures generated by the contrast of blue and yellow (contrast of pure colours).

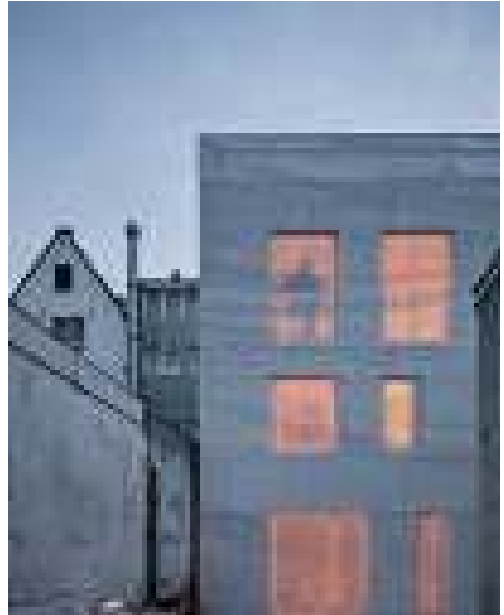


Figure 9. Bent Façade by Chris Kabel, Amsterdam.
Photo © Hans Peter Föllmi for IC4U, 2012.



Figure 10. Brandhorst Museum, by Sauerbruch Hutton, Munich. Photo © Alessandro Premier, 2010.

5 Effects created by variation of lightness and saturation

An effect of vibrating surface is also obtained using elements with colours of different levels of lightness and saturation. An example of this kind is represented by the Brandhorst Museum (2009) in Munich by Sauerbruch Hutton Architects. The façade is clad with ceramic sticks of different colours positioned very close to each other: the effect is a vibrant surface. The difference in lightness and saturation of colour is not only between the single

sticks of the façade but between the basement, the crown of the building and the volume in the background. There are three different lightness levels (Figure 10).

6 Changes of colour gradient made with elements of different shapes and colours

It is the solution we have seen in the Parking Structure Art Façade. The façade cladding is composed of differently shaped elements like coloured pixels that are able to create a shift between different colours. The shift is perceived from different points of view by the observer. Sometimes the façade is designed to be seen in motion.

7 Tension created by particular shapes combined together

Specific façade pattern can be designed to create an effect of tension, like in some works of Kinetic Art, although being static. An example of this technique could be the Richard Desmond Children's Eye Centre of the Moorfields Eye Hospital (2009) in London, designed by Lightscape Projects and Carl Stahl (Carl Stahl Architecture 2011). The glass façade is protected from the sun by a construction made of stainless steel cables and freely placed folded aluminium louvers. The aluminium louvers change in the light in accordance with the architects' plans creating a sensation of tension in the façade. Coloured lighting draws attention to the façade at night.

8 Movement simulated by gradient of reflection

We may find this solution when architects use mirror claddings or high reflective claddings. The effect is amplified by a 3D surface with different angles of reflection. The effect is also amplified in presence of water. In fact we may find it frequently in the waterfront design. An example could be the great ceiling of the Pavilion B (2009) at Genova Trade Fair in Italy, designed by Ateliers Jean

Nouvel. The ceiling is made of undulated metal. Light and the movement of water are reflected on the ceiling, creating a continuous sensation of movement on its surface (Redazione Archinfo 2009) Another example of this kind is the façade of the MAAT Museum (2016) on Lisbon waterfront. It is composed of 15,000 white three-dimensional ceramic tiles that reflect natural light and the movement of the water creating an effect of continuous movement on the façade (Mairs 2016).

Conclusions

It seems that the colour strategies to create a static façade with dynamic effect can be inferred from Op Art and from certain forms of Kinetic Art of the Twentieth Century. They consist in reproducing designs using pattern and light-and-dark contrasts, but also in creating very strong colour contrasts that give a sensation of movement, tension or create specific images, patterns and drawings. From a technological point of view static façades are less complex than dynamic façades. They use static elements to build the façade claddings. Maybe there is a lower technological content but there must be more design content, especially in terms of ideas, concept, experimentation on the architectural composition, combination of cladding elements, and deep expertise in the use of colour. In general, we can confirm once again, looking at this kind of architectural solutions, the contemporary desire to oppose static things and play the flux of our liquid society.

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«Безобразное» в современной городской застройке

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Аннотация

В ходе изучения роли цвета и света в эстетической эволюции итальянской архитектуры было установлено, что ее особенности, базирующиеся на стратегиях строительного производства и технологиях, повторяются и в других регионах мира. Наглядным примером может служить архитектура севера Италии, где большая часть застройки была реконструирована, обновлена или создана в период после Второй мировой войны. То же самое в это время происходило и в других европейских странах. Тогда правила архитектурно-строительного проектирования формировались под жестким давлением сложившейся ситуации. Однако с тех пор традиция проектирования зданий сохранилась без изменений. Методологически целью данной статьи является анализ наиболее заметных феноменов современной городской жизни. Как ни странно, во многих местах, где архитектурно-строительное проектирование подвергается серьезному влиянию антропогенного фактора, начинает доминировать «безобразное», формируясь под сильным воздействием рынка и стремления повысить продажи товара. Как следствие, несочетающиеся, вульгарные и неопределенные цвета распространяются во всех без исключения западных городах. Эта ситуация требует переработки правил проектирования цветовых и световых композиций или их введения там, где их еще не существует. Составляя часть общественного пространства, фасады городских зданий привлекают к себе еще более пристальное внимание благодаря таким формам уличного искусства, как граффити, стикер-арт, стэнсил-арт и др. Нарушая существующие правила и административные инструкции, произведения уличного искусства часто накладываются друг на друга. В конечном итоге современные цветовые и световые композиции растворяются в хаосе и неразберихе, вступая в противоречие с эпохой, где архитектура играет главную роль – либо королевы хроматического излишества, либо, наоборот, рыцаря абсолютной бесцветности. Принимая во внимание подобные факторы, данная статья представляет некоторые выявленные в ходе исследовательской работы, ключевые аспекты цветовых и световых композиций, характерных для современной городской застройки.

The ‘Ugly’ in Today’s Built Environment

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Abstract

Investigating the roles of colour and light in the aesthetic evolution of Italian architecture, particularities based on manufacturing and technology as strategic procedures can also be found in other parts of the world. Considering more closely, e.g., the architecture of northern Italy, most of the built environment has been reconstructed, renewed, or realised in the aftermath of World War II, which, of course, has also happened in other European countries. At that time, architectural design regulations were adopted under the duress of exigent circumstances. Since then, however, this way of designing buildings has not been changed. The methodology underlying this paper is, first of all, to analyse the most evident urban phenomena. It seems strange, but in many places where building design has a high anthropic impact, the ‘ugly’ tends to prevail, generously sponsored by a market that aims to increase the sales of its products. Thereby, without exception, dissonant, vulgar, and ambiguous colours are commonplace in Western cities, necessitating that the regulations for colour/light compositions be rewritten, or if they have never been, transcribed for the first time. As well, urban façades as publicly viewed surfaces are receiving greater attention through street art, such as graffiti writing, sticker art, stencil art, and other forms. Enacted outside of the forces of regulating institutions, the proliferation of street art often entails several overlapping layers of different artists. The end effect is that contemporary colour/light compositions vaporize in chaos and confusion, in contradiction to our times, in which architecture surpasses all, either as the queen of chromatic exaggeration, or—conversely—as the knight of the complete absence of colour. Considering this background of influences, this research paper identifies some key aspects of colour/light compositions that are emerging in today’s built environment.

Floating Art?

Dino Formaggio (1914–2008) was a philosopher and art critic who taught aesthetics mainly in Milan and Padua. Among Antonio Banfi’s pupils, Dino Formaggio is remembered for his ability to introduce and rethink the questions of phenomenology within the framework of philosophical aesthetics. In his work, Formaggio proposed an organic description of the complexity of experience in which the world of art is based on phenomenology. Banfi’s transcendental law of aesthetics and art as a concrete actuality of spirit served as the starting point to Formaggio’s thoughts that he continued to develop and enrich throughout his work (Zecchi 2002: 482).

At the beginning of his book entitled *Arte* (Art), he provides a definition of art: "Art is all what humans call art". If this assertion is taken to be "the only acceptable definition and verifiable art concept" (Formaggio 1973), then it can be easily argued that even architecture is an art form. This definition prevents immediately any hidden, mysterious, unclear or tendentious meaning. In addition it clarifies unequivocally that every age, every community, every single person called 'art' different things, allowing the relativity and variability of every form of art at every time and every place.

Art, as architecture, exists at different times and different places on the basis of this definition. But we do not have to be confused by the question who is it that is describing architecture as art. Is it individuals or social groups related to cultural affinities, economic interests and particular inclinations? Is it a nonsensical question or a decisive one? Two are the ways out of this impasse: either you reply meticulously, precisely, as sufficiently clarified in Formaggio's book that "the work of art is to design meanings" (Formaggio 1973), or you put it aside, since with the passage of time and the dynamics of society and the interests of individuals the answer will change from time to time. Heraclitus' philosophy captures just in two words *ἅπαντα ρεῖ* (*panta rhei*) the idea that literally everything flows, meaning that everything constantly changes. In the individualistic society, for example, like the one we are living in now, in so-called democracies, every answer is wrong anyway, because only change itself is real, constant and eternal so every apparently fixed point is relative.

The error, in which we fall, appears inherent in the origin of the word 'art', which first came with a precise objective, but changed with the advent of modernity. In Sanskrit the word 'art' is derived from the word *'are'*, which means 'giving order'; in Greek by the contradictory word *τέχνη* (*techné*) which indicates the ability to accomplish something and derives from the knowledge of the rules; and in the Latin by *'ars'* which keeps this relationship with the organizational wisdom aimed at making an object, or expressing a thought. To organize or carry out by applying rules we assume that these exist (objects and rules).

Therefore, someone in the past had the burden of creating the rules, sharing them and thus making them acceptable. As long as the society was organised on the fulfilment of shared rules, art was showing and consolidating itself, filling its spaces with those achievements and experiences that we all admire today. The same artist who experienced and practiced commonly accepted rules usually knew architecture, sculpture and painting. However, when these rules are being contravened, even the ancient art meaning is no longer the same. It becomes changeable in relation to new rules replacing the previous ones from time to time. A rule that varies continuously is no longer a rule. With no rules the spectator cannot understand what is the sense of the artistic product. This appeared in examples at the beginning of the last century. Dada, Cubism, Futurism, Expressionism, Surrealism, Neo-Plasticism and many other artistic movements at the beginning of the 20th century basically were following the impulse towards destruction of previous aesthetic rules. As

an example, we recall what was said by Theo van Doesburg. In his manifesto *Towards a Plastic Architecture* (1924) he writes:

14. *Colour*. The new architecture has done away with painting as a separate and imaginary expression of harmony, secondarily as representation, primarily as coloured surface.

The new architecture permits colour organically as a direct means of expressing its relationships within space and time. Without colour these relationships are not real, but *invisible*. The balance of organic relationships acquires visible reality only by means of colour. The modern painter's task consists in creating with the aid of colour a harmonious whole in the new four-dimensional realm of space-time – not a surface in two dimensions. In a further phase of development colour may also be replaced by a denaturalized material possessing its own specific colour (a problem for the chemist – but only if practical needs demand this material).

15. The new architecture is *anti-decorative*. Colour (and this is something the colour-shy must try to grasp) is not a decorative part of architecture, but its organic medium of expression. (van Doesburg 1924).

Van Doesburg is claiming that the meaning of the existence of previous rules has to disappear. At present this aspect leads to a serious crisis of identity in art and architecture. In this transition period of artistic matters colour and light play a strategic role. But users without adequate specialist preparation cannot correctly interpret the meaning and the sense of many artistic works. On the one hand, the contemporary public cannot know the historical art, because the present way of life and culture are radically different from that of the past. On the other hand, the public has some trouble with the comprehension of contemporary art, because it has become more and more elitist, changing continuously the rules and the interpretations.

As a synthesis of what has been previously expressed, we can draw attention to the environmental colour design example of the *Floating Piers* (Figures 1, 2 and 3). It is an artistic installation designed by Christo and Jeanne-Claude in 2014 and realized in the Italian Lake Iseo in 2016. The colour of the water and the golden-yellow floating walkways confuse the mind of the thousand of visitors walking along this original temporary masterpiece. At the same time, the planar surface of the coloured new pathway makes a cut between the architectural volumes of the houses, splits the unity of the natural and manmade environment and dissolves the certainty of memory. A new experience destroys the previous one. The lake becomes also pedestrian; the water becomes pedestrian by an artistic action. The art changes and modifies the natural landscape. At the same time, every woman, man and child walking along this defined pathway, becomes artistic objects in the hand of the artist. Their presence transforms their human existence into free workers for Christo's objectives, although only being art consumers or art tourists for a day.

The understanding of this enormous floating pier was not very easy for the thousand users walking along it every day. Only those people having some ex-



Figures 1, 2 and 3: The Floating Piers, 2016, by Christo and Jeanne-Claude.
Photo © Pietro Zennaro, 2016.

perience with Christo's land art projects have a high probability of reading the sense of this site-specific experience. The others only passed some hours in beatitude.

Fluid Art?

Each work of art should be able to represent its contemporaneity. The contradiction and the complexity of today's world, however, can only request a multifaceted art, which we can see clearly in many contemporary art expressions: site-specific interactive art or various kinds of installation art; body art; land art; urban screen art; light art; and all the traditional techniques like painting, sculpture, architecture and every artistic expression we can imagine. In parallel, it seems that Mies van der Rohe's idea 'Less is More' is in permanent decline. Today we live in a complex and complicated environment, permanently over-

charged with hyperisms: hyper-fast, hyper-big, hyper-small, hyper-precise, hyper-light, hyper-coloured, and so on. In terms of quantity, we are immersed in the over-abundance, especially of information, where the word 'less' is forgotten. The normality in this world has no place, it is over. The ancient Latin motto '*in medio stat virtus*' (in the middle stands virtue) as rephrased by Voltaire, "The better/best is the enemy of the good", is now completely forgotten by the market society. In terms of quality, we have the sensation to be fully immersed into the 'mediocracy' (Deneault 2015), a social and political class governed by or governing by mediocre people, or living and working in a system, in which mediocrity is rewarded.

Complexity and complication have moved inexorably into architectures, especially from a technological point of view. In architecture, technologies act more in a figurative way than in the other arts, with colours and lights affecting a building's perception and interpretation. Often the building skin is a kind of screen at an urban scale transmitting messages that cannot be sent by other media (Flusser 2007, Gasparini 2017). This type of architectures is controlled by computer systems that allow solutions unimaginable some years ago.



Figure 4 (left). MediaLab Prado, Madrid, by Langarita-Navarro Arquitectos.

Figure 5 (right). Caixa Forum, Madrid, by Herzog & de Meuron. Photo © Pietro Zennaro, 2015.

An easy example is the MediaLab Prado, in Madrid, designed by Langarita-Navarro Arquitectos. It has an electronic façade facing the Plaza de las Letras. The shape of this building façade is planar, with a stepped design at its top hiding the gabled roof. So the formal solution of MediaLab Prado is really astonishing when compared with the complex solution realized in the Caixa Forum Madrid designed by Herzog & de Meuron. One building is facing the other so the comparison is quite immediate (Figures 4 and 5).

By day the shape of the media façade is too simple in comparison to the other, but at night, when the media building façade is lit, people's attention is attracted to it. It hypnotizes everyone walking nearby. The small quantity of pixels allows emitting low definition images (from the high definition of the previous

analog technologies we passed to the generalized low definition, that means low quality), static or dynamic, playing a strategic communication role, really not allowed in the complex and sophisticated Caixa Forum. The colours by day are respectively grey or brown, but by night the MediaLab is multi-coloured and the opposite building façade is dark and unlit (Figures 6 and 7).



Figures 6 and 7: MediaLab Prado, Madrid, by night. Photo © Pietro Zennaro, 2015.

The ease of handling big loads, combined with the availability of materials and techniques from various sectors, provides forms of most disparate shapes, especially those who have little or nothing to do with Euclidean geometry, loved and preached by the Modern Movement. This resulted in the advent of architectures hard to classify as such, more like mega sculptures, media buildings or urban screens. Special computational programs allow the designers to materialize what was previously considered utopian. Fluid forms emerge from parametric design, and digital design methods (Figure 8). This kind of buildings, according to Formaggio's definition, should no longer be defined as architectures, or at least they put into crisis the meaning of art initially defined and make a synthesis between architecture and sculpture (one of the classical criticisms of the architecture of the Modern Movement). "Architecture is constantly subject to reinterpretation. In no way can architecture today claim permanence of meaning. Churches are turned into movie houses, banks into yuppie restaurants, hat factories into artist's studios, subway tunnels into nightclubs, and sometimes nightclubs into churches" (Tschumi 1987: 216–217).

The excessive science fragmentation, begun by Descartes and the Age of Enlightenment, was able to inculcate the division also in the artistic world, relegating knowledge and definitions only to specialists. Therefore the only ones who call art the forms of some kind of architecture are only a small number of specialists, isolated from the rest of the users/consumers. In a society governed by market forces, a user is always a consumer. To be a good consumer, people must not think, but only feel.



Figure 8 (top). Underground Station, Innsbruck, by Zaha Hadid: curved glass, steel and beton. Photo © Pietro Zennaro, 2012.



Figure 9 (bottom). Imperial War Museum North, Salford, by Daniel Libeskind: in many contemporary architectures the colour is an unessential complement. Photo © Pietro Zennaro, 2014.

So these architectures are defined that way not by ordinary people but by a few followers. New products of these kinds of arts are interpreted by the man in the street as incomprehensible eccentric things, even if they are original or shocking. The colours that appear on a building's surfaces constitute an inessential complement, the unusual shape in and of itself determining almost always the degree of artistry, in the sense of foreignness and eccentricity of the artwork (Figure 9).

As a part of a very long architectural tradition, strength, utility and beauty (*firmitas, utilitas, venustas*, the three qualities defined by Vitruvius) were essential in creating architecture. Today buildings are not responding, or may not

respond, to any of the three points just mentioned. If the fundamental goals of current architectural production are to be original, diverse, unusual, and shocking, then this implies that the buildings currently realized belong from time to time to a different reality, falling within parameters defined as artistic, but scarcely architectural. The clarification is inherent in the fact that the current society has a particular propensity for diversity, or 'liquidity' as defined by Zygmunt Bauman (Bauman 2000). The continuous variation, change, modification, adaptation, translation, combination and rejection simultaneously establish the advent of new rules, or we might more accurately say, their overthrow. These are propensities may be more noticeable in dense urban areas, where the proximity of diversity allows an easier reading of these aspects (Figure 10).

Increased globalization has, in a certain way, condensed the fragmentation that existed before its mass acceptance. What was not considered artistic in one place, now may be become accepted, hypothetically, across the entire globe, thereby opening more channels of uncertainty and confusion than ever seen before.

The local continues its daily advance alongside other global aspects, amalgamating diversity locally by changing not only the lifestyles and thinking, but also the possible interpretations. Colour and light, the focal points of almost



Figure 10 (left). Museum Reina Sofia, Madrid, by Jean Nouvel: diversity between architectural styles, lighting structures, greenery, and advertising. Photo © Pietro Zennaro, 2015.

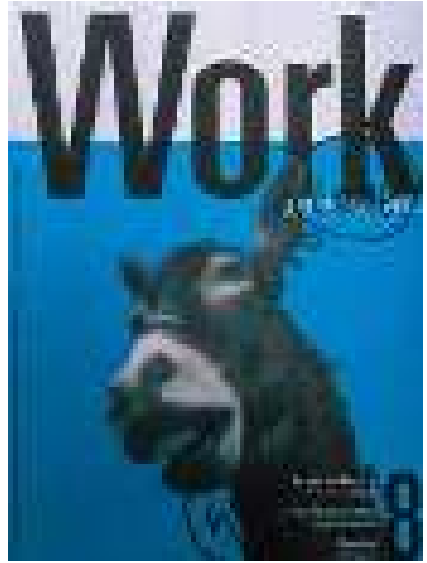


Figure 11 (right). Cover of the magazine *Work*, designed by Maurizio Cattelan, exposed at Poets of Lessinia, in Dolcè, Province of Verona. Photo © Pietro Zennaro, 2007.

every discourse concerning the Visual Arts, including architecture, are emblematic of this kind of change.

From the 20th century we gained a confused, fluctuating cultural heritage allowing the possibility of following the colour harmony while at the same time of its negation. Art is not anymore what people call art because it seems very difficult to accept as art what is commonly considered rubbish. In many art collections, we can find everyday items that we discard when we decide that the life of the object is finished. What distinguishes an art object from such common, discarded objects? Marcel Duchamp abolished this distinction saying that art is what an artist decides to call art. René Magritte, during the same period, made a distinction between an object and his representation (*Ceci n'est pas une pipe*).

Art became research into elaborating contradiction, originality, unusual expressions, at least everything that is intended to shock the public. Artists such as Maurizio Cattelan (Figure 11), Damien Hirst, Ulay, Marina Abramović, Vanessa Beecroft, as well as others with a similar approach, demolished or 'liquefied' every certainty, which is exactly what happened about one hundred years earlier with the various artistic Movements. They criticized what was previously accepted, and after Duchamp's revolution, opened new (at the same time old) ways to shock, surprise and represent the contemporariness, with the help of new (and old) artistic sponsors: the critic and the art dealer.



Figures 12 and 13. Museum of Contemporary Art in Rome (MACRO), Rome, by Odile Decq: detail of the glass ceiling full of dust. Photo © Pietro Zennaro, 2016.

Dust and Urban Blight

In urban realities, the predominant colour is grey, or more precisely it is the colour of dust. Throughout human history dust has always had an important role, even if it is so common as not to be given sufficient attention. In Catholicism, it has a central role in the birth of man, which takes his form from dust, as powder in the hands of God. Such an interpretation is really interesting considering that according to it one of the most developed 'animals' is made from a repellent, or at least not likeable, substance.

Speaking of dust in art in the past, the real turning point was made by Marcel Duchamp; more precisely, by the collaboration of Duchamp with Man Ray during the project execution *Élevage de poussière* (1920). "It's with Marcel Duchamp that dust plays a key role and takes a shape and a new, unexpected development. The reason is that dust now enters into the work no longer in the figured form, represented, but directly as a material" (Grazioli 2004: 55). Dust is not only a repellent substance, but it is at the same time one of the substances used by the artist to represent his contemporariness. It is not only a polluting substance to be constantly removed, but it is an intrinsic part of modernity, the result of mechanization, of velocity, and of the reduction of time and space. Dust's colour is pervasive, such as in the way that many factories paint their products prevalently in grey. This colour is not exalting, but at the same time it can be easily combined with any other colour, chromatic or achromatic.

The aspect that most affects the appearance of a city is the grey colour coming from dirt deposited on the buildings and walls, but this colour is frequently intrinsic to the buildings' skins as shown in some of images above (Figures 4, 8 and 9). At least, this is the urban image that readily comes to the mind. Smog with its particulates fills the air of large cities and settles everywhere, fading

the colours of all the building materials. The smog particles perform a visual filter function, and at the same time, they cause people to take action, either to add additional layers of paint or cladding or to clean the materials. When you apply a layer of paint to a surface or clean a surface, you get the same overall effect: you bring back the colour. In the first case, you add further substance; in the second, you remove substance (Figures 12 and 13).

If the base on which the architecture appears is not accepted as contemporary, in the sense that aging is not tolerated by today's society, and if at the same time the environment is stressed by pollution that cannot be stopped, all that remains are to play the same game: degrade, rape, act blatantly, thereby upsetting the idea of beauty that accompanied the art of the past.

It's clear that the rebellion, swallowed up by the world of production and consumption, also based on some of the assumptions mentioned above, involves and represses any attempt to bring order, whether through organization, initiation of a new process, or regulation of confusion.

The research has highlighted the weakness of any attempt to control urban colour. It may seem counterintuitive, but even where colour plans have been realized (at least examined in Italian cities), most of them have led to an increase in the saturation of colour in comparison to their previous state. These plans apply purely subjective rules that are not based on any historical foundation but act in an anti-historical way, introducing different colours than the local tradition. For the moment, all efforts against anti-aestheticism and the vulgarity of contemporary society appear to be out of date.

In places with high anthropic impact, the 'ugly' tends to prevail, generously sponsored by the market that aims to increase the sales of its products. Thereby, dissonant, vulgar, and ambiguous colours are commonplace in Western cities. "The idea of monstrosity, previously understood as pathological, is now pervasive enough to be recognized as part of our reality" (Bourgeois 1997). In these places, it seems that the regulations for colour compositions need to be rewritten, or if these have never been created, then transcribed for the first time.

As well, buildings and urban façades, as publicly viewed surfaces, are receiving greater attention through street art, such as graffiti, sticker art, stencil art, and other forms (Figure 14). Enacted outside of the forces of the regulating institutions, the proliferation of street art often entails overlapping layers cre-



Figure 14. Graffiti writer tag, Venice: sometimes street art allows requalification of ugly spaces or uses ugly spaces as a place to something (i.e. their existence). Photo © Pietro Zennaro, 2017.

ated by different artists. The effect is a mixture of colours and messages, messy and contradictory, as is also true for the clothing of the younger generation. This approach is also found in the furnishings of many homes of ordinary people. It seems that the 'ugly' has become an intrinsic part of contemporary life, having an obvious historical tradition nevertheless. "For all people, the uncoloured black, white and gray belong to the world of shadow, because all the real colours belong to life, to the day, and to the world" (Rosenkranz 1853: 343). The end effect is that contemporary light/colour compositions are sublimated in chaos and confusion, lost in the contradictions of our times, in which architecture remains the queen, and also of chromatic exaggeration.

Conclusions

This paper highlights some aspects that cannot be neglected in the environmental analysis. In particular, we cannot overlook a crucial fact: architecture is a work of art and as such it responds to artistic and scientific rules. In an age, where science and technology are prevailing, and claiming to affect the arts, architectural reasoning on art is necessary. Architecture is balanced between the technicality and arbitrariness. Colour, which is often snubbed by designers, constitutes the balance. Considered as a secondary issue by most designers, colour has become a strategic element determining the impact of architecture on the environment, natural and built. The push for sustainability, that has become fashionable, has not improved the situation. Indeed, the sustainability trend excludes many toxic colours from the colour palette, inappropriately promoting only a few of them.

What is the outcome of this research?

1- Art, and especially the use of colour, is able to strongly influence the behaviour of users of both natural and manmade spaces; in parallel, that population demonstrates a strong need for a colourful environment.

2- The 'ugly' is strongly loved by the population, being inherent to its inability to manage complexity; the order and the reduction in Western culture are no longer part of its aspirations, driven by hyper-abundance of marginal problems for human survival.

3- Art has greatly influenced the choice of gloomy colours, representing a world in a crisis of identity.

4- Contemporary art is elitist, and as such, has become a tool to make class distinctions: the places where we report extensive use of chromatic colours are popular, while those with prevalence of greys are more exclusive.

5- From the point of view of colour, the market considers architecture as just objects, in the sense that the grey colour is dominant in the building envelope, because buyers do not have to be 'disturbed' by the presence of colours that can be subjective; the market considers grey as a basis on which to make any future customizations.

6- Designers show greater propensity to de-contextualize their works rather than to integrate them into the environment; thanks to information and new building technologies forms and impromptu configurations are much more easily feasible than in the past.

7- In creating colour plans, designers in turn do not care enough about the effects of socio-cultural changes and how the environment is used, but often only seek confirmation of their subjectivity.

8- Anonymity, dirt, and environments unsuitable for life increase the temptation for vandalism, which manifests itself most often through protest art, such as graffiti, stencil art, street art, and other forms, or by the destruction of public and private goods.

These arguments, resulting from observations and investigations of chromatic developments over recent years in the architectural and built world, point to problems that need to be addressed. This research considers mainly northern Italy, and therefore has no claim of generality.

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Седеющая Норвегия: факторы и механизмы в дискурсе норвежской прессы, социальных сетей и коммерческой рекламы

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Аннотация

В статье рассматривается визуальная и вербальная риторика, отражающая отношение власти к ахроматическим цветовым схемам в новых архитектурных проектах и перекрашиванию фасадов существующих зданий в цвета, противоречащие национальным культурным традициям Норвегии. Анализируется процесс обсуждения этой темы в средствах массовой информации заинтересованными сторонами, от домовладельцев до архитекторов, от экспертов по культурному наследию и местных властей до дизайнеров и разработчиков, показывающий, как соотношение сил культурного капитала может реализовываться в сфере журналистики. Рассматриваются отношения между агентами, использующими культурный капитал, и динамика социальной физики. Основной вопрос исследования заключается в том, под влиянием каких факторов происходит сдвиг в сторону ахроматической цветовой гаммы: под действием культурного капитала лиц, принимающих решения, просто в определенный переломный момент, или по причине недостатка специальных знаний в области цветоведения и колористики у представителей профессий, связанных с применением цвета в публичном пространстве. Анализируются точки зрения ключевых участников, представленные в средствах массовой информации, восстанавливается иерархия ролей и описываются механизмы, которые лежат в основе изменений. По мнению авторов, ахроматическая цветовая гамма теперь является стандартной нормой, которая поддерживается производителями лакокрасочных материалов с помощью особых стратегий навязывания трендов, стремительно распространяемых через цифровую среду и социальные сети.

Greying Norway: Influences and Drivers Examined Through a Discourse in the Popular Norwegian Press, Social Media, and Commercial Promotion

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'Safe choice'

The colours we choose are often about feelings and emotions. Grey is a colour that awakes few emotions. Many think that this is the main reason for the popularity of grey, thus being an effective and comfortable choice in the hectic everyday life, where you have so many other decisions to make.¹ (Owren 2015)



Figure 1. Private house in the process of being painted from an ochre yellow to grey. Trondheim, Norway. Photo: Leif Maliks, 2015.

Abstract

This article examines the role of visual and verbal rhetoric that project the power relationships in the drift towards achromatic colour schemes in new architectural projects and the repainting of the surface colour of existing buildings that fall outside heritage regulations in Norway. This is examined through media debate to expose the power relations of cultural capital (Bourdieu 1986) in the rhetoric used by the stakeholders, ranging from householders to architects, heritage experts, local authorities, colour designers, and developers, and as mediated through journalism. It considers the relationships between agents in the exercise of cultural capital and trend instigation in social physics. It asks

¹ The original Norwegian text is: "Trygt valg - Hvilken farge vi velger handler ofte om følelser og emosjoner. Grått er en farge som vekker få følelser. Flere mener at det er noe av årsaken til gråfargens popularitet, det er et effektivt og komfortabelt valg i en hektisk hverdag med mye annet å ta stilling til."

how the drift towards the achromatic is mediated, and if this is the influence of the cultural capital of decision makers, an accumulative tipping point (Granovetter 1978) that leads to a change or the absence of resistance due to lack of disciplinary knowledge in the complexities of colour in the professions that are responsible for the application of colour in public space. Standpoints taken by key participants as articulated in the media have been analyzed to examine hierarchical roles and establish a clearer understanding of the mechanisms through which this change takes place. The authors will argue that the achromatic palette is now the standard norm driven by the paint producers' power position in trend-setting methods and the rapid dissemination processes afforded by digital and social media.

Introduction

The debate on colour in architecture has surfaced in the Norwegian press over the last five years. This is exemplified in two polarized standpoints, on the one hand, complaints about inappropriate colour use that spark social media and printed media reactions for and against, on the other hand, arguments for and against the white, grey, black and beige palette that dominates new building and is impacting previously chromatic zones. This enquiry takes up the question of grey, and aims to define a model of the key drivers of this process, based on the concept of power emanating from cultural capital, economic capital and their compound influence. The most profiled critical examples in this drift towards grey (Figure 1) are in articles in media channels such as "Norway in Black, White and Grey" in *D2*² (Karlsen and Hovda 2015), "This is How Bergen is Turning Grey" in *Bergens Tidene*³ (Maeland 2015), "Modern City Architecture on the Edge of Inhumanity" (Nymo et al. 2014) and "All of Norway is Being Painted Grey" (Nordal and Aune 2014), both published in *NRK*⁴ (Figure 2).

Method

The authors have examined three main sources of influence on colour. Media, net-based discourse, and visual weighting in promotional and in trend material from paint producers. The authors have surveyed some 115 media and net-based articles and attached commentaries in two main categories. First, advice on selecting exterior house colour, and second, debates on house colour. This has been used to diagram the dynamics of the current development and chart the inputs in terms of their position from the perspective of

² The lifestyle magazine *D2* is Friday's supplement of the Norwegian newspaper *Dagens Næringsliv* [Today's Business] specialized in business news and one of the largest in the country, commonly known as *DN*.

³ This article published in one of Norway's oldest newspapers is based on an interview with Professor Mette L'Orange.

⁴ NKR is the abbreviation of Norsk rikskringkasting AS, the Norwegian Broadcasting Corporation, which is the government-owned radio and television public broadcasting company.



Figure 2. Examples of critical discourse of colour of façades in Norwegian media. “Modern City Architecture on the Edge of Inhumanity”, NRK (left), “This is How Bergen is Turning Grey”, *Bergens Tidende* (centre), “All of Norway is Being Painted Grey”, NRK (right).

cultural capital and its production of professional certainties and public uncertainties. We argue that this is a process with its origin in the continuation of an identifiable historical tendency. The diagram (Figure 3) represents the authors’ procedural concept map used to identify and organize the multiple factors that together define the mechanism of the tendency towards achromatic dominance.

The protagonists’ positions in the process

These agents are defined as follows: (a) developers, (b) architects, (c) paint producers, (d) experts, and (e) public. It may be useful to split all these agents into two overlapping sets. The developers and architects define new buildings and exercise power over colour definitions, but in new housing blocks (flats) the purchasing public has no input in the choice of colours. In prefabricated housing, the consumer has some option of colour choice in a limited pre-determined palette at extra cost. In the overlap, there are the paint producers, who exercise an influence in amplifying trends in both directions. Both towards the construction market (prefabricated in particular), and mediated by the experts towards the existing housing stock and the public.

(a) Developers are driven by large-scale economic rationalities of speed and profit concerns, and hold to a dogma that colour neutrality is what the consumer wants (Figure 4). Some actively disavow that the public have any interest in colour, so they also promote the view that this is a means to hold the production cost down, though in reality the cost is marginal in relation to

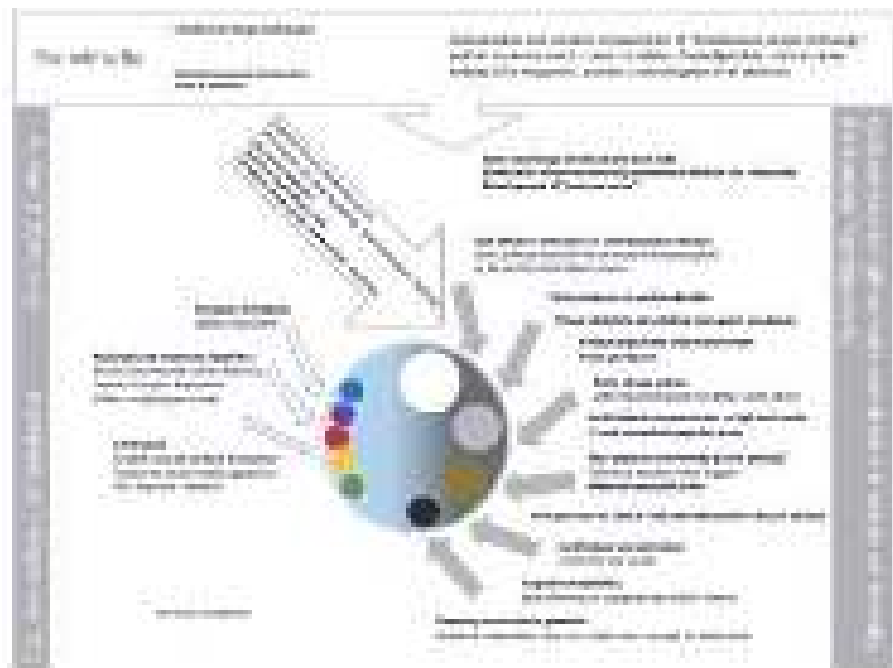


Figure 3. The cultural capital drivers. In this diagram, we illustrate how we interpret the main causes of the achromatic tendency. Starting in mythologies of Scandinavian and functional design, compounded by the architectural education and ultimately driven by paint producer's ideas of trend and the impact of trend exemplification on the public.

Diagram: Alex Booker and Kine Angelo, 2016.

the total build cost. The volume of building of blocks of flats and high-density, multiple-unit estates have a substantial visual impact on the chromatic urban structure in comparison to the traditionally more spread out and small-scale building types. As Per Jaeger, CEO of Boligprodusentenenes Forening (Home-builders Association) comments in the above mentioned article, “People prefer buildings in gray, white and beige, because they do not want buildings that stand out. White buildings can also be nice and exciting, just look how wonderful the opera house in Oslo is” (Nymo et al. 2014). He also believes there is a long-term benefit to using such colours, and that a larger range of colours on new buildings is not very cost effective. It is more important to provide cheap, quality housing, Jaeger argues. “That is of a greater concern than what colour the buildings have, but we will still want interesting architecture” (Nymo et al. 2014),

(b) Architects are mostly locked into a persistent dogma originating in an elitist and selective mythology on the nature of modernist Scandinavian design, coupled with a more recent appropriation of environmentalism (Figure 5). "Wood should be allowed to be wood, steel to be steel and metal to be metal,

maintenance free, environmentally neutral and untreated”, to quote Ole Gustavsen, Dean at The Oslo School of Architecture and Design (Karlsen and Hovda 2015: 21). In the same article, Gerhard Linder, architect and partner at DARK Arkitekter, comments on the lack of colour on their façades: “Colour is the clouds, the sea and the sun. One does not want to compete with nature” (Karlsen and Hovda 2015: 21). Unfortunately, this truth to material ideology⁵ (Serra et al. 2010) is rarely materially implemented with consistency, but tends to give rise to a mimetic correlate in an achromatic colour palette. Furthermore, architects lack the power to resist the developer’s rationalities, and even when they try, they lack the colour skills necessary or the design time required to make a convincing argument or produce a satisfactory result. The prefabrication cladding industry offer an extensive range of colour and material finishes in a variation of materials, so there is no absence of chromatic possibilities available. The poverty of implementation lies in the polarities of developer conservatism and the architects’ uncertainties. As Ralf Weber (2016) has pointed out, a significant problem lies in the dematerialized ‘white’ space of conceptual abstraction, that permeates the architectural education and professional planning process, in which idea generation and realization is divorced from material realities and phenomenological embedding.

Working with colour at architectural scales requires a professional focus, commitment and a deep understanding that few practices have the time, the will or the theoretical capacity to master. It has to be asked, if this is an acceptable position for a profession that is engaged in the production of the aesthetic qualities of urban space and public well-being (Figure 6).

⁵ Truth to materials is the tenet in modernism, that materials should be used with their inherent colour.



Figure 4. Residential block development completed in 2016, with an achromatic façade. Lade Allé, Trondheim, Norway. Photo: Alex Booker, 2016.

Figure 5. Voll Studentby, by Skibnes Arkitekter AS. Student housing block with aluminium cladding in two tones of grey, completed in 2015. Photo: Alex Booker, 2016.



Figure 6. Concept models by students. Common Ground, 13th Venice Biennale of Architecture, 2012. Photo: Alex Booker, 2012.

(c) The paint producer's pivotal role takes two linked forms; the production of the material and the production of change via trend development to maintain turnover and feeding the consumers desire to be 'up to date'. The publication of consumption data, commentaries and associated visual rhetoric are designed and directed at the consumer in a way that emphasizes producer-determined trend choices. The power of this process cannot be underestimated, the release of colour trend forecasts propagate through magazines, blogs and social media news, with near instant effect as professionals and early adopters seek to maintain their position as the formers of opinion, impact and implementation (Figure 7).

With reference to black and other dark colours, Lisbeth Larsen, global colour manager at The Jotun Group, a supplier of paints and powder coatings, states that "It is unbeatable on cabins and modern architecture, but there is no limit to which type of house it suits" (Grindem 2014). Tale Henningsen, colour consultant at Nördsjö Colour Company, asserts, "People are choosing grey for the house and the details... black is also popular... the trend is the same all over the country" (Newswire 2008). In the same article, Anders Paulson, Marketing Manager of Systemhus, a provider in the prefabricated market, declares, "Grey is the most popular colour now" (Newswire 2008). The major paint producers are active in the discourse at the point of sale, through their own web portals, and in social media. Largely, this material is consistent in promoting the achromatic palette as stylish, modern and, above all, safe, while treating chromatics as a traditional historical necessity and labelling some colours (blue and green) as problematic (Figure 8). An analysis of the visual rhetoric in the colour charts available from the three major paint producers of exterior colours on the Norwegian market (Jotun, Nördsjö and Flügger) shows the following weighting in visual examples (Table 1, left). Exterior house colours exemplified in a wide sample of Norwegian websites shows a similar result (Table 1, right). This correlates with the volume of sales in whites, greys and blacks/browns.



Figure 7. A selection of pages from current Norwegian paint brochures, 2016.

Table 1: Accumulative results for exterior colours presented on colour charts by the three major paint producers in the Norwegian market (left), and exterior house colour illustrated in a wide sample of advice websites (right). Table: Alex Booker and Kine Angelo, 2016.

Exterior Colours Presented in Colour Charts *		Exterior Colours Presented on Norwegian Websites	
Grey	45%	White	55%
White	22%	Black	18%
Black	11%	Red	11%
Red	10%	Yellow	7%
Green	8%	Grey	3%
Yellow	4%	Beige	3%
Blue	0%	Blue	1.5%
Beige	0%	Green	1.5%

**Jotun's additional colour chart for only bright white exterior colours was not included in this study.*

(d) The experts may be divided in four categories, with promotional, active, reactive or reflective agencies dependent on the context. The experts connected to the paint industry tend to drive and enhance trends with a high degree of visibility due to their privileged access to the point of sale and embedding within the industry's promotional structure, media impact and a consequent rhetoric of certainties. For the professional painters, the commer-



Figure 8. “Grey facade – never wrong and easy to make the right choice” (left), (Beckers Colour Chart 2010). “Difficult with blue and green – some façade colours are more difficult to get right than others, such as blues and greens” (right), (Westman 2016).

cialization of ready-mixed paints has led to an impoverishment of workmanship (Fridell Anter 2000: 19–21), instigating a subsequent decline in agency and traditions of knowledge, as the choice of façade colours are now in the hands of the architects and building owners with limited knowledge about pigments, paints and colour theory. Colour as an aesthetic element is relegated to its economic aspects, focusing more on fading and maintenance intervals than colour design. “We know a lot about paints and painting, but lack knowledge about colour”, a master painter commented in a discussion with the authors (this also affects point of sale competence). The independent academic experts are reflective, working from a contextual, historical and design perspective. But as they only have impact when consulted to give design advice in the development of colour programs for buildings or zones, this is dependent on the initiative of regional authorities or individuals, and in turn dependent on their awareness of the potential cultural value of maintaining, restoring or developing a specific chromatic identity. The cultural heritage experts are reactive, mostly working to preserve or restore historical cultural value. In more than a few cases, cultural heritage experts are forced by circumstances and public outcry into a negative reactive stance towards colour. This situation arises when individuals engage in ‘contrarian’ colouring of buildings, often with too highly saturated chromatics or inappropriate decorative forms, and the authorities are called upon to provide pressure for a return to a more normalized colouration. Conversely, there is little reaction or outcry when a previously chromatically diverse building is painted grey or white (Figures 9 and 10). There is some overlap between the field of action in relation to the independent and cultural heritage expertise. In the promotional media surveyed by the authors, the industry trend certainties are prioritized. Recommendations for contextual reflection and suitability to



Figures 9 and 10. Houses undergoing repainting, Trondheim, 2016. Photo: Alex Booker, 2016.

neighbourhood, while mostly present, come at the end of the discussion as an afterthought and are represented as uncertainties that require an aesthetic relational consideration. For many, this presents a time-consuming and complex set of judgments.

(e) For the public, the level of agency is dependent on the forms of ownership. Blocks of flats are generally regulated by a residential management committee, and this management structure is also common in single house and multiple-unit estates, that can range from a small number of buildings to over fifty. New blocks of flats afford no agency and are determined by the developer/architect coalition. Older blocks provide some agency if repainting is required and the materiality is suitable. New housing estates, at all scales, are dominated by the current trend towards achromatic. In multiple cases, the choice from a limited achromatic palette is offered, both for ease and to avoid controversy. Here, grey has become a 'no fail' default. This tendency is also affecting older ensembles from the 1940s 1950s and 1960s, houses previously chromatically diverse (Figure 11). From a managerial point of view, it is understandable that conflict avoidance in the emotive question of house colour is attractive. True public individual agency in colour choice exists in the single-family, villa-type housing, and in older collections of smaller owner/occupier town units. In the first case, new build conforms to the current tendency and some older structures follow this trend on repainting. Even in zones of strong chromatic quality, areas that are regarded as representing cultural value identity, we have observed the ingress of a trend to grey. It is in the older villa and town typology that are outside the scope of current cultural heritage regulation, but of high cultural and historical identity value, that the most heated and reactive argument takes place over the right of self-determination contra contextual appropriateness. A significant component in this is also the property speculators indifference to the role of colour in the architectural quality of an area, or in the articulation of surface variation in the building's volume; any articulated character is usually negated by economic rationality by the use of single colour paint schemes.



Figure 11. A selection of housing units that have transitioned from chromatic to achromatic between 2010–17.

Chroma-Atychiphobia⁶

Critical factors accumulate to generate what we call ‘chromatychiphobia’: time pressure, decision exhaustion, peer pressure, ridicule over inappropriate choices in social media, the complexity of colour design, and the wealth of contradictory advice. The volume of choice seen in the context of trend exemplification, and not least of all economic cost, are all powerful motivations for a fear of making wrong choices that drive towards the solutions exemplified in safe trend colours. This applies to the architectural profession as much as to the public, and is compounded by the developer’s suspicion of any factor that might increase time and material costs.

Conclusions

Developers, architects, paint producers and profiled early adopters constitute both the actual capital and cultural capital drivers of this process to and beyond the tipping point. The current white-grey-black is now a default ‘no-risk’ standard. Critics, despite their knowledge, fail to gain traction in counter argumentations due to relational complexity. The subsequent absence of adequate

⁶ The authors have coined the term as a combination of chromophobia and atychiphobia, as we find that the public are not chromophobic but rather increasingly sensitive to criticism and being seen to be inappropriate and uninformed in their choices, therefore a fear of being wrong and subject to peer ridicule.

media profiled exemplification, and the misapprehension in the public that their comments constitute, at best, a reactionary attitude, at worst, it constitutes a desire to take over control and decide on their behalf. This is unfortunate as the implication is that the greying of Norway will continue and constitutes a form of chromatic entropy: A winding down of colour energy that contributes to a recognizable regional and spatial identity risks, in combination with large-scale development, reaching a form of 'lockdown'. From this situation, it will become increasingly difficult to re-engage chromatic qualities. In an area, which has drifted down to achieve a chromatic null point, any attempt by an individual to re-introduce colour will be treated as a contrarian aberration and will be subjected to ridicule. Only a concerted and unified communal effort will have the possibility of changing the direction. New buildings in durable prefabricated cladding are permanent and unchanging, as such they lay claim to the visual and physical environment for the foreseeable future (Figure 12). Because of this, a much greater ethical responsibility should be placed upon the developers, producers and the regulating authorities to achieve the aesthetic qualities necessary for architecture to live up to its primary task of generating a sustainable urban future, in which buildings and public spaces are the results of a co-dependent and harmonious dialogue.

The actions that can be taken range from the production of regional colour programs and guidance, raising political and administrative awareness of the necessity of a more observant and contextualised aesthetic quality control, raising public awareness and debate, challenging the attitudes and pro-



Figure 12. New Apartment Buildings Development, completed in 2016, showing the use of dark grey aluminum cladding, Lade Allé, Trondheim, Norway. Photo: Alex Booker, 2016.



Figures 13 and 14. Student Housing, 2012, Trondheim, by Skibnes Arkitekter AS. These images from December 2016 show just how important colour can be on a short and dull winter day. Photo: Alex Booker, 2016.

cesses in architectural education. In mid Norway, with a solar angle variation between 3 to 50, and with overcast, bluish light more common than direct sunlight (Matusiak 2017), colour is an essential human factor, not just in terms of regional cultural identity and history, but also as a condition for well-being (Figures 13 and 14).

Acknowledgements

The authors would like to give particular acknowledgment to Professor Mette L'Orange who has brought up many of the points central to this paper in interviews and commentaries in the Norwegian media.

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Атлас декоративного бетона: цветные цементные смеси и их взаимодействие с деревянными формами

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Аннотация

Декоративный бетон является строительным материалом, состоящим из цемента, присадок, песка, камня, химических добавок и т. д. Архитектурные характеристики данного типа бетона задаются его поверхностью, которая обладает некоторой эстетической спецификой (за счет цвета, текстуры) и может покрываться различными отделочными материалами. Цвет является результатом смешивания красителей в цементе. Системы или атласы имеют различную структуру, включающую изображения образцов и классификацию оттенков по степени светлоты, насыщенности и тона. Данная статья предлагает систематизацию отделочных материалов для цветных поверхностей, описывает их состав и процедуры, необходимые для их производства. Проект содержит диаграммы и общие сведения, оформленные в виде Атласа декоративного бетона. Для работы над атласом были созданы две группы цементных растворов, в каждой группе были использованы пигменты красного, желтого и белого цвета. Цвет определялся при помощи цветового пространства CIELAB с использованием формул цветовых различий CIEDE1976 и CIEDE2000. Анализировалась также отражательная способность оттенков. Результаты представлены в виде шести схем, позволяющих провести количественный анализ и визуализацию цементных растворов разного цвета. Наиболее существенное изменение цвета зафиксировано с седьмого по двадцать восьмой день эксперимента. Однако интенсивное образование отложений карбоната кальция и сопровождающее его увеличение блеска привели, тем не менее к замедлению процесса.

Atlas of Architectural Concrete: Coloured Cement Mixtures and their Interaction with Wooden Moulds

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Abstract

Architectural concrete is a construction material composed of cement, admixtures, sand, stone, chemical additives, etc. The architectural characteristic of this type of concrete is provided by its surface, which presents several aesthetic aspects (such as colour and texture) determined by different finishes. Colour is the consequence of incorporating pigments in cement. Systems or atlases have been elaborated following diverse principles, which include sketching figures and classifying colours according to different degrees of lightness, saturation, and hue. This paper proposes such a systematization of colour-surface-finish concepts and specifies the ingredients and procedures involved in their respective production. The proposal entails diagrammed images along with summarized information developed as an Atlas of Architectural Concrete. To develop the atlas, two groups of mortars were elaborated, each group with red, yellow, and black pigments. The colour was defined by using CIELAB colour space, and their evolution was compared using CIEDE1976 and CIEDE2000 colour difference formulas. The gloss was also analysed. Results have been represented in six images to allow quantification and visualization of the differently coloured mortars. An important colour variation was observed that developed as of day seven up to day twenty-eight. Associated with an increasing gloss, the intense formation of calcium carbonate deposits, however, was produced a discouraging result.

Introduction

Architectural concrete (AC) is a composite material that, besides having a wide range of mechanical resistance and durability, stands out for the surface aesthetic value provided by its colour and texture (Benini 2005, Benítez and Bálsamo 2004, Püttbach 1992). The aesthetic aspect is an alternative, beyond the traditional ones, that is chosen to build monuments, sculptures, decorative objects and urban furniture (Bennett 2002, 2005, Expertenforum 2007). The main components contributing to the colour are the cement and pigments. However, the desired colour is sometimes not attained by the different proportions of the used components. This fact and high cost of the pigments make attaining new colours

difficult. Both reasons justify research studies using mortar mixtures (without stones) since they constitute a rapid and low-cost alternative. An extensive study on the effect of the grey and white cements, the pigments content and type such as iron oxides (red, yellow and black), carbon black, and phthalocyanines (blue and green), and the superfluidificant type and increase was made to evaluate the colour of coloured self-compacting mortars and concretes (López 2012). The colour was defined according to the CIELAB colour space studied by the International Commission on Illumination (Commission Internationale de l'Éclairage, CIE) (Lozano 1978, CIE 15 2004, Hunter 1975), and allowed to estimate it through the concrete parameters lightness (L^*), saturation (C^*) and hue (h^*) after assaying mortars placed in steel and wood moulds. In the field of colour, the existing bibliography—Ostwald (Lozano 2006), Munsell (1969), Villalobos (1947) and the Natural Colour System, NCS Colour Atlas (2004)—presents different alternatives to systematize it and pursues the purpose of ordering the colours according to some criteria. In order to systematize the colour systems or atlases exist ordered according to different principles that classify colour in ranges of lightness, saturation and hue and are outlined in figures. Little has been found on surface terminations classification, and even less on these attributes related to cement mixtures. The concrete colour obtained from the use of adequate proportions of its components is influenced not only by the surface finish, so does the roughness or gloss achieved by the contact with the mould. Therefore, colour and gloss are determinant variables in the cement mixtures appearance (Hunter 1975, Lozano 1978).

The technological evolution of the construction industry demands the use of steel moulds. However, wood is still the most common material used to make moulds due to its lower cost. Primary information states that lighter colours are obtained in steel moulds and darker colours in wood moulds, after analyzing the way in which cement particles move (Mindess et al. 2003). Another research study suggests several colour alternatives regardless the material used for the mould (López 2012). Moulds should be carefully prepared, taking care that they are free from dust and that release agents recommended by manufacturers are used (Mindess et al. 2003).

This lack of information justifies the elaboration of an Atlas of Architectural Concrete. Information gathering is performed on the base of three tips that should interact to outline the scope of this material. One of these tips is the design of mixtures with their main parameters as starting point: the water/cement ratio, which defines the mechanic strength and durability, and the pigment/cement ratio, which contributes with colour; another tip is related to the surface geometry, where the material of the moulds and the treatments performed are assumed as main factors that modify and define the different textures (Hunter 1975, Lozano 1978, Mindess et al. 2003). Finally, the third tip involves the decision regarding the tolerable limits of colour and roughness changes, based on colour and gloss measurements and visual evaluation.

This paper presents the first analyzes leading to the development of the above mentioned atlas. For this, the methodology is presented below.

Methodology

Evaluation of the Aesthetic Aspects: Colour and Evolution, Gloss and Visual Inspection

BYK-Gardner spectrophotometer programmed to measure with the CIELAB Color Space was used. Saturation (C^*) was calculated with a^* and b^* values as shown in Equation (1), (Table 1). This instrument also informs the gloss data. The colour difference among different pigment contents and the colour and gloss evolution between 7 days and 28 days were compared with the CIEDE1976 (ΔE^*_{76}) and CIEDE2000 (ΔE^*_{00}) colour-difference formulas (CIE15 2004, BS EN 12878 2005, López et al. 2016, Melgosa et al. 2004, Sharma et al. 2004). The Equation (2) calculates ΔE^*_{76} values and the Equation (3) calculates ΔE^*_{00} values. Finally, mortars' samples were photographed in visual comparator box so that all the images were captured under the same condition (Figure 1).



Figure 1. Visual Inspection Machine (left), Gardener BYK (middle) and Wooden Mould (right).

Table 1. Equations

$$C^* = \left((a^*)^2 + (b^*)^2 \right)^{1/2} \quad (1)$$

$$\Delta E^*_{76} = \left((L^*_1 - L^*_2)^2 + (a^*_1 - a^*_2)^2 + (b^*_1 - b^*_2)^2 \right)^{1/2} \quad (2)$$

$$\Delta E^*_{00} = \left(\left(\frac{L^*_1 - L^*_2}{k_L S_L} \right)^2 + \left(\frac{a^*_1 - a^*_2}{k_a S_a} \right)^2 + k_f \left(\frac{a^*_1 - a^*_2}{k_a S_a} \right) \left(\frac{b^*_1 - b^*_2}{k_b S_b} \right) \right)^{1/2} \quad (3)$$

Samples' Preparation

Two groups of mortars were elaborated. Mortars of the first group were elaborated with a 0.40 water/cement ratio while the corresponding to the second group with a 0.50 ratio. A mortar without pigment was elaborated for each group (4M and 5M) and then red (R), yellow (Y) or black (B) iron oxide pigment was added at 0.5, 3.0, 6.0 or 9.0 % ratio by weight of cement. The groups were identified as 4 or 5 before the capital letters so mortars with pigments were identified as 4R05, 4R3, 4R6, 4R9 (sub-group 40R); 5R05, 5R3, 5R6, 5R9 (sub-group 50R), 4Y05, 4Y3, 4Y6, 4Y9 (sub-group 40Y); 5Y05, 5Y3, 5Y6, 5Y9 (sub-group 50Y); 4B05, 4B3, 4B6, 4B9 (sub-group 40B), 5R05, 5R3, 5R6, 5R9 (sub-group 50B). Cement, pigment, water and sand were mixed according to the sequence indicated in the Argentine standard (IRAM 1622 2006) and packed in cylindrical recipients (10 cm in diameter and 3 cm high), whose base was made of wood treated with a release agent. This surface was treated with 1 millilitre of release agent placed on 78 cm². The moulds were manufactured especially for this test and in a way that allowed the replacement of the wooden base by another one made of different materials. After passing the mortars to the moulds these were kept in the laboratory for 24 hours, and then placed in a chamber at 21°C and 95% of relative humidity (RH) for 28 days. These conditions are suggested by the Argentine standard (IRAM 1534 2004) to obtain a uniform cement hydration (wet curing). After the curing period, all the samples were kept in a room at 21°C and 50% of RH up to start off the tests (Figure 1, right, wooden moulds).

Number of Tests

Measurements were made on the mortar surface in contact with the wood mould. Two cylinders of each mortar were prepared and each one of them subjected to five measurements, making ten tests. From their results the average values (X) were calculated to obtain the central tendency of each variable (L^*) lightness; a^* and b^* coordinates, and gloss (G), and the variation coefficients (VC) for determining the data dispersion obtained in relation to the average value.

Results and Discussion

Statistical Analysis of Aesthetic Parameters

This section shows the statistical values of colour and gloss in mortar groups made of L^* , a^* , b^* and gloss (G) at 7 days and 28 days: average value (X) and coefficient of variation CV . The ΔE_{76}^* and ΔE_{00} colour-difference and lightness-difference (ΔL^*) between both ages were presented too.

Table 1 shows the colour parameters and gloss values measured in mortar group made with a 0.40 water/cement ratio. When the measurement was performed at 7 days of cure, the L^* , a^* and b^* values depended on the pigment colour. 40R and 40B subgroups showed L^* values between 40 and 50 units; on the other hand, the 40Y subgroup showed values greater than 55

and reached 67 units of L^* . As expected, the a^* and b^* coordinates increased as the pigment R and Y increased in the 40R and 40Y subgroups, respectively. After 28 days of curing, the behaviour was repeated in terms of the L^* , a^* and b^* variations trends. In general, large increases of L^* (i.e. lighter colours) occurred in the 40R and 40B subgroups, and 4M mortar, which was exposed by the positive and elevated lightness-difference values ($\Delta L^* > 6$), and also by the important differences found between the high ΔE^*_{76} and ΔE^*_{00} colour-difference values. On the other hand, L^* values were maintained in the 40Y subgroup which showed $\Delta L^* < 6$. As expected, and as indicated by the L^* increase, the surface colour was significantly affected by the efflorescence phenomenon (Positieri 2005), situation that alerts on the wet curing effects. The variation of these measurements was very important and inquires about the colour heterogeneity and its alteration if the samples are subjected to a saturated cure; very few variables showed $VC < 5\%$, one example of it was the L^* variable of the 4M, 4Y05, 4Y3, 4Y6 and 4Y9 mortars. Values of VCs $> 30\%$ were found for the a^* and b^* variables corresponding to the two evaluated ages of 40B subgroup. On the other hand, the gloss of samples surface in contact with the wood was independent of the mortar colour and reached average values of 0.5% to 0.7% at 7 days, increasing slightly from 0.7% to 3.3% at 28 days. In this, variable too high VCs were presented for the different elaborated mortars.

Table 2 shows the colour parameters and gloss values measured in mortar groups made with a 0.50 water/cement ratio. When the measurement was performed at 7 days of cure, 50R and 50B subgroups showed L^* values between 50 and 60 units—higher values than in the 40R and 50B ones; on its part, the L^* variation in the 50Y subgroup was between 55 and 67 units. The a^* and b^* coordinates behaved as mentioned above by increasing the amount of R or Y pigment. After 28 days of curing, the behaviour was repeated in terms of a^* and b^* variations, however, the same thing did not happen with the L^* variable. In general, L^* decreased in the 50Y and 50B subgroups, which means darker colours. This is exposed by the negative values of lightness-difference ($\Delta L^* < 0$), and the important differences in the high values of ΔE^*_{76} and ΔE^*_{00} colour-difference.

The variation of these measurements was also very important and inquires about the colour heterogeneity and its variation, very few variables showed $VC < 5\%$, one example of it was the L^* variable for the 5M, 5Y05, 5Y3, 5Y6 and 5Y9 mortars; note that it was in the mortar without pigment and in those that used the same yellow pigment content as the previous group. It is also highlighted that for the two evaluated ages of 50B subgroup, values of CVs $> 30\%$ in the a^* and b^* variables were found.

On the other hand, the obtained gloss reached from 0.6% to 1.0% average values at 7 days and maintained these values at 28 days. In this variable also too high VCs were presented by the different elaborated mortars.

Table 1. Statistical values of color and gloss in mortars group made with a 0.40 water/cement ratio.

Mortars/ Statistical values		7 days				Differences between 28 and 7 days			28 days			
		L*	a*	b*	G	ΔE^*_{76}	ΔE^*_{00}	ΔL^*	L*	a*	b*	G
4M	X	48.0	1.3	8.2	0.5	18.2	16.8	18.2	66.2	0.5	6.0	1.1
	VC	4.9	13.4	9.5	9.6				2.9	16.0	25.7	8.5
4R05	X	47.1	6.3	6.7	0.7	14.6	14.0	14.5	61.6	4.6	6.5	3.3
	VC	12.9	10.4	11.8	10.6				3.7	12.9	18.8	78.6
4R3	X	45.3	13.2	8.9	0.6	12.2	12.0	11.7	57.0	10.1	9.6	0.8
	VC	7.7	14.6	>	18.6				4.6	13.3	13.3	14.1
4R6	X	46.6	14.8	9.5	0.6	5.2	5.3	5.2	51.8	13.4	9.1	0.7
	VC	7.6	19.7	28.7	15.8				7.6	20.7	26.5	16.3
4R9	X	47.8	14.4	9.1	0.6	7.1	6.9	6.8	54.6	12.6	9.2	0.7
	VC	14.3	20.5	27.1	25.8				6.0	20.9	19.4	18.1
4Y05	X	67.9	0.9	5.8	1.1	1.4	1.2	-0.7	67.3	1.0	7.1	1.0
	VC	4.3	16.8	18.5	11.3				3.2	18.4	16.4	9.0
4Y3	X	64.9	2.5	11.3	1.0	3.1	2.0	0.4	65.3	2.9	14.4	1.0
	VC	4.2	12.2	15.8	11.6				5.8	24.2	23.4	17.6
4Y6	X	61.5	4.5	18.3	0.9	4.5	2.8	2.2	63.7	4.9	22.2	0.9
	VC	4.7	24.7	27.9	10.0				3.4	15.7	17.1	10.9
4Y9	X	56.1	6.7	23.3	0.7	6.0	5.3	6.0	62.1	6.1	23.5	0.9
	VC	2.6	6.7	8.3	15.0				2.8	10.9	13.7	13.3
4B05	X	51.2	0.6	3.9	0.6	9.3	8.7	9.3	60.5	0.5	4.6	0.9
	VC	8.8	29.3	21.2	20.8				4.8	19.8	10.1	11.2
4B3	X	50.4	0.1	0.8	0.7	8.2	7.9	8.2	58.6	-0.1	1.7	0.8
	VC	12.8	>	>	23.2				7.3	>	16.0	14.0
4B6	X	44.8	0.0	0.0	0.6	5.8	5.6	5.6	50.4	0.0	1.4	0.7
	VC	17.0	>	>	27.5				8.2	>	23.1	19.5
4B9	X	43.5	0.0	-0.2	0.5	8.7	8.6	8.6	52.2	-0.1	1.0	1.0
	VC	10.9	>	>	26.8				7.6	>	25.1	15.2

- > Variation coefficients greater 30%

Table 2. Statistical values of color and gloss in mortars group made with a 0.50 water/cement ratio.

Mortars/ Statistical values		7 days				Differences between 28 and 7 days			28 days			
		L*	a*	b*	G	ΔE^*_{76}	ΔE^*_{00}	ΔL^*	L*	a*	b*	G
5M	X	51.1	1.1	7.8	0.6	11.8	10.8	11.4	62.5	0.7	4.9	1.0
	VC	4.1	14.8	14.0	11.1				9.4	>	18.3	9.0
5R05	X	58.2	5.3	7.3	0.9	2.9	2.4	0.3	58.4	4.9	10.1	0.8
	VC	8.1	26.6	27.2	17.8				9.1	12.6	15.6	15.0
5R3	X	61.6	7.8	5.0	0.8	1.7	1.9	0.1	61.6	6.3	5.8	1.5
	VC	7.6	26.7	>	15.0				5.1	14.5	12.2	>
5R6	X	62.3	8.7	4.7	0.9	3.1	2.6	-2.7	59.6	8.5	6.1	0.8
	VC	9.7	>	>	19.4				9.2	29.9	>	13.6
5R9	X	61.1	9.2	4.4	0.9	5.6	4.8	-5.0	56.1	10.1	6.6	0.8
	VC	5.5	16.4	18.9	10.9				7.7	24.9	>	13.6
5Y05	X	67.2	1.5	6.6	1.0	5.7	4.7	-5.6	61.6	1.5	7.3	0.9
	VC	3.2	21.0	17.8	8.2				7.5	>	24.5	10.0
5Y3	X	66.1	3.0	11.2	0.9	3.9	3.2	-3.8	62.3	2.8	11.9	0.9
	VC	2.5	25.8	25.2	10.0				5.6	19.1	16.3	11.2
5Y6	X	63.7	4.4	15.0	0.8	4.1	3.5	-3.2	60.6	5.2	18.9	0.8
	VC	3.2	8.8	11.6	5.8				3.6	8.9	10.1	7.7
5Y9	X	60.7	6.5	21.4	0.8	0.9	0.6	0.1	60.9	6.4	22.3	0.8
	VC	1.8	8.1	9.7	10.2				2.1	11.1	10.6	7.7
5B05	X	58.2	0.0	1.0	0.7	7.0	6.7	-7.0	51.3	0.1	1.8	0.7
	VC	16.8	>	>	23.4				4.5	>	23.9	11.6
5B3	X	52.1	-4.3	-0.1	0.6	5.4	6.4	-3.5	48.6	-0.2	0.1	0.6
	VC	10.6	>	>	16.8				6.7	>	>	12.1
5B6	X	48.9	-5.4	-2.4	0.6	5.4	6.5	-0.3	48.6	-0.3	-0.6	0.6
	VC	20.0	>	>	28.7				12.1	24.0	>	26.1
5B9	X	56.7	-6.8	-1.5	0.8	8.2	9.2	-4.9	51.8	-0.3	-0.5	0.6
	VC	2.2	>	28.2	9.4				2.3	>	>	10.7

> Variation coefficients greater 30%

Sheets Elaboration to Make the Atlas

Results were summarized and represented in six pictures to allow quantification and visualization of the different coloured mortar groups. Figure 2 shows the pictures for mortars 40R. At the top of the figure, a header appears in a table forms with the following data: the pigment colour, the pigment/cement relationships (p/c:%), ages of colour measurement and visual inspection, wet curing conditions, the volume of mortar paste (pigment, cement and water), and the mould material type. Then the graphics C^* vs. p/c, L^* vs. p/c, G vs. p/c, and ΔE^* (CIEDE1976) y ΔE (CIEDE2000) values appear. Finally, photographs of mortars without pigment and with 0.5, 3.0, 6.0 and 9.0% of pigment contents are shown. The information is summarized for 7 days (up) and 28 days (down). The wood grain could also be observed on the surfaces due to the mortar mixture-wood surface interaction. At 7 days, C^* changed from 10 to 20 units as increased red pigment, instead L^* (47 units) as well also the gloss (0.6%) remained unchanged. The colour differences (ΔE^* and ΔE) were < 2 units when changing the pigment content from 3.0% to 6.0% (see ΔE^*2 and $\Delta E2$), this suggests that it is unnecessary to add pigment since the colour changes very little.

At 28 days, the changes were very noticeable in the L^* as it increased in each mortar values was > 50 units. In turn, as more pigment was added, L^* decreased from 50 to 70 units. Furthermore, colour differences were very important. It should be noted that the G values increased dramatically at first and reached similar values (0.6%) than at 7 days. Finally, the mortars appearance is shown: left unpigmented mortar, to the right it can be seen as mortars are saturated at increasing the pigment content. This analysis allows suggesting that the addition of more than 6% of red pigment is not meaningful. An important colour variation was observed between the 7- and 28-day curing periods. However, associated to the strong formation of calcium carbonate deposits, the gloss increasing was a discouraging result.

Color	Pigment/Cement (%)	Age (day)	Wet Curing	Vol. of Paste (%)	Mold
Red	0.0; 0.5; 3.0; 6.0; 9.0	7; 28	21 °C, 95 % HR	46	Wood

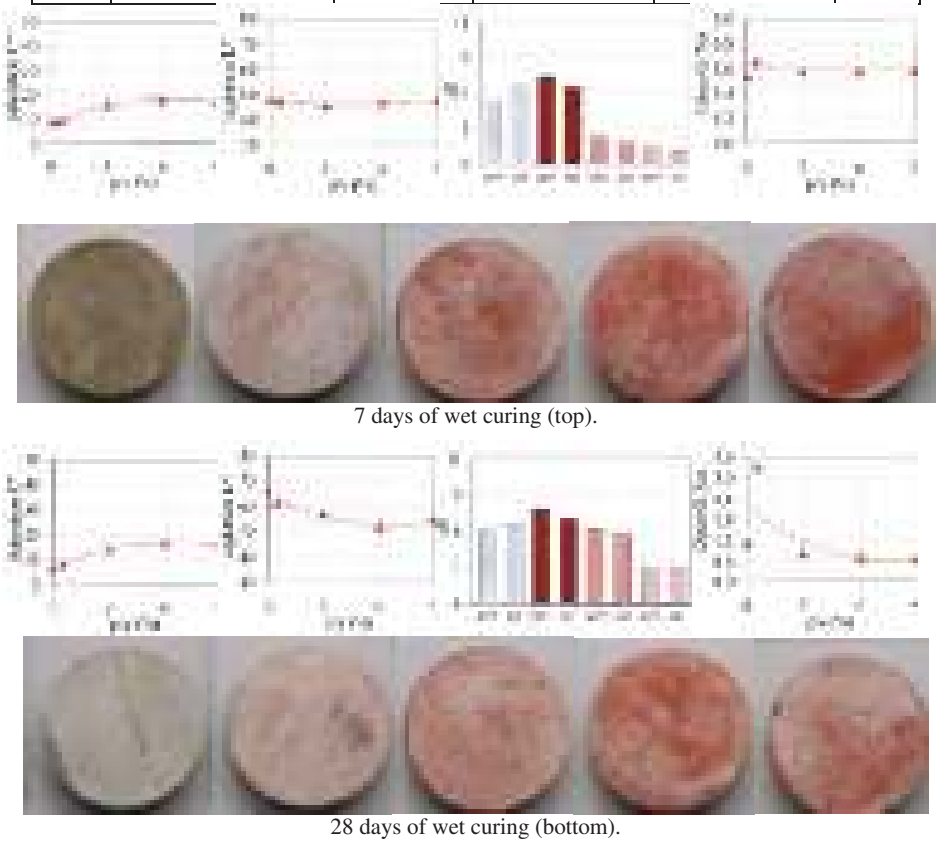


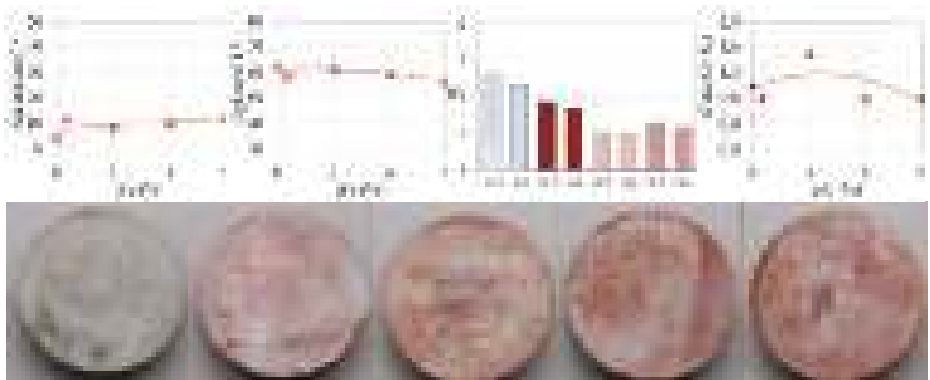
Figure 2. Red mortars (40R). Water/Cement = 0.40.

Figure 3 shows the pictures for 50R mortars, when the water/cement ratio was equal to 0.50 after 7 days, and a slight increase in saturation by 10 units and an increased lightness, in almost all the mortars is observed. It acquires the gloss values of 0.70% similar to that obtained in the mortars 40R. At the age of 28 days, the values of saturation, lightness and gloss had similar values to those measured at the age of 7 days. However, colour differences are less evident at this age.

Color	Pigment/Cement (%)	Age (day)	Wet Curing	Vol. of Paste (%)	Mold
Red	0.0; 0.5; 3.0; 6.0; 9.0	7; 28	21 °C, 95 % HR	52	Wood



7 days of wet curing (top).



28 days of wet curing (bottom).

Figure 3. Red mortars (50R). Water/Cement = 0.50.

Figure 4 shows the pictures for 40Y mortars. These mortars have a water/cement ratio equal to 0.40. Note that the gloss is similar to those previously observed and increases slightly as the time goes on. Figure 5 shows the picture for 50Y mortars. It was very similar to 40Y mortars.

Color	Pigment/Cement (%)	Age (day)	Wet Curing	Vol. of Paste (%)	Mold
Yellow	0.0; 0.5; 3.0; 6.0; 9.0	7; 28	21 °C, 95 % HR	46	Wood

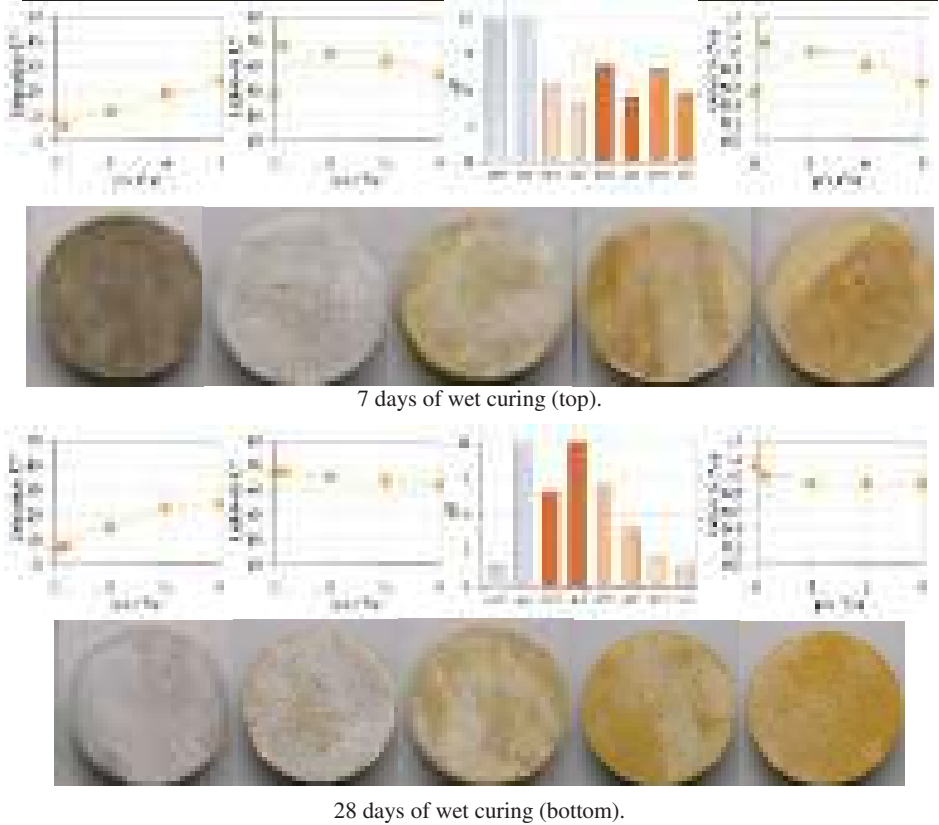
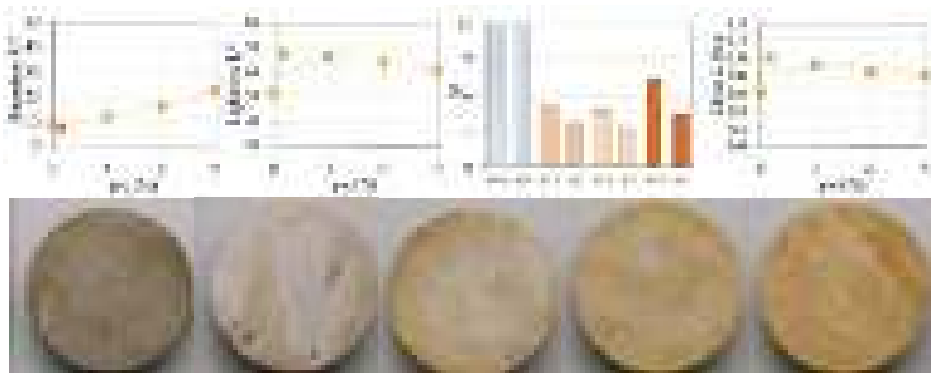
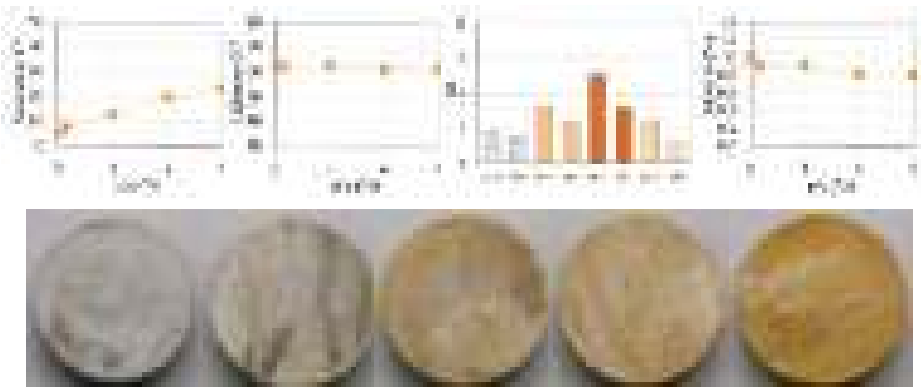


Figure 4. Yellow mortars (40Y). Water/Cement = 0.40.

Color	Pigment/Cement (%)	Age (day)	Wet Curing	Vol. of Paste (%)	Mold
Yellow	0.0; 0.5; 3.0; 6.0; 9.0	7; 28	21 °C, 95 % HR	52	Wood



7 days of wet curing (top).

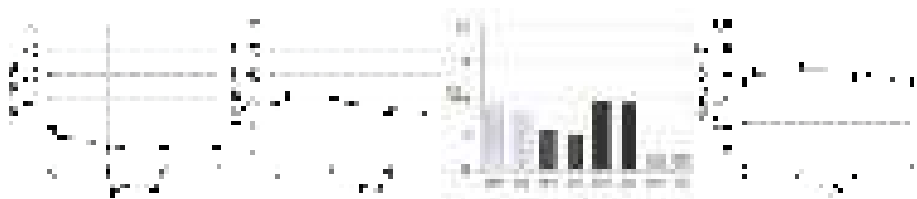


28 days of wet curing (bottom).

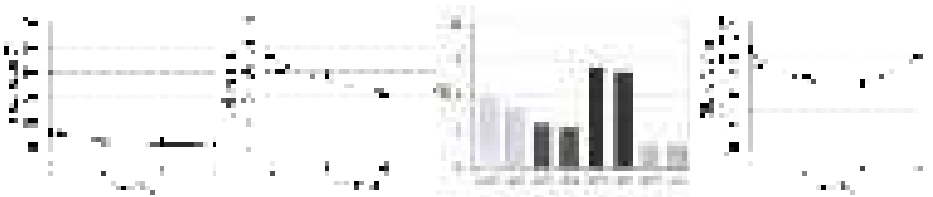
Figure 5. Yellow mortars (50Y). Water/Cement = 0.50.

Figure 6 shows the pictures for 40B mortars. As expected the saturation values were very small and as the pigment content increased, the lightness decreased from 50 to 40 units, the gloss is behaving similarly to the above and note in this case, the significant loss of lightness happened after 28 days of wet curing. It seems that added black pigment had no effect.

Color	Pigment/Cement (%)	Age (day)	Wet Curing	Vol. of Paste (%)	Mold
Black	0.0; 0.5; 3.0; 6.0; 9.0	7; 28	21 °C, 95 % HR	46	Wood



7 days of wet curing (top).



28 days of wet curing (bottom).

Figure 6. Black mortars (40B). Water/Cement = 0.40.

Figure 7 shows the pictures for 50B mortars. It appears as if no black pigment has been used.

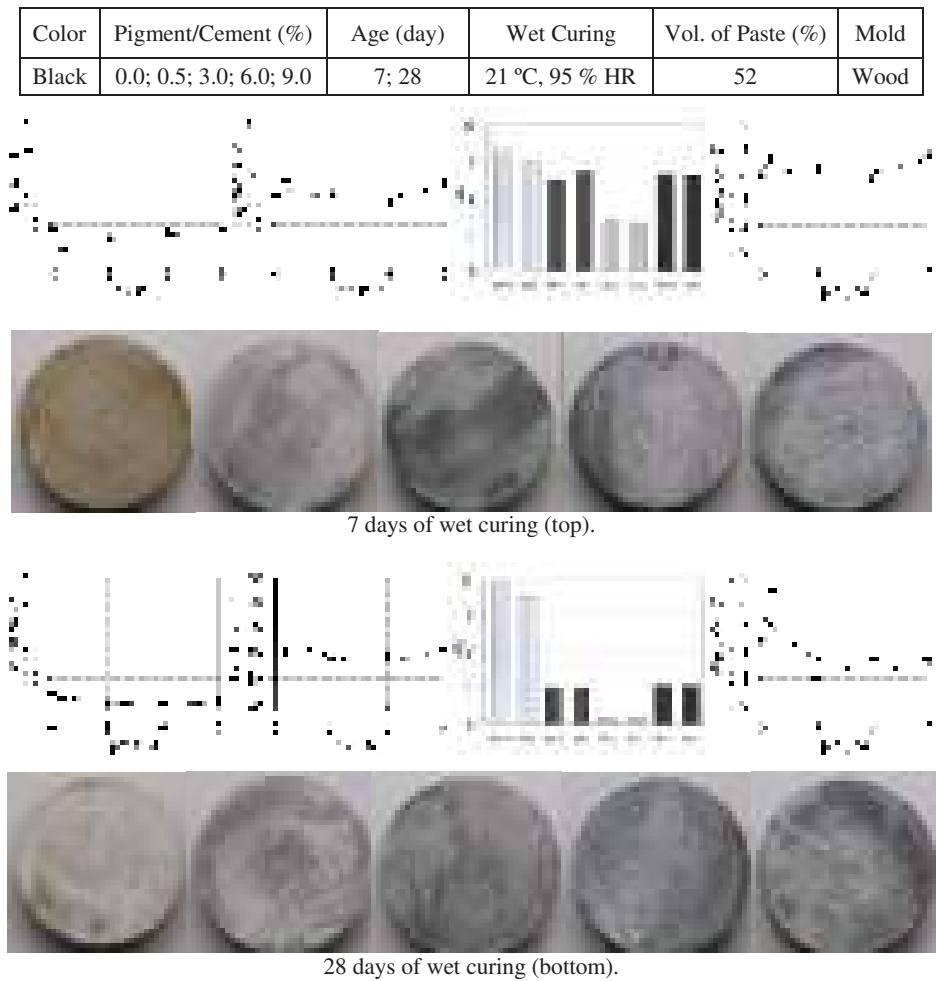


Figure 7. Black mortars (50B). Water/Cement = 0.50.

Some Examples of Architectural Concrete in Argentina

Architectural concrete was the building material chosen by the engineer Francisco Salamone (1897–1959) to form his works. Many have been the typologies adopted by him. In addition, those that had their imprint due to their ‘futuristic and technological’ qualities were of public origin. Located in the Province of Buenos Aires in Argentina, the goal of these public works involved three types of buildings: municipal ones, parts of cemeteries, and slaughterhouses. In general, in front of a municipal building a plaza was designed and erected.

The modern movement through Art-Déco manifested the ‘futuristic and technological’ imprint that represented him. This artistic demonstration could be materialized with architectural concrete, which offered the aesthetic qualities required by the designs. The concrete and the constructive techniques used to obtain clean and pure geometric forms were innovative at the time (1930–1940) and their influence spread across the Province of Buenos Aires (Gutiérrez et al. 2001, Traversa 2016).

Figure 8 shows the main entrance to the cemetery located in Laprida City, Buenos Aires Province. The construction is very imposing and the forms well defined. For its part, Figure 9 shows a water fountain located in the plaza of the same city, while Figure 10 corresponds to a flowerpot in the Plaza Juan Pascual Pringles, Colonel Pringles City, also in Buenos Aires Province (López et al. 2007).



Figure 8. Francisco Salamone: Entrance of the Cemetery (top), Laprida City, Province of Buenos Aires. Detail (right). Photo: Anahí López, 2014.

Figure 9. Francisco Salamone: Water Fountain (bottom), Laprida City, Province of Buenos Aires. Photo: Anahí López, 2014.



Figure 10. Francisco Salamone:
Flowerpot, Plaza Juan Pascual
Pringles, Colonel Pringles City,
Province of Buenos Aires.
Photo: Sebastián Márquez, 2005.

Taking into account that the aesthetic aspect is the most highlighted characteristic of these artworks along with their historical significance, their deteriorating state of conservation alert us to the need to propose methodologies that allow us to correctly characterize the construction materials that were used with the aim of performing the necessary maintenance and repair work.

Conclusions

The present work shows the first analyzes leading to the development of an atlas of architectural concrete. In particular, the interaction between cement mixtures and wood moulds was studied.

The colour was defined by the Lightness (L^*), a^* and b^* coordinates. The colour difference among different pigment contents and the pigment colour evolution were compared with the CIEDE1976 and CIEDE2000 colour-difference formulas. The gloss was also evaluated.

Statistical values of colour and gloss show high values of variation coefficients. This fact warns about the lack of homogeneity of the colour and about corrections to develop during the wet curing.

This paper presents 6 pictures of summarized information on architectural mortars necessary to develop an Atlas of Architectural Concrete. They include the following data: 1) pigment colour; 2) pigment/cement relationships ($p/c\%$); 3) ages of colour measurement and visual inspection; 4) wet curing conditions; 5) volume of mortar paste (pigment, cement and water); and 6) mould material type. Then the graphics C^* vs. p/c , L^* vs. p/c , G vs. p/c , on which ΔE^* (CIEDE1976) and ΔE (CIEDE2000) values appear.

This study allows determining the optimum pigment content and thus avoiding an unjustified increase in its content.

Acknowledgements

The authors gratefully acknowledge the Comisión de Investigaciones Científicas de la Provincia de Buenos Aires (CICPBA), and the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) of Argentina by their financial support for this research. Authors thank TENSAC S.H. for kindly providing release agent for the experimental tests.

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Цветовая идентичность места: исследование случая Нарборо Роуд в Лестере (Великобритания)

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Аннотация

Кейс-стади представляет результаты визуального и хроматического анализа уличного ландшафта в районе Нарборо Роуд в городе Лестер (Великобритания). Целью исследования является определение механизмов участия цвета в процессе формирования идентичности места. Проверка выдвинутых гипотез проводится в различных контекстах и на разных уровнях. С учетом сложного характера городского пространства используется комплекс методов и подходов, ориентированных на выявление цветового узора городской ткани. Особое внимание уделяется обоснованию необходимости комбинирования в проекте, посвященном цвету в городской среде, визуальных методов с этнографическим описанием. Сложность цветового ландшафта Нарборо Роуд позволила осуществить эмпирическое исследование отдельного случая, которое показало, что цветовое разнообразие можно рассматривать как элемент дизайна и использовать для формирования идентичности места в городском контексте. Более того, переход от ландшафта брендов на более высокий уровень социокультурного проектирования способствует росту творческого потенциала мышления при разработке цветовых стратегий для обустройства городских районов.

Colour Identity of Place: A Case Study of Narborough Road, Leicester, UK

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Abstract

The case study presents visual research and colour analysis of a streetscape in the Narborough Road area of Leicester, United Kingdom. The approach aims to analyse how colour can contribute to the construction of the identity of a place. The studies extend across different contexts and scales in order to stimulate thinking about the variety of possible outcomes. With respect to urban complexity, the approach includes mixed methods incorporated from various perspectives and intended to identify colour presence in the urban fabric. In particular, the colour research project in urban environment emphasises the needs to entwine visual methods with an ethnographic focus. The diversity of the colourscape at Narborough Road provides an empirical case study demonstrating that 'colourful-

ness' can be considered as a design feature for constructing identity in the urban context. Moreover, the shift from brandscape to cultural site encourages more creative thinking for new colour strategies of place making.

Introduction

The case study presents a systematic observation and colour analysis of a streetscape in the Narborough Road area of Leicester. The practice aims to analyse how colour contributes to the construction of place identity. The combined studies are across different contexts, scales and perspectives in order to enable the readers to think about the variety of research outcomes.

This project intends to address the importance of visual ethnographic approach to the methodology. On the one hand, the project starts with an investigation of the people who were already familiar with the idea under study. I sought to establish coding for the narrative data from earlier interview scripts that informed the process of deciding where and what to photograph. These interviews and archival techniques have been supplemented and extended through visual methods and analysis.

On the other hand, the visual research sheds light on certain aspects of the colourscape of the street, retail setting and their competition for visibility and the influence of specific kinds of surface materiality on production. It also provides evidence through which we can observe management strategies applied distinctively to shop fronts, pointing towards various degrees of perceived entitlement about their presence within the city fabric.

This paper will first focus on understanding the location and function of Narborough Road. The second part will deal with the colour identity of the place. The third part will demonstrate a shifting pattern of the streetscape and, finally, the fourth part will address the main findings and reflections.

Narborough Road as an 'Introduction' to Leicester

Narborough Road is a fragmented pattern of commercial, residential and civic service mixed uses that overwrite the street's new framework of sectors and zones. Over the years Narborough Road has been transformed from being a quiet residential area to a place full of small retailers. This process of social and economic change determines the mechanism of spatial structure, meaning and function of place when redefined. Urban meaning and functions jointly determine urban form, that is the symbolic expression of the processes that are materialised as a result of them (Castells 2003: 24). Urban form is thus the combination of materials, colours and volumes in physical setting.

Narborough Road has changed dramatically since 2010; the study of history of arrival illustrates a tendency of more diversity (Hall et al. 2015). This shopping street has owners from different parts of the world and is thus named the most multi-national road in Britain by academics in 2016 (Robertson 2016). The process of development of Narborough witnesses the expansion of city into surrounding rural hinterland, absorbing villages into the urban fabric (Ravetz et al. 2013: 20).

Because from where I live I have to drive down Narborough Road to get into Leicester. It is kind of first introduction to Leicester. (Dennis, English Lecturer)

First time when I visited Leicester, I drove here and I came straight to Narborough Road, as an introductory to Leicester. (Mangat, Architecture Student)

Based on the interviews, Narborough Road could be seen as an introduction to Leicester. The introduction can be analysed at least in two aspects: Firstly, in terms of its specific location. Narborough Road is located at 6 miles southwest of Leicester city centre. According to Leicester City Core Strategy (LCC 2014: 59), Narborough Road falls in the Westcotes neighbourhood, which is regarded as part of inner city areas of Leicester. It connects to highway A5460 as a traffic artery leading in and out of the city. The A5460 links the motorway network on the southwest side of Leicester to the city centre (Figure 1).

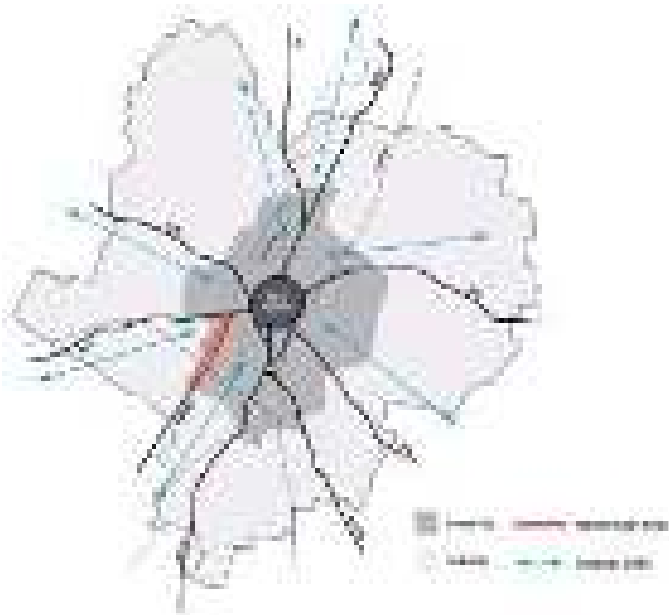


Figure 1. Location analysis of Narborough Road. Source: Leicester City Council.

In examining the location, the basic spatial ordering in both perspective and hierarchical sense needs to be understood. The urban morphology of Leicester is framed into a typical British school, which is the concentric-zonal model that offers a descriptive framework for land use. In this model, differences in land values were regarded as the mechanisms by which different functional groups were distributed in space in an orderly and efficient way (Herbert and Thomas 1990: 134).

Narborough Road is located in the inner city area, which is functioning as a connection between suburbs and the city centre. The extensive of Narborough South Road even links the peri-urban to the suburban. The particular position of Narborough Road then becomes more complicated than a normal high street. To a large extent, the street can be seen as urban-rural interface, with an emphasis on the mixed character of these areas without fixing them on a single, simple gradient (Ravetz et al. 2013: 16).

The movements for commuting and logistic, on a daily basis, produces a counter flow and creates an integration of inner and outer city areas. Overall, three and a half commuters come into Leicester daily for every one travelling out. (LCC 2006: 5). Mobility increases the sense of place (Doran 2013: 10). I experimented with video cameras to record street scenes from a range of points. The video captures the chaotic bustle in car flow especially for lorries. It created an opportunity for people to interact with the street, and expands its audience and potential consumers.

Secondly, with regards to the generic situation, Narborough Road is Leicester in miniature in which the multiple ethnic groups and cultural setting of the street are representative of the diversity of Leicester. In terms of ethnic composition, according to the 2011 census the high percentage of race diversity is significant. Leicester's population is from a black and minority ethnic background, the largest proportion in the whole of England and Wales, and just over a third of its residents were born outside the UK. It is little wonder then that Leicester has often been described as the first city in the UK where its minority residents are projected soon to become the majority.

The long-established retailers on Narborough Road include shop owners mainly from East Europe, Africa and South Asia. Based on a recent research, Hall et al. (2015) indicates that there are 23 countries of birth represented among the 108 proprietors. Shopkeepers from 23 countries include: Afghanistan, Britain, Cameroon, Canada, China, India, Iran, Iraq, Jamaica, Kenya, Kurdistan, Lithuania, Malawi, Pakistan, Poland, Somalia, Sri Lanka, Tanzania, Thailand, Turkey, Uganda, Zambia, Zimbabwe. New communities arriving in the city began to establish characteristic buildings and street scenes that give Leicester much of its present distinctiveness (Taylor 2016: 237).

Narborough Road is based not so much on the presence of one particular community but on the wide range of business represented there (Taylor 2016: 286). The aggregation of multiple cultures has a large impact of diversity, which is significant in Leicester. Multiculturalism is a prominent urban phenomenon in Leicester involving the sociological and ideological change in policy making in public spaces. Councillor Abdul Osman (LCC 2014) in *Leicester City Local Development Framework: Core Strategy* states that Leicester is home to a diverse range of ethnic and faith communities. Diversity thus becomes a core value of Leicester, which is distinct from other places in the UK.

Although some of the local interviewees, e.g. Valerie Samlley, think Narborough is a shallow representation of Leicester because the image of the street does not capture the typical 'social relations and community structures

of residents' (Rodger and Madgin 2016: xiii). The argument may worthwhile to discuss further as a separated issue. But at least it cannot be denied that Narborough Road is a place of identity that reflects the diversity as the main characteristic of the city. The unique historical, geographical, social and cultural context also will be helpful to explain and understand the meaning of the colourscape of the street.

Colourfulness as Identity

Brand Identity and Colour

The different colours of shop fronts of the place just make it more attractive and beautiful in that kind of way. This is interesting because it is more than just an attractive and beautiful presentation, it also refers to culture, which is from the inhabitants' original country. This is how people adapt to the culture of colour as a standpoint. (Mangat, Architecture Student)

The colourscape of Narborough Road includes architectural colour, ground colour, colour of public signage, tree colours and mobile colours. Few interviewees take these urban elements as the unique point of the street. The most distinctive colour on Narborough Road for either insiders or outsiders is the colour of retail. From the coding for interviews, the key words to describe colour and colour object show that 'shop fronts' and 'shop signage' are often mentioned. The visual research thus focuses on the meso level to explore colour and environment relations on Narborough Road, gathering a physical experience of colourscape through streetscape (Figure 2).



Figure 2. Investigation area on Narborough Road. Map Source: Leicester City Council, 2015.

In total, 116 retail shops along Narborough Road have been documented and analysed in terms of corporate identity, corporate colour and colour combination of shop front and signage, as well as each retail design for their shop front and signage in corporate with individual brand strategy (see Appendix). For example, most of the shops excise theme colour as part of the corporate identity. According to statistics generated from the visual research, 17% of the retail establishments implement one colour strategy, 44% two themed colour combinations, 23% use three colours, 13% uses four colours and 3%



Figure 3. Typical retail elevation on Narborough Road.
Scheme and Photo: Johnny Jie Xu, 2016.

applies more than five colours for their corporate image. Although shops use more than one colour, the colour theme of signage and shop front consists the same in hue, so that a prominent colour still can easily be identified. In this sense, individual shops are operating a coherent and consistent colour system to portray their brand images.

The shop owners normally have very similar material used in decoration (Figure 3). Colour seems to be a consid-

erable way to identify and distinguish themselves from others. Leicester City Council runs a competition for granting shop owners to improve the quality of shop front design (City Mayor 2016: 24). This policy encourages retailers to invest on their brand image in terms of the use of material and construction method. The design and condition of shop fronts are critical in defining the attractiveness of street frontages and shopping areas. A visually attractive shopping environment is important to the image of the City as a whole. (LCC 2006: 160). At least both policy makers and shop owners realise the importance of shop front colour as an important part of the city image. From a practical perspective, many shops highly implement their corporate colour into retail design strategy.

The use of a corporate colour gives the product a strong market presence. Colour increases brand recognition by up to 80% (Adams et al. 2008, Morton 2005). Large corporations such as Coca-Cola and Marks & Spencer use red and green respectively to identify themselves and other brands under their domain. Consistent colour of a brand can be a colour affiliated with a strong brand identity (Triedman and Cullen 2004: 77). The colour choice of a brand also reflects the identity of the target audience in terms of its age, gender and culture. Corporate identity determines the individual shop has a unique address for its position and what the brand stands for.

Narborough Road as an aggregation of retail shops that require the brand should stand out from its competitors. A corporate identity programme thus helps a company in first, identification, second, differentiation (Bernstein 1984: 162). Chromatic colour provides distinctiveness and character to a sign (Arnkil 2013: 146). Thus, the corporate colour helps to enhance the brand image and increase recall of the brand. In some occasions, a consumer is able to find the shop only by its clear corporate colour instead of the unit number or name of the shop. Colour, in this sense, provides a coordinate for navigation in an urban wayfinding system.

Moreover, selling environment (place and economy state) sets the scene for the identity exploration by establishing the brand's in-market context (Upshaw 1995: 49). An individual retail shop is implicit within an internal and external relation into a sense of place by its material coalescence. Le Corbusier (cited in Porter 1982: 110) points out how individual façades subtly demarcate and communicate differences between 'public' and 'private' zones. The highly contrastive architectural colour used to decorate a shop is a denotation to declaim a territory boundary.

This internal-external relation also implies the identity is constructed by a particular perspective. Colours, names and logos of a brand contribute to what is referred to as its 'identity'. Brand identity unifies a self-image and public image in a synthesis of insiderness and outsideriness. A company when it communicates on its own behalf or that of its brands must allow for diversity (Bernstein 1984: 138). It is not necessary for shop owners to be aggressive to gasp more consumers, but it addresses the importance of a brand image in being capable to outreach diverse audience from various social and cultural groups.

Retail Colourscape of Narborough Road

The extraordinary variety of shop signs, posters and display produce a street scene that reflects another dimension in the city's social and economic diversity (Taylor 2016: 286). The retail construction accordingly needs to be understood as part of a visual regime shaping understandings of Leicester's urban environments. Narborough Road as a shopping environment uses the display and visual communication approaches of design to create more engaging and meaningful interaction with customers.

Research reveals that all human beings make an unconscious judgment about the environment or item within ninety seconds of initial viewing and between 62 percent and 90 percent of that assessment is based on colour alone (Adams et al. 2008: 36). Therefore, colour and colour contrast are considered to provide the clearest noticeable differences in terms of environmental perception (Rapoport 1982).

As mentioned in the previous section, the corporate colour constitutes various brand identities in a streetscape. The high contrast colours form a pattern on the external lay-



Figure 4. Window displays on Narborough Road.
Photo: Johnny Jie Xu, 2016.

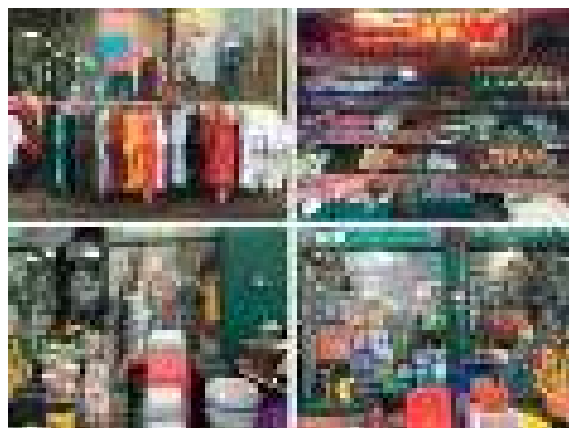


Figure 5 (top four). Merchandise displays on Narborough Road. Photo Johnny Jie Xu, 2016.

Figure 6 (bottom four). Advertisements of retail windows on Narborough Road. Photo Johnny Jie Xu, 2016.



er of the street. Apart from the shop front and signage, merchandise display at the front of the shop and window display also contribute significant colours to visual perception (Figure 4). The operation of retail format differs because of different regulations and industry structure in market (Ferne et al. 2015: 9). The particular retail format on Narborough Road allows the extension of display of visual merchandising outside the shop, which is associated with the street structure as a distinctive pattern in contrast with other high streets in the city (Figure 5).

Retail windows are created for showcasing various merchandise that attract the pedestrians who pass by the shop. The physical setting does not only serve the purpose of displaying but as a medium to increase the interaction. The wide range of commodity is very likely to convert the outsiders to potential consumers. In addition, commercially selling things to people often

means selling them an identity (Jenkins 1996: 7). Identity and consumption has close connection whereby commodity was imprinted by certain culture that shared value within a particular social group.

Nevertheless the poster and advertising can be found anywhere along Narborough Road (Figure 6). Visual communication through posters and lightboxes extends the business opportunities to approach potential customers. Colour is an integral element of corporate and marketing communications (Aslam 2005). Random posters appear in the street often would disturb the eye of pedestrians. But the interruption of visuals in a sense has a large impact on the experience of the environment.

In order to analyse colourscape of the street, it requires reviewing and re-thinking of the delicate relation between visual objects and the built environment. The notion of documented colourscape on Narborough Road is to help to interpret the unique dynamic scene of the street. It should be seen as a representation that intends to explain the structure of colourscape and process to constructing identity of Narborough Road as a whole.

Colourfulness is Identity

I spend years and years driving up and down Narborough Road, which is a very colourful place. As well, you can see any colour and different languages all down the road. (Dennis, English Lecturer)

Go to Narborough Road, they have so many nations. They probably prefer many different colours. (Mangat, Architecture Student)

In the retail colour survey of Narborough Road, 76% of the corporate colours use at least one primary colour, which remains in a high saturation and brightness level. Saturation is the colourfulness of a colour relative to its own brightness (Fairchild 2004). In this sense, a highly saturated and bright colour stimulus is vivid and intense, and can be described as colourfulness.

In a large scale, the colours of corporate identity in the street are in contrast to each other creating a colourful scene. Colourfulness thus presents an identity as a whole in visual perception. The convention of colour identity in both colour theory and practice is often to look at specific hues in relation to others (Cheskin 1951, Moon and Spencer 1944, Billger 1999). Due to the much more complex colour relationship, it seems colour identity goes beyond colour contrast and harmony framework in the textbook.

From the case of Narborough Road, colourfulness has a visual quality that distinguishes it from other places that have been understood as identity of place. Colourfulness implicitly suggests variety and individuality of colour in terms of colour hues and colour combinations. It can be argued that colourfulness should be considering scientific terminology to describe the visual phenomena in colour theory. Diversity of colourscape on Narborough Road provides an empirical case to demonstrate that colourfulness could be considered as a design solution for constructing identity in the urban context as well.

Individual colour including signage colour, colour of merchandise, and poster colours is one of the configurations of retail design. It describes the colour feature on different levels, scales and contexts. For example, a highly saturated colour is a type of colour pattern used for shop fronts to catch immediate attention and enhance the brand image. At the macro-scale, colourfulness is another example of colour patterns creating a rich visual experience and hence constructing an identity of place.

still not many retail shops, instead there were warehouses, according to one of the interviewees. This means the function of the street was mainly for logistic purposes because it connected the outside and inside of the city. Today, the local plan already includes Narborough Road within the area of the inner city (Figure 7). The expansion of the city's urban boundary has resulted from wider economic, social and cultural dynamics of change. (Ravetz et al. 2013: 14).

The City Council (Visit Leicester 2015) introduces Narborough Road as a shopping street and commercial place. Narborough Road presents a total variety of all kinds of small brand identities or 'a collection of identities' (Doran 2013: 72). Of the concept of 'scapes', a brandscape is used to describe the pronounced corporate competition in a place. The 'scape' is a perspective depending on the situation of those navigating their way within it and on how they view these scapes, and how they perceive and act upon it (Landry 2006: 45).

Narborough Road is not a venue only for consumption, but it is a place for exchanging social experience and mediating cultural memories. The street shops with their settings provide the opportunity for inhabitants to meet up with neighbours and gather information about the community. At the same time, shopping becomes a social activity; the multi-race shop owner and staff are sharing the same social identity with inhabitants as members of the community. Moreover, this move can be seen as part of 'reshaping collective memory', it is to foster inter-ethnic relations, by reminding the public of the benefits of migration to the city (Herbert 2016: 330).

An image of Narborough Road becomes symbolic in a cognitive process that suggests cultural variability of urban environment. The rich colour meanings of culture acquire a connotation beyond its commercial purpose. The corporate identities contribute to a structure of cultural identity of place. This shift and change of street patterns through artistic creation can reshape a shopping street to a cultural landscape in a city. Colour corresponds to the creative input and production and ascribes specific associations in a particular cultural context. The visual of retail colourscape may explain and elaborate the deep meaning of colour conventions from historical and geographical dimensions, which emphasise more ethnographic and cultural aspects rather than a single perceptive of economy and consumption.

A Mural Project

This idea arose in 2013, when we thought of making some changes to shops and shop fronts. My friend said why don't we paint a beautiful scene from a Mediterranean country on the shop front. We found an art student to help us to finish the final piece. (Ufuk, Shop Owner) (Figure 8).

Obviously you can see the colours: blue sea, green hills and white mosque, which reflect Mediterranean cultures and our cultural identity. (Ufuk, Shop Owner)

A brand culture indicates not only what they are selling but also where

they are coming from. Restaurants of Narborough Road often have a strong and clear statement about the originality of the cuisine. The food or products reflect a prominent cultural identity of corporate brands. In a sense, a retail shop is selling their identity.

Figure 8. Mural on the shop front, Yesim Restaurant at Narborough Road. Photo Johnny Jie Xu, 2016.



It is often argued that people need a sense of identity, of belonging to a specific territory and/or group. Individuals need to express a sense of belonging to a collective entity of place, and of individual identity, which may be achieved by physical separation or distinctiveness, and/or a sense of entering into a particular area. Design strategies can emphasise these themes (Carmona et al. 2003: 97).

In Leicester City Local Development Framework: Core Strategy (LCC 2014: 40), the City Council suggests that new developments of urban form and character should achieve the urban design objectives:

- Contribute positively to an area's character and appearance in terms of scale, height, density, layout, urban form, high quality architecture, massing and materials;
- Create a sense of identity and legibility by using landmarks and incorporating key views within, into and out of new developments.

Shop owner Ufuk's practice, though, has little impact on the streetscape at the macro-scale, but at the micro-scale, the shop front's mural significantly changes the overall appearance. However, by injecting cultural identity to the brand image, it becomes a design turn that creates the effect of 'museumisa-

tion' of space (MacLeod 2004: 64). The painted wall may offer widening access through the cultural interpretation.

With the Mediterranean landscape, the shop front elaborates and enhances the meaning of their authenticity. This in turn allows a sense of place which is extroverted, which includes a consciousness of its links with the wider world, integrating the global and the local in a positive way (Massey 1993: 66).

As Roland Barthes says, it is not what the object is or does, in any concrete sense, which give it its attractiveness: rather, it is what it signifies (Barthes 1973). Even though we perceive a similar hue of colour, the meaning of colour will vary in a different cultural context. Human response to colour, or actual hue, is largely a matter of cultural conditioning (Claus and Claus 1971: 18). A wide range of different ideas is connected to the same colour (Tomić and Marić 2011: 316). This determines the level of understanding of colour meaning from different cultural groups.

On Narborough Road, although the corporate colours of retailers have great involvements in sophisticated cultural meaning, outsiders hardly do interpret the original information that is likely to obscure the simple branding convention. One of the blind spots in city-making is 'cultural literacy'. Landry (2006) explains cultural literacy is the ability to read, understand, find significance in, evaluate, compare and decode the local cultures in a place. This allows "one to work out what is meaningful and significant to people who live there" (Landry 2006: 245).

On the other hand, the shift from commercial to cultural conception supplies the basic information—including symbols, patterns and meaning (Zukin 1995: 11). In this mural project, the landscape painting is a representation of Mediterranean scenery, which embodies a regional culture intertwined with originality and regional identity. As a source of images and memories, culture symbolises 'who belongs' to specific places (Zukin 1995: 1).

When assessing the city, in the various levels of public art, landmarks and other elements that form the characteristics of a place, there is a missed opportunity to enhance the meaning of these objects through a large connected story (Fleming 2007: 10). A meaningful environment corresponds with a high degree if the individual's social identity which, through the ability of social and spatial orientation, is likely to include feelings and familiarity and security (Öncü and Weyland 1997: 75).

One of the issues facing Leicester city is improving the image and perception of the city (LCC 2014: 21–22). The solutions of local development should be provided in a quality of creativity. It implies that the strategy for urban development will not only be restrained in conventional ways but also encourage the use of imagination and innovative ideas to make positive changes. To align with the core strategy (policy) of Leicester city thus requires designers and artists would be able to involve in the city-making and improve the quality of the city.

A new cultural colour strategy thus could be implemented into design that enables designers and artists to take a more human-centered approach in their work. Every image they created has the focus that can shift from commercial to experiential creation including creative and cultural input for thinking about the art of making place. To these clear and differentiated forms people have made strong

attachments, whether of past history or of their own experience. Every scene is instantly recognisable, and brings to mind a flood of associations. The visual environment becomes an integral piece of its inhabitants' lives (Lynch 1960: 93).

Shift from Outsider to Insider Perspectives

Underlying peri-urbanisation is the changing nature of the city itself, as well as the physical expansion of urban or suburban form, there are wider economic, social and cultural dynamics of change. (Ravetz et al. 2013: 14). Insider and outsider perspectives thus are interlinked and nested on different spatial scales. Changing perspectives can be a specific method that is used for analysing different mixed views and confront each another in this case study of Narborough Road.

The colours are not merely a visual stimulus or a physical signal, but rich in cultural meaning, which provides opportunities for people to read and understand. By repeating specific colours and emphasising the association with certain ideas, the cultural meanings of colour will potentially become symbols of representations. Even like the symbolic meanings of a corporate identity, which is retrieved from self-cultural identity, at the same time it tends to be accepted by the same cultural group.

In terms of the role of colour in urbanscape, this is the means to store and transmit the historical and cultural memory (Żybaczynski 2014: 91–92). Culture can also play a major role in encouraging regeneration, particularly in the vicinity of the river and canal and areas of historic and industrial importance, to form hubs or clusters of creative industry and cultural facilities. It is also important in attracting tourists, visitors and new residents to the city (LCC 2014: 90).

However, the cultural streets and districts have not yet been included in the list of cultural infrastructure development in Leicester Local Plan. Design should be seen as linking the economic to the cultural, as both articulating and enacting social relations and human behaviour (Knox 2011: 36). The colours of a cultural site increase the familiarity of the environment for outsiders.

Urban colourscape are shot through with complex layers of intersubjective meanings and affect—people's collective emotional responses to their environment, to each other, and to the patterns of local economic, social and cultural activities. Affect is generated not only from the meanings ascribed to buildings and spaces, but also from the reassurance of the daily rhythms of street life (Knox 2011: 175). An affect that is 'seeing with the interplay of cultures and ideas; a place where outsiders can quickly become insiders' (Florida 2002: 232). Today we start to realise that true freedom presupposes belonging, and that 'dwelling' means belonging to a concrete place (Norberg-Schulz 2003: 125).

Conclusions

Methodology Reflection

Streets are the setting for public expressions and unpredictable encounters with the potential to produce creative friction as well as accommodate diversity (Campkin and Duijzings 2016: vii). Especially for a complex case like Nar-

borough Road as public space, everyday practice and interaction dramatically changes the colourscape of the street. With respect to complexity, it requires that the research methodology should be more flexible so that it can be easily adapted in order to respond to new emerging problems in a dynamic perspective of urbanism.

Although the case study initially emphasises the need to combine visual methods with the ethnographic focus of this research, various methods listed in the book *Engaged Urbanism* (Campkin and Duijzings 2016: ii) have been utilised in the practice-led research (Table 1). The challenge still remains that urban investigation seemingly requires us to rethink and re-evaluate what the appropriate methods and tools for investigating colour in streets like Narborough Road are. Furthermore, what new methodologies can be developed to explore colourscape in a consistently changing environment? How can we establish methods in order to accommodate the diversity in urban context?

Table 1. Relevant methods in the case study of Narborough Road.

Method	Relevant practice
Colour analysis	Retail brand colour identity analysis
Colour palettes	Creation of colour ranges of shop front and signage
Colour survey	Shop front colour survey
Comparative urbanism	Comparison of different sites, location and scale
Digital imaging	Shop front elevation
Everyday observation	Full-day on-site observation
Experimental photography	Street snap by using phone camera and digital camera
Listening	Listening to people
Located theory	Main theories of Relph and Alexander
Mapping	Adoption of map and valuation of mapping
Public conversation	Dialogue and casual chatting with shop owners and residents
Photo-documentation	Systematic photography
Repeat photography	Revisiting site and photography again
Story-telling	Individual personal story collection
Surface analysis	Retail signage and shop front material analysis
Terminology	i.e. 'Colourfulness', 'Colour pattern'
Thinking with elsewhere	Other places as reference
Video-documentation	On-site video recording
Visual analysis	Macro-micro scale of visual analysis
Visual comparison	Retail image comparison
Visual ethnography	Intertwined interview and visual research
Walking	Investigation by walking

In addition, an interest in exchanging and adapting theoretical and methodological conventions and intervention becomes a critical issue throughout practice-led research. Because ongoing conversations about method are crucial in urban scholarship, where theorisation can easily lose touch with newly emerging empirical realities (Campkin and Duijzings 2016: 2). Thus some new questions

can be asked, such as: What current urban methodologies can update colour theories? How to bind the theory and methodology to form a new knowledge of urban colour across multiple disciplines?

Macro-Micro Scale Strategy

The task of structural analysis deals with the relations between the whole and the parts, between ‘micro’ and ‘macro’ levels (Lefebvre 1991: 158). The scale and design is sympathetic to the character of the Narborough Road area. Scale design involves interventions, invention and research around the theme of identity in public space (Bencsek 2008).

The identity of any sizable place is likely to be the sum of all kinds of smaller identities. Each place is a collection of identities—whether the place is a village, a town or in the countryside (Nairn 1965: 72). Each retail of Narborough Road can be attributed a clear colour identity for the brand image which is considered as a design pattern in micro-scale. The individual colour pattern contributes to colourful visual context at the macro-scale.

Many researchers may focus on the same issue: to relate the segmented colour objects and visual elements in effect to create a coherent environment. Fleming makes the criticism that many placemakers remain isolated objects in spaces when their effect could be more pronounced if architects and urban designers sought to relate them effectively to create a choreography of meanings (Fleming 2007: 222). How to contextualise the streetscape remains a challenge to creating a unique, unreplicable place and yet still tending towards resemblance of acquired value.

However, colourfulness pattern as identity of Narborough Road is supported by most of the interviewees. Colourfulness as identity is an important manifesto in current colour research field, because it has been neglected in most of the literature and colour theory. In order to establish a theoretical approach to understanding colourfulness, identity could be explored in future research.

In addition, the macro-micro division implies many urban relationships: private-public space, social-cultural context, residential-commercial interaction, and inhabitant-policy-makers. The micro case study of a retail mural project for example implicitly reflects the needs for manifesting identity and synthesising cultural relationship. Nairn suggests that besides identity, relationship is another important element for townscape. Relationship concerns making the parts of the environment fit together (Nairn 1965: 5). Another research problem could be to relate colour identities to a place. Ultimately the goal is to achieve what Lynch says: “parts fits into parts, the visual environment becomes an integral piece of its inhabitants’ lives” (Lynch 1960: 93).

Insider and Outsider Framework

This research already demonstrated how to use Relph’s (1976) insider and outsider dualism framework to explore different views and perspectives of colour identity. Although both insiders and outsiders celebrate the colourfulness of Narborough Road, it still shows the subtle difference in interpretation of meaning and cultural preference.

For example, some insiders have been concerned that the hybrid colour patterns have caused the blurring of the local identities. The density of immigrants and minority groups of all kinds in cities contributes to the confusion of meanings around urban culture (Zukin 1995: 267). On the other hand, outsiders tend to manifest their authentic identity and invite more outsiders to share and enjoy their culture.

The problem that emerges is how to coordinate the relation between insiders and outsiders. Relph (1976: 62) indicates that the various types of identity are not discrete, nor mutually exclusive, nor unchanging. However, it has yet to be considered how the conversion between insider and outsider might occur. Indeed, identity is not always fixed in meaning. On Narborough Road, English is still a common language among the immigrants, which means their identity has already been overlapped and they have established a new identity within the local society.

In this situation, a delicate balance is needed to ensure inclusive economic development to benefit communities and individuals, while at the same time the diversity of cultural expressions avoids the risk of weakening the sense of place (*genius loci*), the integrity of the urban fabric, and the identity of communities (UNESCO 2016: 22).

Colour design may partially contribute to the problem. Colours can be a compelling, exact and calculated medium for producing and reproducing power and for transmitting knowledge, and an essential facet of a knowledge system (Young 2013). Meaningful colours, colour symbols and colour patterns will create an opportunity for both insiders and outsiders to understand and appreciate each other's culture. To these clear and differentiated forms, people have made strong attachments to the place (Lynch 1960: 78).

Acknowledgements

This paper is based on research conducted during my PhD studies from 2015 to the present. My thanks and appreciation go first of all to my supervisors Robert Harland and Roberta Bernabei for their continuous support of my PhD study and research, and for their patience, motivation, and immense knowledge. My sincere thanks also goes to Verena M. Schindler, for offering me the opportunity to contribute this research paper, and for her kind help and insightful comments. I am also using this opportunity to express gratitude to everyone who supported me throughout the project. Last but not the least, I would like to thank my family for their selfless love and continues encouragement. Without their endless support I could never have completed this work.

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Appendix

NARBOROUGH ROAD LEICESTER

COLOUR ANALYSIS OF RETAIL SHOPFRONTS AND CARPENTRIES

BY JIE XU, BA, BSc
SUMMER 2017







Территория и цвет: кейс-стади трех районов острова Теха в Вальдивии, Чили

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Аннотация

Города представляют собой сцены, на которых разворачивается наша история, и средства, с помощью которых мы создаем пространство. Такая взаимосвязь одновременно динамична и проблематична для документирования. В статье представлен анализ проявления этой взаимосвязи в архитектурно-пространственной колористике и нарративах трех районов на острове Теха в городе Вальдивия (Чили). Несмотря на расположение всех районов на территории одного острова, их развитие существенно отличается друг от друга. Население имеет различные корни и по-разному переживает принадлежность к месту, оно складывается из семей рабочих закрывшихся фабрик, университетских профессоров и специалистов, переехавших сюда во время подъема рынка недвижимости. Подобное разнообразие выражается в очевидном своеобразии цветовой атмосферы каждого района. Эти аспекты были подвергнуты глубокому изучению в рамках качественного подхода, который предполагал разработку кейс-стади и включал анализ литературы и архивной документации, непосредственное наблюдение и интервьюирование ключевых информантов. Результаты показали ассимиляцию способов заселения районов и очевидную связь между обыденными вещами, например, окрашиванием фасадов и процессом консолидации внутри района, и позволили внести определенный вклад в развитие науки с точки зрения междисциплинарности.

Territory and Colour: Case Study of Three Districts on Teja Island, Valdivia, Chile

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Abstract

Cities act as stages of our history and the means by which we produce space in an interplay that is both dynamic and difficult to document. This research explores this relationship, addressing architectural-spatial colours and land-based narratives in three districts on Teja Island, Valdivia (Chile). The approach is de-

liberate: while districts are sited in the same island territory, their development differs notoriously. Diverse origins and sense of belonging/ownership are apparent, including working class families from former factories, university professors and professionals who arrived during the real estate boom. This diversity is closely bound up to the districts' chromatic atmospheres, the differences of which are also apparent. These aspects were delved into through a qualitative approach, developing a case study that included literature and archive reviews, direct observations and interviews with key informants. The findings reveal a naturalization of ways of inhabiting and strong ties between daily aspects—such as façade colours—and the district's consolidation process, leading to certain contributions from a cross-disciplinary perspective.

Introduction. The District from the Perspective of its Dwellers

The notion of district is both broad and ambiguous. Classical definitions refer to the idea of a stable and delimited community while critical opinions allude to a space of relationships subject to urban dynamics, including conflicts.¹ In both cases, material and experience-based dimensions are closely interwoven: the district alludes to a territory not restricted to architectural style or administrative district, suggesting ownerships which frequently weaken characterizations developed from 'outside'. As highlighted by Lynch in a study that has become an indispensable reference about urban space from the perspective of its dwellers, the city is a built and perceived object, involving dense relationships and images soaked in memories and meaning. In this sense, districts could be understood as "...relatively large city areas which the observer can mentally go inside of, and which have some common character" (Lynch 1998: 84–85). The core nature of physical aspects is relative, admitting districts perceived as ethnic or socio-economic units, without major physical differentiations, versus spaces, which have been clearly defined in terms of their material nature.

The district as a symbolic production has been subject to extensive research, referring to an urban space being consolidated during the second decade of the 20th century (Gorelik 1998), and which constitutes a more or less defined object with fairly restricted anchor points and exploration possibilities. Furthermore, it remits to sets of imaginary representations which acquire a leading role in the context of the current structural crisis of cities. This scene for stigma and segregation stresses both the discourse and the management of cities as a whole, while tending to position itself as a venue for settlement and stability (Gravano 2011).

By way of example, Olga Segovia refers to small parts of cities characterized at the same time by merely physical issues and experience-based aspects, where the notion of 'familiar space' becomes relevant: "The district is the closest and most common space for what is public for city dwellers. It is the place for everyday face to face encounters among people from different families, particularly low income inhabitants" (Segovia 2000: 61). Francisca Márquez (2003: 48–49), who focuses on segregation processes arranged around the identity of the district, stress-

¹ For more information on the concept, see Tapia 2015, or Gravano 2011.

es the development of public-private imaginaries about the city, with the growing consolidation of the 'city without borders' scheme, where the district becomes a benchmark. Based on the analysis of 'placelessness', Graciela Martínez (2004: 1–4) develops a definition of district whereby everyday activities gain centre stage, as they are 'living entities' based on kinship and neighbourhood relations. Starting from the idea of the district as a long-standing historical construction, Mario Sabugo mentions the institutional and territorial dimensions as key variables, with the former understood as a 'specific way of community organization' (2004: 38), while the latter refers to an inhabited space with specific physical characteristics, referring to the area or district. In this same sense, Liliana Barela refers to the 'territory and the sentiment', with a city divided into quantified urban spaces versus symbolic spaces produced by the wanderings, recognitions and sense of belonging of neighbours, where the district appeals to "...the house, childhood, everyday life, neighbours, family, school, parties, and opportunities where emotions or rejections remain a vivid memory" (2004: 11–12).

Most of these approaches refer to the concept of putting down roots. The notion of district identity gains relevance, considering definitions that crystallize in the memories and the discourse of some of its dwellers, and in the glances which 'from outside', record, describe and fix with an (alleged) increased durability. In the words of Ariel Gravano, district identity refers to "...a production that makes the district a benchmark of the social identity construction process" (2013: 121), implying a delimitation of own-foreign space. This process defines aspects that provide the district with contents, pointing to shared elements that call to stability and continuity.

Thus, this process strengthens what Verónica Tapia (2015: 129) or Ariel Gravano (1998: 114–116) himself—as a gesture to Lefebvre—call 'district ideology': contents are naturalized, drawing the district-downtown opposition. As suggested by Manuel Delgado, the former alludes to a "...built and inhabitable space. It is understood that within such space there are coexistence principles based on a compact of frankness and predictability. In the structured social venue within such space, stabilized relations can be found" (2007: 33–41). These notions have a strong foothold, projecting cohesive communities that involve a minimum of primary relations (family, intimate) and sociability in public and/or community venues.

This attachment of content has become an object of discussion. While the district appears as a community venue as opposed to (strongly devaluated) public space in most of the studies discussed, processes of 'placelessness' and internal segmentation are accounted for, where this distinction becomes a point of stress.² This brings in aspects that relate the district to the city and the territory in global terms. In this sense, Jorge Larraín (2001) highlights three dimensions, considering definitions that he calls temporary, spatial and deficiency. Temporary dimensions refer to tipping points associated to the origin of the district and to a more or less continuous line that accounts for its evolution in time. Spatial dimensions highlight milestones and physical delimitations and deficiency dimensions refer to conflicts and tensions that arise while linking the district to the city.

² See, for example, the works of Gravano 2013, 2011; Martínez 2004; or, Márquez 2007 and 2003.

Colour in the District and in the City

While the district-downtown conflict tends to articulate the narratives about the inhabited territory, these integrate diverse contents changing the images between both areas. Neighbours' narratives interweave historical events, characters and daily activities, milestones and physical aspects that are considered relevant. This is where colour, and more specifically the notion of 'chromatic atmosphere',³ finds its foothold. As highlighted by Armando Silva (2006), collective impressions about the city have a high level of segmentation, reason for which they should be addressed from different levels, emphasizing the relationships between inhabitants and national-international scenarios, 'modes of mediated expression' (graffiti, advertisement, posters, etc.), social uses (segmentation and imaginary cropping of the city) and physical conditions.

The latter level comprises all the elements that shape the district's materiality, including colour. It is an additional aspect among those that could be potentially included in the district's narratives, without such integration being unexpected. Tensions are expected in the interplay among materiality, daily activities and what neighbours highlight when they reflect about their district. In this sense, it should be noted that the notion of 'chromatic atmosphere' (Lenclos 1999: 9) makes reference, first of all, to physical dimensions: it is the 'palette' of the surroundings, integrating elements from architecture, the street, nature and 'impermanent' and 'random' colours.⁴ The latter impacts the general palette of the surroundings through choices that transform everyday space and even bodies themselves, including all displacements. The set of colours that integrate daily activities respond to this imbrication of fixed and moving elements, where presence itself is part of the set. (Batchelor 2010: 70)

Being considered a relevant aspect when defining territory is, however, relative. There is background information about its linkages with senses of belonging of multiple derivations. A common reference is that which refers to class distinctions. Only by way of example, the well-known quote by Goethe should be recalled, whereby he stresses that "learned people have certain aversion to colours, either due to a weakness in the visual organ or poorly defined taste, which thus tends to take refuge in nothingness. Today, almost all women wear white and men black" (1999: 214)⁵ On the other hand, colour tends to vanish from nar-

³ This term is based on the definition by Jean Philippe Lenclos and Dominique Lenclos in their book *Colors of the World. A Geography of Color*, 1999, and, the concept of 'atmospheres' defined by architect Peter Zumthor in his homonymous book published in 2006.

⁴ While the impermanent refers to changing elements within a landscape, namely light, vegetation, water courses and the sky (in the way of a city's 'stage'), random colours allude to moving objects such as curtains, automobiles and even dwellers themselves.

⁵ Complementing this observation, the author identified the taste for strong colours as something natural, infantile, and primitive. Similar references can be found in former epochs, such as for instance the relationship between being 'unlearned' and excess of colours commented by Pliny in the 5th century BC (Gage 1993: 15).

ratives about everyday activities precisely because it is so obvious, which makes it difficult to make its presence explicit.⁶

The findings we present below discuss the perspectives of neighbours from three districts of Teja Island, Valdivia, Chile. Observing clear differences at the chromatic atmosphere level we explored the introduction of this aspect in the different district-related narratives.

Methodology

Addressing perceptions that are closely related to the physical aspects of the surroundings requires an inquiry that considers both dimensions, taking into account an 'experience-based space' which is built in everyday activities. It is a qualitative approach permitted by the restricted extension of districts, integrating direct observations and consultations with neighbours. This research decided to work on a case study basis as such methodology privileges approaching a phenomenon from several properties and sources, keeping the selection of techniques open. (Marradi et al 2007: 237)

Specifically, we decided to develop a collective and compared case study (Stake 1995), carrying out, as a first step, the contextualization of the territory (Teja Island) and of the three districts, reviewing available literature and collecting data from archives and oral sources, considering surveying and official deeds, as well as data provided by key informants from prior activities and under this research.

Fieldwork took place thereafter, considering the description of material aspects and inquiring on the points of view of neighbours. Considering the notion of 'chromatic atmospheres', direct observations and visual records were conducted in all three districts. The work began with exploratory visits, a photographic record with general shots and, subsequently, of each house, including watercolour sketches. Then, data sheets were developed for every house, including an identification photograph, general information, historical background, conditions of the green areas and a detailed description regarding materials. Based on this description and the visual record, colours of façades were identified by means of chromatic surveying based on two codes.⁷ Approximation was used in houses for which the colour charts failed to exactly match the colours used.⁸ Finally, a blueprint for every district was developed, along with a simple

⁶ This phenomenon has been addressed thoroughly by authors including Pierre Bourdieu, who coined the term 'habitus' referring to perception, reflection and action schemes which—coerced by social and historical conditions (featuring class affiliation)—guide everyday activities (Bourdieu 1996: 133). For the naturalization of colour we used Lenclos 1999: 9.

⁷ Chromatic surveying was conducted with the digital ColorScan 2.0 tool of the NCS (Natural Color System), verified on site with the colour chart by the same company. For fact sheets, a further translation of the Ceresita colour chart was made, thereby relying on a chromatic language at the national level.

⁸ Due to variations in varnish or vein shades of the material used, added to cases where surfaces show major wear considering, for instance, façade colours that result from the optical combination of bottom and top layers.

colour chart of the main colours used in each house: main façade, ceiling, main door and windows on the main façade.

Nineteen interviews with key informants were conducted to collect neighbours' perceptions (12 in-depth, six semi-structured and one group interview.) The interviews considered three thematic areas: personal ties with district and area; memories about its origin and evolution (including the characterization of the district in its initial stages); and perceptions on materials and colour. The selection and contacts with interviewees were based on their seniority and ties with the district, favouring contacts in their own houses (16 out of 19 interviews), which facilitated the photographic record of façades, objects or spaces within houses and in front yards (following the guidance of the interviewees.) The interviews were recorded and notes were taken in field notebooks, initially obtaining an informed consent that included an approval to use verbatim extracts. In the former Anwandter district a simple questionnaire was also used, the purpose of which was to clarify concerns and provide information about emerging changes observed during the course of the investigation.⁹

Findings: Districts on the Island

The three districts that we discussed form an area urbanized as from the industrial development promoted since the mid-19th century. (Figure 1) Their links with the island reveal differences in terms of the origin and characteristics of all three housing projects. These are relevant aspects to the extent that district-based narratives usually refer to a common origin as a turning point, considering historical elements that are related to aspects in the surroundings which are currently valued by neighbours.

In the case of the former Anwandter quarter, currently Los Avellanos street, the turning point of its consolidation is the development of new industrial uses by German settlers in the east side of Teja Island (Egert and Pantoja 2008: 33–34).¹⁰ Of the districts addressed, this is the one with the strongest historical roots and is part of a workers' housing complex on the island. Originally, these houses were owned by the companies in charge of the industries, and by the Worker's Security Fund (Caja de Seguro Obrero.) Consequently, the decisions about the design and layout, as well as those concerning permanence, were not in the hands of workers and employees.

The Anwandter quarter was linked to the Anwandter brewery and established beyond the development of this family industry under the ownership of the national brewery company (*Compañía Cervecerías Unidas*, CCU) as of 1916.¹¹

⁹ As interviews took place and photographs were taken in the area, the changes in materials and colours in a large number of façades became apparent. The questionnaire was able to shed light on the process.

¹⁰ Other workers' quarters were built along the Anwandter quarter, including Viña-Hoffmann, Rudloff and Seguro Social quarters.

¹¹ At the beginning, between 1851 and 1916, the brewery and its facilities were located in property of eight lots, in the eastern side of Teja Island. The property, owned by Carl Anwandter until 1858, was transferred that year to his sons and son-in-law under the name Anwandter Brothers Co., which subsequently sold most of its shares to the national brewery company *Compañía de Cervecerías Unidas* (Muñoz 2005).

It was built in three stages: according to ethnographic references, settlement followed the line from the river to the island's mainland. The first houses were rented out exclusively to the brewery's senior workers. A second stage was built in 1949, introducing new workers and the first traders in the area. The third stage began in 1957, where the last houses built in the western end of current Los Avellanos street were inhabited.

Currently, the ancient border between industrial districts has been removed, establishing a broad territory that integrates different areas¹², with the former Anwandter quarter as the entry point. This makes it one of the ancient quarters of Valdivia that is still standing, sheltering part of the industrial era households. A key event that

made its existence possible was the houses' titling process: after decoupling from CCU¹³, efforts were made to obtain housing titles, which were granted to neighbours in 1989. "The ceremony in which the titles were granted to the new owners of the Los Avellanos quarter on Teja Island took place in the former Rudloff factory [...]." (Austral Newspaper 1989 (2.343): 3) (Figure 2)

On the contrary, the Teja Sur district is part of a spatial and economic reconversion process on Teja Island, following its connectivity with the urban area, considering as milestones the construction of the Pedro de Valdivia Bridge in 1953 and the development of the Universidad Austral de Chile UACH) after the 1960 earthquake.¹⁴ In this process, the early neighbours of the workers' quarters became subject to a progressive stigma, to the extent that the former industrial districts (among them the former Anwandter quarter) are the working-class nucleus of an island that is increasingly developing residential districts. Some widespread expressions of the time are 'the poor Teja' or even 'the Teja's blem-

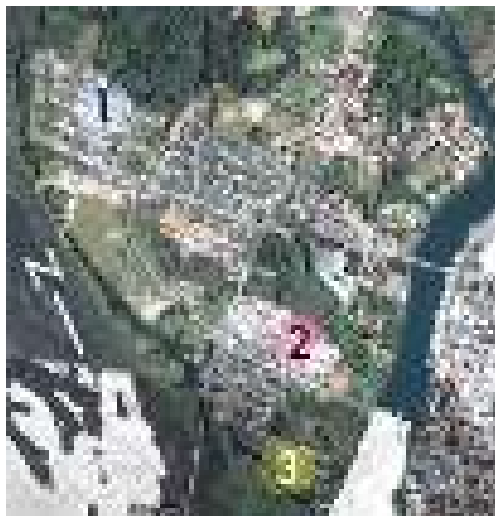


Figure 1. Location of the three districts studied on Teja Island: (1) Lomas del Río Cruces, (2) Former Anwandter quarter (currently Los Avellanos street) and (3) Teja Sur. Photo: Google Earth image edited by the author.

¹² The difficult and partial economic reconversion process has meant that most of the island neighbours have stayed, resulting in a district identity that is opposed to new residential areas, which is shared by the so-called Teja-dwellers (tejeños or the inhabitants of industrial districts and their further expansions.)

¹³ Bordering the property of Sociedad Forestal Pedro de Valdivia and then, of SERVIU.

¹⁴ During Salvador Allende's Administration, a public prison was built on the Island. While this activity is not considered a milestone related to the origins of the district, the controversial decision accounts for the opposition between a Valdivian-based view of the Teja island as a peripheral area and the development of several real estate projects as of 1970.



Figure 2. Neighbours and government officials walk through the former Anwandter quarter after the house titling ceremony. Source: Austral Newspaper 1989 (2.343): 3.



Figure 3. View of the empty lots in Teja Sur, during the seventies. Photo: Courtesy of Gladys Marchant.

ish', which suggest the development of new ties within the island.

The Teja Sur district is one of these new housing complexes under a residential project closely related to the Universidad Austral de Chile: its promoters were mostly university professors. The district was laid out in an area, which, during the industrial boom, was owned by the Rudloff family. Upon the arrival of the new neighbours, parts of the industrial and household facilities were still standing beside the tenement of the Hoffmann factory.

The management of the housing project involved an initial procurement and land development stage, including the allocation of lots. The initiative took place "[...] during a period of enormous housing shortage in Valdivia. Particularly, even university professors lacked a place to live" (Juan K., Teja Sur neighbour, interviewed in 2011). This resulted in the creation of the 'Teja Sur' housing group, formed by 60

members, who finalized the purchase of the plot in 1970, managed to obtain project approval in 1973 and subdivided the property in 78 lots in the south side of the Island, by year 1974. (Figure 3)

Urban development began in a partially rural and relatively isolated area, and lasted almost 10 years. House construction followed a disperse pattern, with a general feeling of shared effort noted in the interviews. The design was strongly guided by this community mark: while there was never any formal enforceability, a managing board was established which set out general construction and coexistence guidelines and made explicit the intention of keeping open spaces and ensuring visibility for all neighbours.

As from the eighties, new neighbours joined in, including the expansion of the district's north-west bank in 2007.¹⁵ Thus, the district's original style (including the lack of fences and height restrictions) was slightly modified. Notwithstanding, even today there is a common line prevailing white, wood and single-storey houses.

Finally, the Lomas del Río Cruces area is a later urban development space. Located in the north-western area of Teja Island, the property where it is sited was kept clear until the nineties. (Figure 4) The housing complex is an independent project promoted by a shareholders' partnership that purchased the plots then belonging to the Araucanía Vicariate.

The project involved the development of complex titling access schemes, following a slow process to establish an *ad hoc* legal figure before actual construction works could begin. Its protracted execution involved adjustments and partners' entrances, exits and replacements.

It should be noted that unlike the Teja Sur district or the former Anwandter quarter, the Lomas del Cruces area is currently an urban land under transition. It is a housing complex still under construction and some of the interviewees highlighted weak or even absent neighbourhood ties.

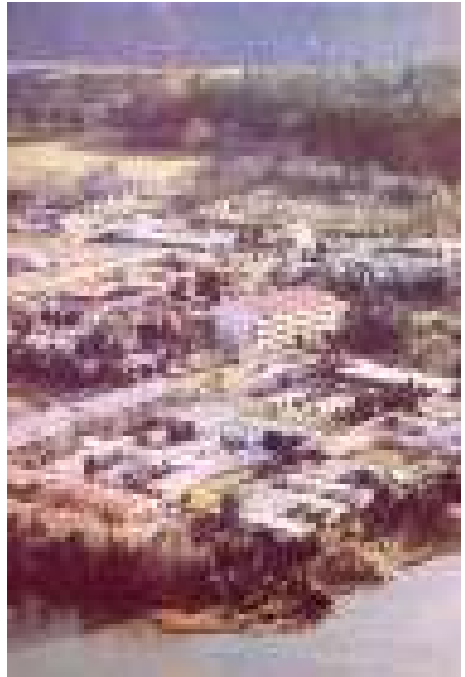


Figure 4. Aerial view of the Isla Teja University Campus. In the background, the rural hill where the Lomas del Río Cruces quarter was to be built. Source unknown.

Districts Seen from Outside: Colour and Materiality

As noted earlier, the former Anwandter district kept its original location and architectural lines, and is currently inhabited by workers' households. Overall, it is a housing complex with a well-defined style, with single or double-storey townhouses with a continuous façade. Most have been modified either due to maintenance or adjustments to different purposes, but in general, the façades have kept the original design. Notably, the building of cabins in backyards is widespread, which means changes in lifestyles and in the way the plots are used.

¹⁵ In the hands of the real estate developer SOCOVESA, including 10 lots, with a total surface area of 6,653 square meters. (Serviu Blueprints, "Housing development Project Teja Sur Plot", December 2007) Urban development took place by filling an area, which is known to be a wetland, formerly considered part of the Teja Sur district.

Façades play a greater role over backyard spaces, which were formerly used for animal husbandry and vegetable gardens. The original material of façades and guillotine windows was wood, while for roofing Pizarreño fibre cement sheets were used: with time, wood in façades was replaced by zinc and siding, and more recently, by fibre cement. Windows have been changed to wooden double pane or sliding aluminium windows and roofing to zinc. (Figure 5)



Figure 5. The original horizontal wood wall planks were often kept in the façades looking east and south, which are not as exposed to harsh weather conditions. Photo: Elisa Cordero-Jahr, 2014.

These modifications are both the result of individual and public house improvement projects¹⁶ and of changes in use. The palette tends to wood-looking browns and even black (in one case.) In spite of this, some of the colours used originally are still kept. At the time, these colours were chosen in part due to local market availability, which was quite limited at the beginning of the 20th century. In average, only eight colours were in supply, including turquoise, light green, sky blue, apricot, yellow, white, colonial red and blue (Figure 6). If the owner wanted a special colour, the painter knew how to make it. The 'single chart' containing more than 1000 colours with paints prepared in the store arrived in Chile only during the eighties and to Valdivia, during the nineties. Therefore, when house owners began to paint, they used what was offered in the local

¹⁶ Along with individual interventions, starting in 2011 there was a progressive replacement of façade materials with white, cream and imitation wood fibre cement, pointing to an eventual standardization of colours in the district under a housing improvement program (2011-2012.)

retail market, including classical yellows and whites typical of Valdivia and its German tradition (Cordero 2008: 3).

These colours can still be found in the district. Almost half of the houses are painted yellow, and while turquoise, sky blue, light green and apricot are least frequent, these colours make the district unique, as they are not found in other areas of Teja Island. It should be noted that they can be found in other industrial areas in Valdivia, namely Barrios Bajos and Collico. Notably, unusual colour combinations can be found between façades and architectural elements, for instance the turquoise-red or dark green-gold associations.

In Teja Sur, housing distribution is more spacious, lots are bigger and since most houses lack fences, public and private spaces are combined. Most houses are painted white, which combines with varnished or native raw wood, either in the same shades or darker and redder, and including flagstones. This combination of whites, cool rocks and warm wood contrasts with the lush tones of surrounding greens, which accommodate the colours of architecture appearing as merging with the foliage. (Figure 7)

Lomas del Río Cruces, at the western side of the island, is located over a hill with a panoramic view to the river (west) and the city (east and south.) To the north, the area borders the Teja Norte estate, property of Universidad Austral de Chile, which acts as a backdrop with huge and lush trees. More than half of the houses are painted in shades of red, from opaque orange, deep red, to dark oak, over wood or fibre cement. White also prevails, either painted or in synthetic sidings, and finally, neutral tones in the form of grey flagstones, black volcanic rock, bare concrete, black tiles and grey pre-painted steel. Other materials include varnished wood and yellow, both painted and in natural stones or golden pre-painted steel. Exceptionally, apricot, moss green and brick are visible in a small number of façades. (Figure 8)

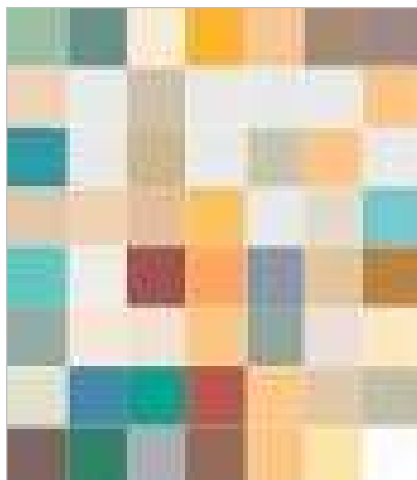


Figure 6. Colours of the façades of the houses at the Anwandter district. Author: Elisa Cordero-Jahr, 2014.

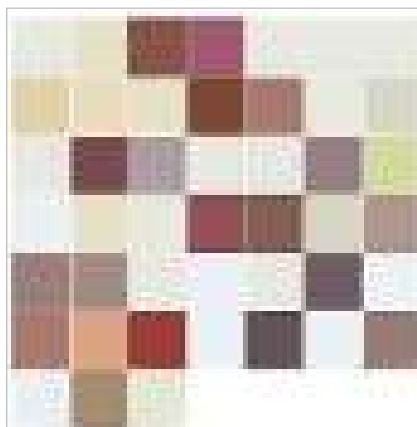


Figure 7. Colours of the façades of the houses in Teja Sur. Author: Elisa Cordero-Jahr, 2014.

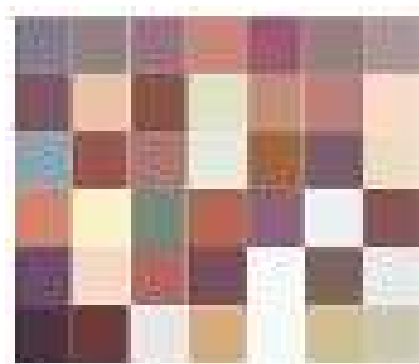


Figure 8. Colours of the façades of the houses in Lomas del Río Cruces. Author: Elisa Cordero-Jahr, 2014.

Given the slope in the area, housing roofing is visible, mainly made of black asphaltic tiles, except for one green living roofing. Colour combinations between façades and architectural elements are classical and sober. There are two colours that were not included in this study as they are located in a different area of this same district; one is a blue concrete house and the other an orange prepainted galvanized sheet house; the latter was built only recently in 2015.

Discussion: The Point of View of Neighbours, History, Sociability and Colour

Concerning the districts discussed, we have highlighted the marked differences in their historical origins. These differences exist in neighbours' narratives, even when addressing the characterization of chromatic atmospheres, an elusive topic in all three districts.

The former Anwandter quarter is part of a broader complex. While it can be distinguished as a more or less defined unit, it is closely linked to the other traditional industrial districts on Teja Island. In general, the district's value is related to aspects such as the existence of neighbours' support networks, familiarity and seniority, with special emphasis on the links with the industrial tradition of the first dwellers. This aspect is mentioned persistently, supporting the existence of long standing neighbourhood ties.

'Colour and houses' do not appear spontaneously in the conversation and become difficult to address. Even when direct questions are raised, respondents go back to neighbourhood ties and other time-related milestones. While this is related to the lack of agency that these dwellers had in the construction and consolidation of a local style,¹⁷ the omission is also found in the Teja Sur and Lomas del Cruces districts.

Older neighbours remember that the first houses kept natural wood. The act of 'painting the house' was associated to the adoption of an urban lifestyle, in contrast to the practices of 'brewers' (the first dwellers), mostly of rural origin, who heavily used house backyards and nearby areas leaving façades in second place.

In a second construction stage, as from 1946, neighbours recall that houses were assigned painted in light yellow by the Compañía Cervecerías Unidas (CCU) brewery. The household selection of façade paint is associated to a later period, matching the 1989 tiling process. Thus, the district's chromatic diversity

¹⁷ The original houses are designed and built by the factory, including façade colours as of 1946.

tends to be related to the title: "Once we became the owners of the houses. Before nobody would fix their houses; you see, we were constantly afraid and knew nothing of what was going to happen with the houses" (Mónica G., neighbour of the Anwandter quarter, interviewed in 2011).

Currently, chromatic diversity prevails in the district, raising positive reactions among most neighbours when asked directly. While the selection of the specific colours is related to a great diversity of factors, among them personal taste, keeping the colour chosen by parents and social support networks, positive opinions significantly highlight the titling process and the subsequent individualization of house property. There are additional practical and status criteria, notably the adoption of an urban image associated to second and third generations.

The current structure and chromatic palette in Teja Sur is associated to a common project of the original neighbours, as from the seventies. This collective project involved coexistence rules and construction standards: while designs remained open, a common understanding of what was meant by 'dwelling' was taken for granted, including construction styles.

Thus, the first houses share the same architectural lines, single-storey and the predominance of whites and wood façades.¹⁸ This style is indirectly associated—most of the time—to a sense of class belonging.¹⁹ Keeping a construction style and colour pattern is part of the district's original project, but a shared understanding and way of experiencing the territory plays a strong role. New dwellers, apart from small modifications, "start doing as they see. The first houses, you more or less tried to adapt to what you saw..." (Herbert S., Teja Sur neighbour, interviewed in 2011).

With time came the progressive weakening of initial expectations, particularly in terms of neighbourhood ties. While the arrival of new families to the area is seen as positive, their integration has been weaker when compared to the original group. However, this had no impact on the colours and materiality of the district, which kept a similar construction style.

Again, spontaneous positive comments make no mention of colour as a relevant element, putting emphasis, this time, on security and surroundings. The focus is placed on the landscape over the houses, in the understanding that relying on open surroundings is a relevant right of neighbours. It is precisely in terms of these elements that the characterizations about the district's colour and construction styles are more easily developed, to the extent that the houses have tended to merge with the surroundings. Unlike the case of the former Anwandter quarter, interviewees mention no relevant milestones associated with changes in façade colours.

¹⁸ In two cases, this is also related to the economic standing of a large number of original neighbours, favouring the real estate offer of the time, a standardizing trend in the district's consolidation (given the purchase of prefabricated houses that were later expanded).

¹⁹ None of the interviewees referred explicitly to this idea. References are subtle, mentioning that neighbours are professionals or using terms such as 'cultural level'. Like in most approaches to the idea of class, the use of the category is ambiguous and unable to fully grasp the characterization of the 'group' being addressed.



Figure 9. White and wood architecture plunges into a lush landscape, without borders between public and private. Photo: Abel Lagos, 2013.

Thus, the continuity of styles and colours characterize the development of the district in material terms. Once again, positive opinions concerning these aspects need to be prompted by direct questions. Overall, a naturalization of the selection criteria is also observed: colour is taken for granted, with white and wood prevailing among the options of the interviewees, favouring the leading role of the surroundings. (Figure 9)

In a second period, the idea of a shared style is more clearly expressed, notably with comments such as "...wood prevails here, but I think these people have a different level. We have different ideas, a different vision of what, how can I say, of what ecology is, or the visual or aesthetic aspects..." (Juan K., Teja Sur neighbour, interviewed in 2011).

Finally, in Lomas del Río Cruces there is a shared understanding of stylistic freedom in terms of construction, also positively regarding landscape and access to a 'good view'.²⁰ (Figure 10)

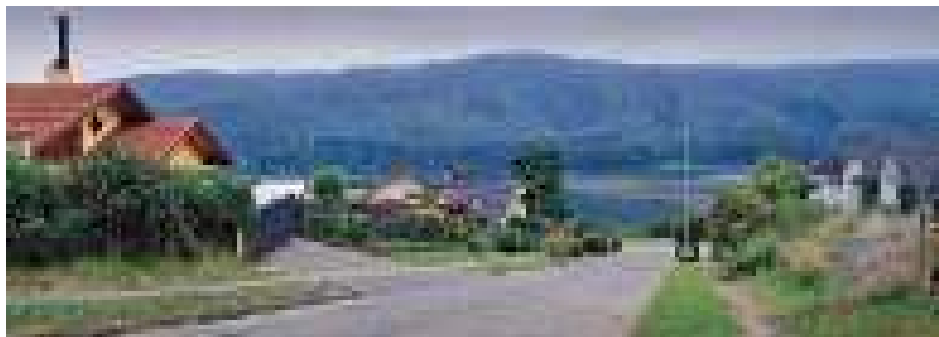


Figure 10. Spatial characteristics of Lomas del Río Cruces are beautiful views, underground power cables and a clear division between public and private with fences. Photo: Abel Lagos, 2013.

On the other hand, district sociability dynamics are not considered as relevant in the opinions collected, in line with the development of the area over time. While a number of neighbours have been in the area for about ten years, there have been several construction stages, even with works in progress during

²⁰ Houses look to the Cruces River or to Valdivia, trying to take advantage of potential panoramic views of the Nature Sanctuary or to the city.

the study. These are construction processes that involve agreements between owners and architects, which, in some cases, impose their style signature. While a company promoted the transformation of the original space with the development of a residential area, the sale of lots and the housing construction process has taken place gradually, often led by new owners without ties to the original project.

Notably, there are few or even no positive opinions concerning neighbourhood ties, with some interviewees stating: "...I have the feeling that neighbourhood ties or activities are not present here. Perhaps you know the person who lives right next door, but nothing beyond that. Maybe you could find more history there, in the quarter where *El Riñihuaso* is located; that area the name of which I cannot remember."²¹ (Guillermo D., neighbour of Lomas del Río Cruces, interviewed in 2010).

Thus, there are mentions to the freedom and individual mark of house designs, and the protection regarding the access to views. Once more, colour is a secondary issue, submitted to the special consideration of the surroundings, featuring rivers and forests. Arguably, the most representative quality of the district at this moment is its lack of definition and an emphasis on private property. Most certainly, together with the visual contact with the river and the panoramic views over the city, this is a key factor in the positive opinion of residents. This is a consideration shared by interviewees beyond the stylistic diversity of the houses where they live.

Conclusions

From an external point of view, there are obvious constructive and colour differences in the three districts discussed. Both Teja Sur and Lomas del Río Cruces share colours leaning towards whites and natural materials, unlike the case of the former Anwandter quarter, which chose a broader and varied palette. However, from the point of view of the neighbours, these differences play a secondary role. When characterizing the district, emphasis is placed on elements related to neighbourhood ties and urban insertion, with interviewees from the former Anwandter quarter mentioning familiarity and seniority of dwellers, Teja Sur neighbours mentioning security and beauty of the surroundings and those from Lomas del Río Cruces, the panoramic view, quietness and closeness to the university and downtown Valdivia. Opinions on materiality and colours were prompted in every interview, revealing the minor importance of these elements in the narratives about the inhabited territory.

When these aspects are addressed, the perception of common material patterns or styles emerges clearly and spontaneously, unlike the case of colour. At least in one of the districts it prompts references to common construction agreements. In all of them, the issue appears spontaneously when prompting the aesthetic assessment of the complex. That is not the case with colours; while there are exceptions, raising the topic tends to result in response gaps, suggesting greater uncertainty. Respondents become hesitant or refer to a pretended

²¹ This refers to workers' quarters, where the former Anwandter quarter is located today.

naturalness concerning colours, pointing to well-established and deep-rooted associated criteria.

Our approach reveals the close relationship of these criteria with the history of every district: the selection of colours and the consequent 'chromatic atmosphere' responds more or less in a definitive form, to collective ownerships in time, always mediated by practical criteria. This is more apparent in the case of the former Anwandter quarter. As mentioned above, in an attempt to follow a historical course through the district's colours, an outstanding feature is how this matches the neighbours' lack of agency during the houses' construction and design stages, referring to their condition as workers of Teja Island factories, and to the late titling process. Thus, household agency is referred as one of the values associated to the district's chromatic diversity, sometimes submitted to a family tradition, in terms of keeping the colours used by parents or grandparents the first time they painted the house. In Teja Sur, this reference to collective ownership is more elusive, but further conversations link the use of a restrictive palette to an implicit adhesion to a shared understanding of 'dwelling', alluding in some cases to similarities linked to the professional nature of first and current neighbours. In addition, these references become even clearer in contrast with other districts and quarters in Valdivia, in a classic process of building identity by opposition. On the contrary, in Lomas del Río Cruces references are made precisely to the lack or weakness of neighbourhood venues, even from the beginning, without the establishment of relationships with the materiality and colour, at least explicitly. These refer to individual agency and/or the signature of the architect who designs the house, with almost no suggestions to settlement processes or other milestones associated with the history of the area.

Considering the close relationship between colour, materiality and history, emphasis should be placed on the complexity involved in approaching these topics with a view to an intervention of neighbourhood venues. Interventions aiming at taking this aspect into account in city planning are expected to consider both the difficulties in terms of approaches and the eligibility of the perspective. If colour and materiality lack a privileged space in district-related narratives, the surveying and subsequent consolidation process should carefully consider the flexibility of the interventions and the openness of its findings. Methodological implications are obvious. The differences in materiality and colour, as evidenced in the case studies discussed, are related to socio-cultural restrictions, considering both the access to economic resources and conditions of greater or less territorial control, as well as to the attachment to shared ways of understanding 'dwelling'. Such links are not apparent at the narrative level, so their discussion calls for the development of relevant qualitative techniques and, above all, a lengthy and open period of time in the understanding that our ways of inhabiting and the ways in which we imagine and make an account of the territory change with time.

Acknowledgement

This research project was funded by the Research and Development Division (DID) of the Universidad Austral de Chile, Valdivia, Chile.

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Два примера развития городской колористики в Великобритании: сохраняя чувство места и создавая чувство места

Джем Вейгуд
Waygood Colour

Аннотация

Представлен анализ двух примеров регенерации городского пространства в Великобритании. В первом (Дуглас, столица острова Мэн и финансовый центр с международной известностью) акцент стратегической программы развития сделан на оживлении общественной сферы, во втором (Мосс Сайд, центральный район Манчестера) – на развитии программ социального жилищного строительства. В обоих случаях компания «Waygood Colour» была приглашена для разработки дизайна в сотрудничестве с ключевыми участниками многопрофильной команды архитекторов, ландшафтных дизайнеров, специалистов по свету, картографии, разметке дорог, инженеров-сметчиков. Джем Вейгуду, дизайнеру среды и колористу, было поручено на основе тщательного изучения существующего контекста разработать проект и создать для обоих проектов цветовые палитры, которые способствовали бы формированию особого чувства места. Центр Дугласа расположен на восточной окраине острова и имеет неровные границы, заданные сложным ландшафтом и морем. Проблема заключалась в том, чтобы, опираясь на имеющиеся физические условия, с помощью цвета «выделить» город как столицу острова из его окружения. В Манчестере расчистка городского квартала дала возможность сформировать новое чувство места, определяемое не викторианским прошлым, а энергией и культурой его новых жителей, выходцев из азиатских и афро-карибских общин. В статье описан процесс цветового проектирования и представлены результаты обоих проектов, которые можно использовать в качестве моделей в дальнейших разработках.

Colour in the Urban Environment: Responding to a Sense of Place and Creating a Sense of Place, Two Examples from the UK

Jem Waygood
Waygood Colour

Abstract

Two examples of urban regeneration from the United Kingdom are examined. In the first, Douglas, capital of the Isle of Mann and an internationally recognised financial centre, is the focus of a strategic programme of public realm renewal,



Figure 1. Douglas townscape. Photo: Waygood Colour, 2011.

and in the second, Moss Side, an inner city neighbourhood of Manchester, is redeveloped for social housing. In both instances, Waygood Colour was invited to contribute to the design approach, working as key members of a multidisciplinary team encompassing architects, landscape architects, lighting designers, mapping and way marking specialists and quantity surveyors. Jem Waygood, an environmental artist and colourist, was commissioned to design and modulate a colour palette for both projects, which would contribute to a sense of place, through a rigorous examination of context. Douglas city centre is located on the eastern edge of the Island with its boundaries defined by rugged landscape and sea. The challenge was to draw in colours from its surroundings to firmly 'locate' the city as capital to the Island, building upon the strong physical context of its site. In Manchester the clearance of a city block provided an opportunity to create a new sense of place determined not by its Victorian past but by the vibrancy and culture of its new residents with roots in the Asian and Afro-Caribbean communities. This paper will document the colour design process and outcomes of both projects as possible models for future development.

Douglas, Isle of Mann

The Isle of Mann is a self-governing crown dependency set in the Irish Sea between the countries of Ireland, England, Wales and Scotland. The island has in-

ternational significance as a centre for the off-shore banking industry and as such attracts interest from around the world. Douglas, its capital, is a town of approximately 28,000 people and is a centre for business, finance, legal services, transport, shopping and entertainment. The town was first modernised in the late 1800s to early 1900s with new streets replacing a narrow jumble of lanes, a sea front promenade was added in 1870. This period of Victorian improvement formed the town we see today, but over the intervening century and a half, the town centre had become rather drab and lacking in character, prompting the local development partnership to instigate a programme of renewal and refreshment. The business community, essential to the vitality and viability of the town, felt the appeal of Douglas as a financial centre was in part affected by the quality of its environment and in particular the quality of the retail environment. A brief was drawn up which focussed upon the public realm of three key streets, which together constituted the retail heart of the town.

These streets form a continuous link from south to north across the town centre, and though individually named they join along their length to form a continuous street called The Strand. Figure 1 illustrates typical views of the architecture of the street at the outset of the project.

Waygood Colour, environmental colour consultants, were appointed to a multidisciplinary team charged with improving all aspects of the public realm of The Strand. Jem Waygood set out a strategy for adding colour to the façades of buildings which formed the street to create legibility, incident and identity, and to define clearly the character of each individual street. As the buildings along The Strand are in private and individual ownership, it was recognised from the outset that this strategy would take some time to come to fruition, furthermore it was decided that building owners could

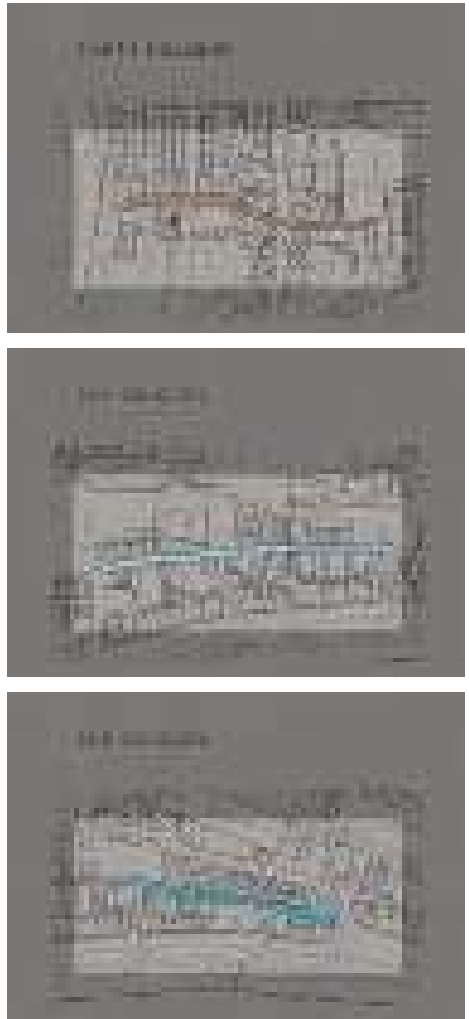


Figure 2. Colour Palette allocation on Douglas street plan. Credit: Waygood Colour, 2011.



Figure 3. Earth colours existing palette. Credit: Waygood Colour, 2011.

not be forced into accepting a given colour but that they should be given a choice, within the terms of the palette for their part of the street. Waygood Colour therefore decided to create three palettes, one for each street, which responded to the setting of the town and the views available from each of the streets.

Duke Street, the most southerly of the three, framed views to the south of the cliff faces rising above the River Douglas, and to the rural hinterland surrounding the town. Castle Street, the most northerly, framed views onto the sea front of Douglas Bay, and also abutted a number of side streets with views onto the sea. The middle section, Strand Street, contained no long range views at all, except for views upward to the sky in the narrow gap above the street and between building frontages. This analysis led to the decision that the palettes should be organised around the three elements of earth, sea and sky respectively. This is illustrated in Figure 2.

Earth Colours

Indigenous colours from the landscape were collected from long range views, mid range views and close details, giving a range of colours which encapsulated the underlying geology, soil, land use and flora. Examples of this are illustrated in Figures 3 and 4.

In addition to site observed colours, paintings of local landscapes kept in the Manx National Museum were analysed as a way of incorporating artists'

emotional response to landscape in the colour range. Manx residents are very proud of their cultural heritage and the museum has an extensive collection of significant art works. The numerous collected colours, together with those from the paintings were synthesised to form a working palette of existing hues and dominant tonalities. From this range a developed palette of colours, suitable for application to the façades of buildings, was created. Developing the palette involves making allowances for the effects of light reflection, distance and atmospheric distortion of colours and simultaneous contrast. Highly chromatic colours were ‘knocked back’ to make them less demanding and create a greater sense of space within the street frontages. The colours selected for the developed palette have a strong resonance with the earth colours of the Island without being direct matches; rather they are a range of colours, which will work well with the landscape but also with the built environment of the street.

This same process of palette development has been applied to the other colour groupings, using the three-dimensional NCS colour space. The developed palette is laid out for ease of use by building owners and their agents, with colours set out in column groups according to function: integration colours for the largest area of a façade, paired with complementary and harmonising colours and also colours of increased or decreased chromaticness for accent and highlight on architectural detailing and decoration. A grey scale of selected colours is provided for tonal comparison. Thus a wide choice of colours is available but within a prescribed range, ensuring that the strategy of introducing legibility into the streetscape holds good. The developed earth palette is illustrated in Figure 5.

Sea Colours

The sea was observed under different weather (and therefore light) conditions, and also at different depths, giving rise to a remarkably wide range of colours. These are illustrated in Figure 6 with the synthesised palette in Figure 7 and the developed palette in Figure 8.



Figure 4 (top). Synthesised earth palette, the existing range. Credit: Waygood Colour, 2011.

Figure 5 (bottom). Developed palette, earth colours. Credit: Waygood Colour, 2011.

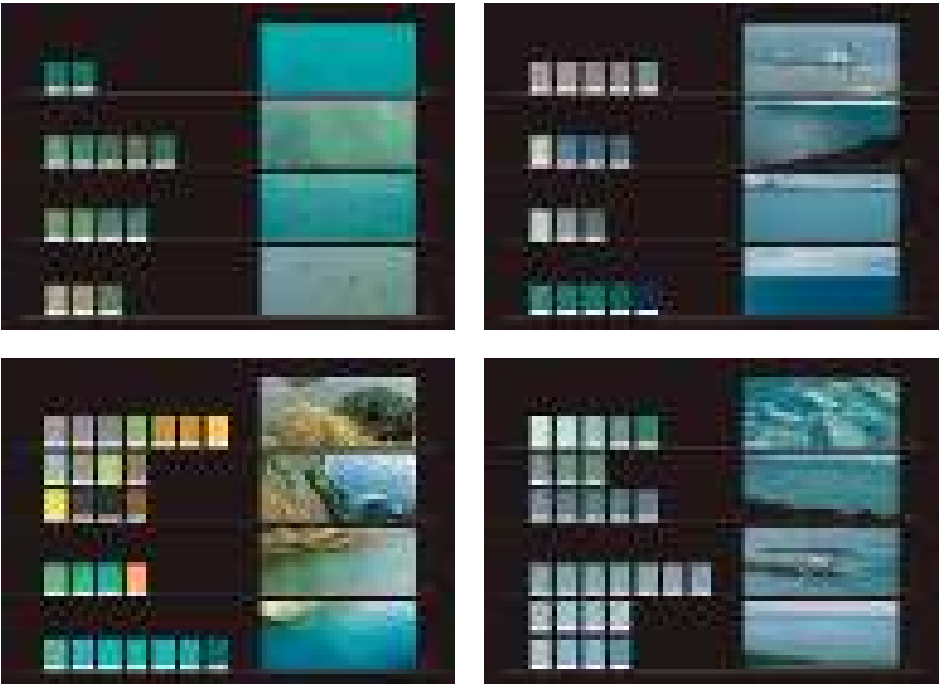


Figure 6. Sea colours, existing palette. Credit: Waygood Colour, 2011.

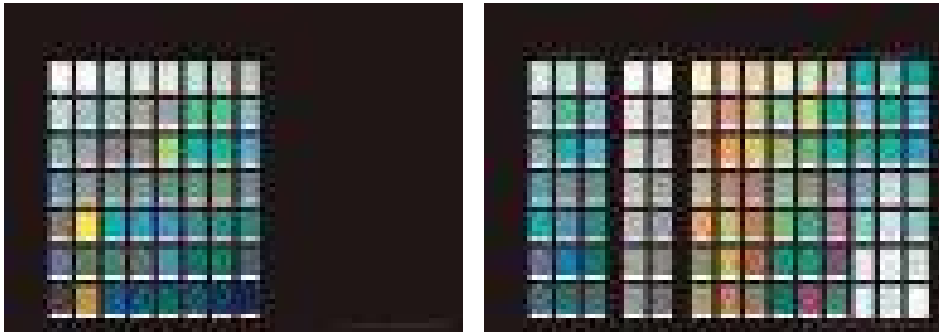


Figure 7 (left). Synthesised sea palette, existing colour range. Credit: Waygood Colour, 2011.
Figure 8 (right). Developed palette, sea colours. Credit: Waygood Colour, 2011.

Sky Colours

Sky colours were recorded at different times of day and weather and from all points of the compass to generate a wide range of colours (Figures 9 and 10).



Figure 9. Sky palette, existing colours. Credit: Waygood Colour, 2011.

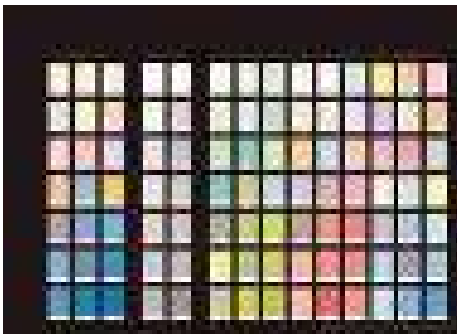


Figure 10. Developed palette, sky colours. Credit: Waygood Colour, 2011.

Colour Plan

The three developed palettes were placed on to the three street plans as a graphic device to locate the application of the palettes and whilst colours were not apportioned to individual buildings, key elevations and prominent gables were identified for the use of accent colours (Figures 11 and 12). Discussions with other team members responsible for way marking and lighting were factored into the designation of key elevations to ensure a co-ordinated approach to urban design

for the streets. The colour plan now forms part of the strategic guidance for the continued improvement and regeneration of the retail heart of the town and is being used not only for building frontages but also for colour specification for street furniture, landscaping and signage.

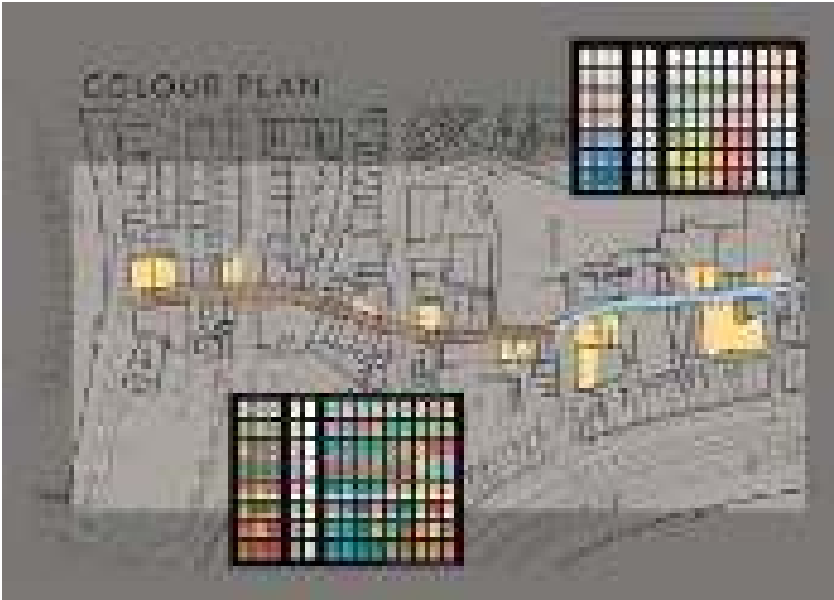


Figure 11. Colour plan. Credit: Waygood Colour, 2011.



Figure 12. Colour plan. Credit: Waygood Colour, 2011.

Greenheys, Moss Side Manchester

Manchester developed as a great industrial and manufacturing city during the cotton boom of the industrial revolution. The legacy of that period can be seen today in many of the fine civic and industrial premises which proliferated at that time, however it was also a period of mass housing for the workers, many built to low standards and the majority now coming to the end of their usable life. Manchester City Council has been pursuing a programme of planned regeneration over many years and to a variety of new standards. Concerns for twenty first century sustainability issues, and best practice in urban design now underpin the Council's approach to new housing. The author was invited by architects, Bernard Taylor Associates, to contribute to the design development and colour specification of a new housing scheme, known as Greenheys, in the Moss Side area of the city.

This project consists of 65 brick and board clad timber framed low-energy houses and flats forming two blocks around two off set landscaped squares. With striking wedge shaped forms and leaning corner towers they create a new sustainable neighbourhood for this area of the City just south of the University. The 1.2 hectare site forms a city block with well defined boundaries within a tight urban grid. One boundary is formed by the main north to south route into the city centre, and as such the block also forms a gateway into the city. The starting point for the colour palette design concepts began with a thorough analysis of the immediate indigenous colour range in the surrounding neighbourhoods. Moss Side is a culturally diverse area with immigration from the Indian sub continent and the Caribbean prevalent in the 1950s and 1960s. In the 1980s it became the hub of Afro-Caribbean community in Manchester and more recently there has been inward migration from the Somali, Chinese and Eastern European communities. This diversity can be seen on the street with traditional textiles and shop displays representing the cultural mix (Figure 13). Whilst the traditional building materials are red brick and grey slate throughout the typical Victorian terrace, there are also examples of Victorian tiles in the locality, often around the entrance to houses as illustrated in Figure 14.



Figure 13 (left, centre). Moss Side street colours. Photo: Waygood Colour, 2012.

Figure 14 (right). Victorian tiles. Moss Side. Photo: Waygood Colour, 2012.

These details were recorded and synthesised to give an existing palette from which to develop a colour plan for the development. The process here follows the same procedures set out for the Douglas project, with the notable exception that the designer has control over the application of the colour plan, elevation by elevation. The architectural form of the new housing continues the precedent set by the Victorian terrace with continuous building frontage and special detailing and increased scale for corner buildings to help define the city block. Waygood Colour built a working scale model of the development in order to bring architectural form and applied colour together, with the opportunity to experiment with both over the course of design development (Figure 15). Underlying the colour design was the principle that the new housing scheme offered an opportunity for the buildings to reflect the energy and diversity of the new communities, whilst respecting the discipline of the surrounding urban grid. The colour palette therefore referenced the shop frontages and street colours, validating these as essential elements in a new sense of place, and therefore an optimistic new beginning for residents. Once the colour sequences had been finalised these were transferred to a computer model to enable distribution of the ideas and consultation with stakeholders (Figure 15 and 16).



Figures 15 and 16. Greenheys computer models. Credit: Waygood Colour, 2012.

Colour Design Detail

Five different coloured bricks were specified and four different fibre cement weather boards. The corner towers were constructed from four different coloured building boards, one colour for each corner of the development. The bricks were selected as a common material to the city, with colours to provide contrasts within the built form and to provide reasonably high chromatic content. Once the brick choices were finalised the fibre cement and building boards with a wide colour choice were selected to work with the bricks. The corner towers feature strong hues to mark the edges of the development. The landscaped squares feature fairly recessive grey/green plant material to allow the built elevations to stand forward, the same principle was applied to the hard landscaping and boundary treatments. The largest public square was completed with a sculptural fence line, which referenced a neighbouring Victorian school, topped with a copper spire, which established an axis across the space. Patinated copper was applied to the sculpture to link the new development to the adjacent city blocks. Figures 17 to 23 illustrate the completed development.



Figure 17. Greenheys, Gaskell square. Photo: Positive Image, 2012.



Figure 18. Greenheys Gaskell square. Photo: Positive Image, 2012.



Figure 19. Corner tower, Greenheys. Photo: Positive Image, 2012.



Figure 20. Corner tower, Greenheys. Photo: Positive Image, 2012.



Figure 21. Corner tower, Greenheys. Photo: Positive Image, 2012.



Figure 22. Greenheys. Photo: Positive Image, 2012.



Figure 23. Gaskell square sculptural fence, night time. Photo: Positive Image, 2012.

Conclusions

These two schemes illustrate aspects of urban colour design within the United Kingdom. Douglas required an approach of drawing in the surrounding landscape to fully locate the town within its island setting. Its former appearance was of a faded and generic Victorian seaside town, not the capital of a very particular place. By responding to the strength of colour in the land, sea and sky, this colour strategy now has the potential to change the feel of the town and raise the confidence of its residents and business leaders. The strategy will need perseverance and tenacity to implement, absentee landlords and diverse ownerships mean it will take time to implement and on going reviews of the palette application will be required to monitor the effectiveness of the guidance.

Greenheys in Manchester required a slightly different approach creating a new beginning for this inner city area. The immediate building context of Victorian terraces was in a transition away from the traditional red brick and grey slate, into a twenty first century vision of community and sustainability. The colour design attempts to reflect this change, creating a new sense of place based upon diversity, and urban intensity expressed through the material culture of its residents.

Colour has a very visceral and immediate impact upon the perception of places and therefore needs to be incorporated into the design process in a conscious and strategic way, rather than as an after thought. Working alongside architects, as happened with Greenheys, allows the colourist and architect to work together creatively to the benefit of the scheme, and this must be a model worth pursuing for new build projects. For refurbishment of existing environment, bringing colour design into multidisciplinary teams, also ensures that colour is treated in a strategic manner, rather than an arbitrary decision taken in isolation. Convincing building owners and agencies to support proposals needs a compelling vision, with a strong narrative that holds the concepts together, and therefore the colourist needs to be able to operate at an ambitious scale, as was the case with Douglas.

Цветовое поле в архитектурной среде

Стиг Эванс

Художник, Брайтон, Великобритания

Аннотация

В статье демонстрируются примеры привязанных к месту публичных работ, выполненных автором, британским художником Стигом Эвансом. Описывается роль этих произведений искусства в процессах трансформации, улучшения и обогащения городского пространства и архитектурной среды. Рассматриваются ключевые идеи и этапы творческого процесса. Выявляются связи с предыдущими работами, составившими основу крупномасштабного проекта применения цветового поля в Брайтон Марине. Показана связь общественных работ художника с его студийной практикой и представлены соответствующие примеры. Обсуждается деятельность художника в качестве реставратора живописи в Королевском павильоне и музеях Брайтона (Великобритания), которая также оказала серьезное влияние на его отношение к цвету. Использование цвета с учетом условий местной и региональной среды представлено как главная идея художественного творчества.

The Use of Colour Field in the Built Environment

Stig Evans

Artist, Brighton, UK

Abstract

This paper shows examples of site-specific public works conceived by the author, British Artist, Stig Evans. It describes how these artworks are specifically designed to transform, enhance and enrich urban spaces and the built environment. It examines the concepts and creative processes behind examples of his public work and how previous projects have culminated into a large-scale colour field project at Brighton Marina. It also links his public work to his studio practise, with examples of each. It also discusses his work as a Paintings Conservator (Royal Pavilion and Museums, Brighton, UK), which also has a profound impact on his colour sensibility. The paper describes the use of colour, taking inspiration from the local and wider environment as the central concept to the artworks.

Introduction

Architectonic space is continually modified by transformations in light and colour. The visual and spatial shifts and changes created by changes in environmental conditions can create indefinite spaces, architectural variations and

ambiguities. My site-specific public work attempts to employ and enhance this effect by integrating artworks based on elements of natural phenomena within the urban context and built environment. It attempts to create an architectural atmosphere of synergic effect that is continually and subtly modifying the space. Finely creating spatial areas of kinetic ambiguity within a rigid, static and concrete building context is something that interests me and also resonates within my studio-based work; where ambiguous and hard-edged features manifest in medium scale 'colour field' type painting. Through my work as a paintings conservator I examine, study, identify and analyse paintings, paint layers and pigments (modern and historic) (Figure 1). Proficiency in matching and mixing colours is fundamental to the restoration of paintings. This has had and continues to have a profound effect on my studio practise as my work explores aspects of how artworks are changed by time, environment, context, and intervention (Figure 2).



Figure 1. Cross-section of paint (magnification $\times 100$), Royal Pavilion Music Room, showing layers of original paint (vermilion and cochineal) and later unoriginal retouchings. 2010. Photo: Stig Evans.

Studio



Figure 2. Stig Evans at work in his Studio. 2017. Photo: Julian Vilarrubi.



Figure 3. Stig Evans, *The Ravished Image* (Darkpurplishblue), 2017, 130 x 150 cm.



Figure 4. Stig Evans, *The Ravished Image* (Verydarklightishgreen), 2017, 130 x 150 cm.

'The Ravished Image'

Paintings change over time; the materials alter physically and visually with age. Authenticity, artistic intent, cultural and social values are modified. The paintings I make use colour to explore these aspects and the relationship 'we' as viewers have in light of these modifications. However they are at the same time abstract Colour Field paintings exploring the possibilities inherent in space, colour, line and edge within the context of an a priori knowledge of future change.

The painting titles reference the book *The Ravished Image or How to Ruin Masterpieces by Restoration* by Sarah Walden (1985). My painting process generally starts with large fast broad gestures taking only a few minutes to complete. They are subsequently altered (often subtly) by modification through application of dozens of glazes (applied by airbrush) and 'retouchings' over a period of weeks (Figure 3). Both historic and modern pigments are used. Colour matching is an integral part of this process, adjusting the large brush marks with small retouching brushes (Figure 4). The divided area of tonality and chromatic changes

in the paintings suggest diptychs, colour swatches, wrongful interventions, removed areas or just discoloured and faded paint layers, are permanently suspended in change.

'Interventions'

'Interventions' is a conceptual photographic investigation extending the idea of colour matching with colour charts and swatches. 'Interventions' matches natural colours by using household paint swatches (taken by holding the swatch up on a stick in front of the lens). These photographs are showing human intervention on nature, alluding to our desire in someway to domesticate the landscape and environment. They also suggest the homogenising effect the paint industry has on our observation of nature and how they offer us a safe, anodyne escapist fantasy to something foreign and exotic; (with names like 'Moroccan sands', 'Russian Velvet', 'Tuscan treasure', 'Javan Dawn', 'Martian Skies').

These names and colours on everyone's walls within our domestic dwellings must have a certain impact in the way we perceive the natural world premise. The photographs highlight this effect that the mass domestic paint market influences our colour consciousness. It was the American linguist Benjamin Whorf, who suggested that our language determines how we perceive the world.

We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way—an agreement that holds throughout our speech community and is codified in the patterns of our language. (Whorf 1940: 213–214)

I believe that since the time of Whorf's writing, our colour language and vocabulary are now more complex and varied than ever before. We now have a very sophisticated and elaborated colour language and terminology at our disposal. Thanks to the modern household paint industry and fashion industry, we as consumers are very accustomed to new and ever changing colour vocabulary from clothing to paint to Pantones.

These photographs interrupt the perspective with the coloured swatches subtly changing the image in a way that makes us contemplate and re-assess the image, the colours, the colour names and our powers of perception highlighting our continuing urbanisation and separation from the natural world (Figure 5–7).



Figure 5. Stig Evans, *Amazon Beat*, 2014, Digital C-Print.



Figure 6 (left). Stig Evans, *Blue Lead*, 2015, Digital C-Print.

Figure 7 (right). Stig Evans, *Sapphire Springs 4*, 2014, Digital C-Print.

Public Projects (Precursors)

Prior to the Marina project, two preceding public commissions were influential in determining the form and idea for its concept. *ZipGates* (Figures 8 and 9) and *Vega Building* (Figure 10).

ZipGates

ZipGates (2006) were a percent for art commission for new build residential flats, the gates represent our relationship with urban architecture and urban contemporary living.

The colour palette for the gates comes from the surrounding architecture and natural elements reflected in that architecture. Solar powered lights come on at night and the central vehicle gate bars illuminate on opening.



Figure 8 (left). *ZipGates*, 2006, opening for vehicles, 4m x 1.5m, Hove. Powder coated aluminium and steel. Fluorescent and solar lights, acrylic box sections. Photo: Stig Evans.

Figure 9 (right). *ZipGates*, 2006, closed for pedestrian, 3m x 1.5m, Hove. Powder coated aluminium and steel. Photo: Stig Evans.

Vega Building



Figure 10. *Vega Building*, 2015, Hove. Photo: Jim Stephenson.

The *Vega Building*, while being mainly a light based piece, as well as having a limited palette, played an important role in developing the concept for realising aspects of the local environment kinetically and architecturally.

The building is sited close to Hove seafront. Its close proximity to the sea inspired the idea for a kinetic lighting system that corresponds to the rise and fall of the local tides for Hove. The tides rise from 0.1m to 7m every 6 hours. The building comprises of three glass south-facing towers, with the central tower reaching a height of 14 metres. The towers are constructed of hollow glass sections fitted with coloured LED strip lighting in 2 metre intervals. As the real tide rises and falls, so do the two central strip lights, mimicking the sea level in increments of 2 metres. The lighting creates a didactic and continuously nocturnal changing illumination system for the building, subtly affecting the form of the building. Colours were chosen to reflect the colour of the sea. The different glass balconies were also picked from local sea colour.

***Timelines*, 2016, Brighton Marina, Brighton, Sussex, UK**

A Percent for Art commission was put out to tender by Brighton and Hove City Council in 2015 for a series of artworks for a new residential and retail development in Brighton Marina. The commission brief was quite open and asked for an artist to introduce a series of artworks that were floor or wall based throughout the new development.

The Marina opened to the public in 1979 and covers 127 acres (0.51 km²) and has a functioning harbour, residential buildings, and leisure and retail units. It is the largest manmade Marina in Europe. The commission formed part of 'Phase



Figure 11 (top). *Timeline 1 and Timeline 2*, 2017, North and South Building, West Quay, Brighton Marina. Photo: Woody Evans.
Figure 12 (bottom). *Twelve Hours*, 2017, West Quay, Brighton Marina. Photo: Stig Evans.

1' of a new regenerative development scheme, providing 195 residential apartments with retail units underneath. Situated on the West Quay in the inner harbour the development was built on piled concrete platforms suspended over the water.

Initial aspirations for the work was to subtly alter the architectonic space by introducing large-scale expanses of colour or 'colour fields' and to make the colours relate in some way to the local environment (Figures 11 and 10). Living (and surfing) by the sea, I observe the variations and changes in colour and tone of the water on a daily basis. Sea colour constantly changes on the Brighton shoreline. It ranges from a custardy brown colour (rough seas and sand) to a turquoise clarity (clear summers day over chalk rocks).

Researching into the colour of water revealed a simple colour matching method for indicating pollution levels the Forel-Ule Scale is a method used to approximately determine the colour of bodies of water and has been used in oceanography since the late 19th century. It uses a colour palette numbered from 1 to 21 and the observer measures this to a sample of water matched against the colour scale (Figure 13).

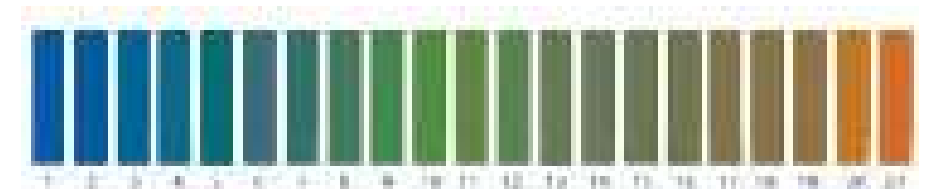


Figure 13. Stig Evans, Interpretation of Forel-Ule Scale Colour Palette.

Sketches and working watercolour/collages in the studio explored ideas of colour change in time periods as well as notions of water meeting architecture; liquid soft against architectural solidity, cut line contra airbrush (Figure 14). Through a combination of on site daily visual observations and studio based colour studies and the colour matching idea of the Florel-Ule Scale the concept and form of a 'barcode type timeline' linked to the times and changes to sea colour was developed for the artworks.

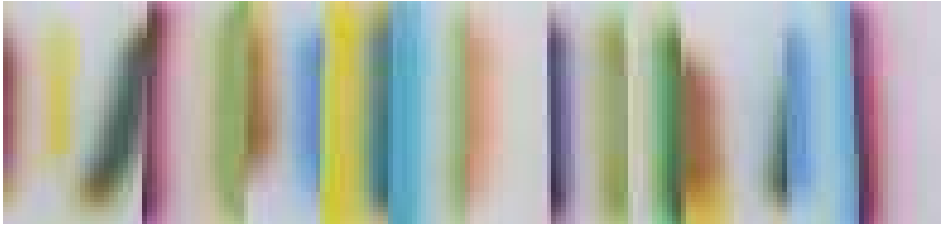


Figure 14. Stig Evans, *Colour Study*, 2015, Watercolour on Paper, 25 x 40 cm.

A barcode is an optical representation of data. A timeline is a list of events in chronological order. The combination of changing colour fields incorporating 'chromatic' information within a barcode/timeline format seemed relevant for the site and positioned correctly within the architecture would allow large-scale coloured expanses at low level having a dual purpose of both modifying the buildings as well as an immersive and didactic experience for users (Figure 15).



Figure 15. *Twelve Hours*, 2017, Detail, North Building, West Quay, Brighton Marina. Photo: Woody Evans, 2017.

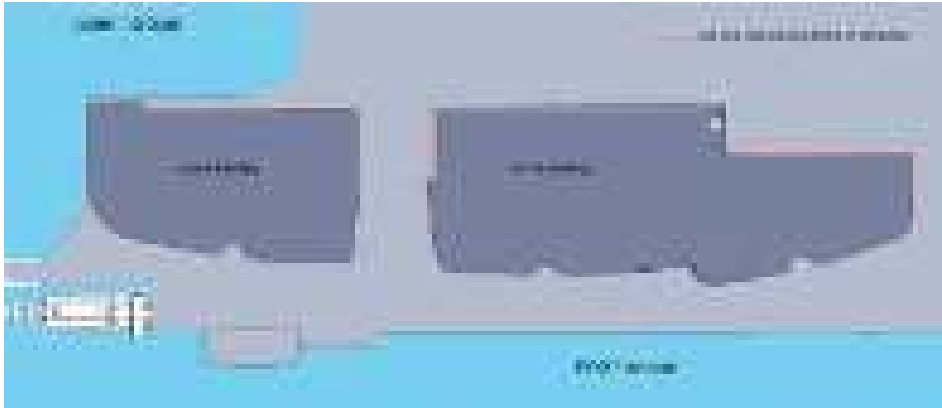


Figure 16. Plan of West Quay. The red lines denote position of artworks. Diagram: Stig Evans.

Three separate 'timelines' were designed to cover a total of 90 metres for the lower sections of the buildings, following their contours and wrapping around the bases of the structures; visually separating the buildings from their foundations (Figures 16 and 17).



Figure 17. *Timeline*, 2017, South Building, West Quay, Brighton Marina. Photo: Woody Evans.

Ceramic tiles were chosen for the materials as they are long lasting, non-fugitive, highly coloured, and easy to replace and replicate. Exterior grade tiles with a broad palette were sourced through Grestec Tiles Ltd. (Figure 18). Original sea colour observations and sketches presented many more colour variations than the Cesano tile range. The colours had to be modified to accommodate a more 'limited' palette.

Tonal variations became an important aspect to illustrate the colour transformations, and the overall form and hue had to be adjusted to incorporate these changes (Figure 19).



Figure 18. Cesano Tile Range, Matt. Grestec.co.uk



Figure 19. Stig Evans, *Twelve Hours*, Timeline, 48 m x 2 m.

Digital sketches and working drawings were made using the colour palette from the Cesano tile range (Figures 19 and 20).



Figure 20. Stig Evans, *Timelines*, 2015, Digital Studies.

As the timelines were further developed, phases and periods of colour were incorporated. Twelve hours is the largest of the timelines at 48 metres long by 2 metres high (Figures 15, 19 and 21). It represents the colour the sea goes through in an idealised day, from dawn to dusk. The size of each colour section is proportional to the time it remains that colour.

The work also incorporates and shows the reflections from sky colours through the same period (Figures 22, 23 and 24). Sea colour is determined by the interaction of light and particles in the sea. It is also affected by the colour of the sky and with varying degrees of differentiations mirror and reflects the colour of the sky. At certain points during the day colours will match the sky and sea.

The development has been constructed on concrete columns piled and drilled into the seabed; they are literally 'suspended' above the water. It was this aspect of the buildings that I wanted the artworks to emphasise. Having the works wrap around the base of the buildings presents them with a sense of separation—balanced above the water and their foundations.

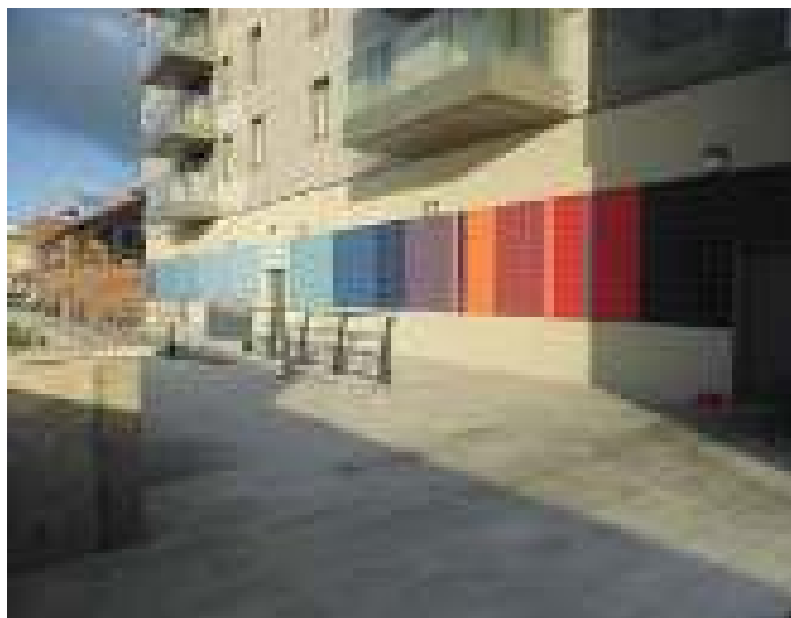


Figure 21. *Twelve Hours*, 2017, North Building, West Quay, Brighton Marina. Photo: Stig Evans.



Figure 22. *Timeline 1*, 2015, South Building, West Quay. Photo: Stig Evans.



Figure 23. *Timeline 1, 2017, South Building, West Quay.* Photo: Stig Evans.



Figure 24. *Timeline 2, 2017, North Building, West Quay.* Photo: Stig Evans.

Conclusion

Timelines is a culmination of my studio practice, conservation work and previous public art projects. The public work I do is not the stand-alone type sculpture, but rather work that is integral to the architecture and architectonic space and its surrounding environment. As a colourist the majority of the work I am requested to do is collaborative; with architects who use my creative input and colour expertise as a means of enhancing and enriching a project. The introduction of colour into urban architectonic spaces is becoming increasingly common, architects and designers realise that colour has an integral function to a spaces ambience. Modern materials have allowed more stable colour possibilities. The introduction of colour, especially if routed in the natural world, no matter how abstracted, can not only influence the form, shape and concept of an architectonic space but can also have a very positive physiological and psychological benefit on users of those spaces.

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Наблюдения за цветом в Дессау: сезонные отклонения в сочетании цветов

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Аннотация

В процессе наблюдений за цветом в Дессау были выявлены цвета, появляющиеся в разное время года в парке Георгиум в районе Рослау (Дессау, Германия). Описание проводилось исключительно на основе чувственных впечатлений без применения каких-либо вспомогательных средств. Результаты фиксировались в терминах цветовой системы NCS Farbsystem®©. Затем проводилось непосредственное сравнение наблюдаемых цветов с образцами указанной цветовой системы. В исследовании был использован доработанный атлас цветов, позволяющий сравнивать образцы с оттенками, наблюдаемыми в парке. Результаты наблюдений показали, что зимой цветовая гамма (с преобладающим значением около 10-Y10R) отклонялась в сторону зеленого и зелено-синего, тогда как летом цвета (с преобладающим значением около 30-G40Y) при их восприятии сдвигались ближе к фиолетовому. Направления отклонений практически никогда не оказывались параллельными, они расходились от центра в разные стороны. Центры отклонений в основном находились в области более высокой насыщенности. Отклонения располагались радиально вовне от всей совокупности сравниваемых цветов. Различные комбинации цветовых значений в течение года определялись разными характеристиками цвета. Цветовые значения вычислялись в ходе наблюдений в Дессау. Цветовые инсталляции, разработанные по результатам наблюдений в Дессау, позволяют понять, как в будущем можно использовать цветовой дизайн в архитектуре зданий, садов и ландшафтов для создания гармоничного баланса внешней и внутренней природы восприятия.

Die Dessauer Farbbeobachtungen: Jahreszeitliche Abweichungen der Farbzuoordnung

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Zusammenfassung

Bei den Dessauer Farbbeobachtungen wurden die in den wechselnden Jahreszeiten erscheinenden Farben vor Ort im Park Georgium in Dessau-Roßlau, Deutschland, nur nach ihrem Sinneseindruck ohne Verwendung irgendwelcher Hilfsmittel beschrieben. Die Beschreibungen folgten der Terminologie des NCS Farbsystems®©. Danach wurden die Farben direkt mit Farbmustern des NCS

Farbsystems® verglichen. Ein modifizierter Farbatlas wurde verwendet, der optisch direkte Vergleiche der Muster mit den Farben des Parks ermöglichte. Zusammengefasst verursachten die Winterfarben (mit einem Schwerpunkt bei 10-Y10R) eine Verschiebung nach Grün und Blaugrün, während die Sommerfarben (mit einem Schwerpunkt bei 30-G40Y) in der Wahrnehmung nach Violett verschoben wurden. Die Richtungen der Verschiebungen waren nie wirklich parallel, sie driften aus Zentren und streuen in verschiedene Richtungen. Diese Verschiebungszentren liegen überwiegend im höher gesättigten Bereich. Die Verschiebungen wandern radial aus dem Farbbestand der verglichenen Farben nach außen. Verschiedene Farbbegriffe durchlaufen während eines Jahres unterschiedliche Zuordnungen zu Farbwerten. Diese können aus den Dessauer Beobachtungen abgeleitet werden. Die Dessauer Farbinstallationen, die aus den Beobachtungen hervorgegangen sind, geben einen Ausblick, wie zukünftiges Farbdesign in Architektur, Garten- und Landschaftsgestaltung die Balance der Farbigkeit der äußeren Natur mit der inneren Natur der Farbwahrnehmung in ein harmonisches Gleichgewicht bringen kann.

Einführung

Das farbige Umfeld, das uns alltäglich umgibt, ist neben wechselnden Licht- und Wetterverhältnissen auch noch großen jahreszeitlichen Veränderungen unterworfen. Das wird schon so manchen, der sich für eine Erfassung der farblichen Umwelt interessierte, abgeschreckt haben, genauere Nachforschungen anzustellen. Meine Dessauer Beobachtungen im Park Georgium in Dessau-Roßlau, Deutschland, können zu diesem Fragenkomplex einen Beitrag leisten. Die jahreszeitlichen Regelmäßigkeiten in der Farbwahrnehmung werden dargestellt, und meine Dessauer Farbinstallationen deuten an, wie solche Erkenntnisse bei künftigen Gestaltungen im Außenraum anzuwenden sind.



Figure 1. Optisch direkter Vergleich mit einem modifizierten NCS Farbatlas.
Photo: Jan Raffael Christiansen, 2014.

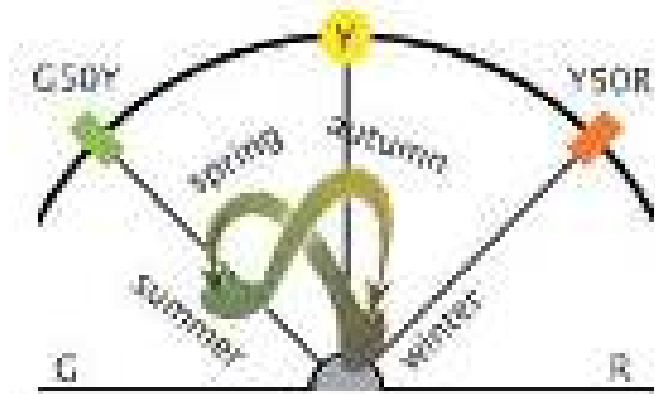


Figure 2. Schematische farbliche Pendelbewegung im Jahreslauf. Diagramm: Bertolt Hering, 2004.

Jahreszeitlich wechselnde Farbigkeit in natürlichen Umgebungen hatte ich schon durch mehrere Jahre hindurch beobachtet, bevor ich zu den Installationen in Dessau eingeladen wurde und die Dessauer Beobachtungen begann. Ich hatte die Farben der Natur mit Farbmustern des NCS-Farbsystems®© (Figure 1) optisch direkt verglichen. Grundsätzliche Aussagen über die Eigenfarbigkeit naturnaher Landschaft wurden so möglich (Hering 2004 und 2007).

Dass die Farbigkeit sich überwiegend im gelbnahen Bereich abspielt und im Jahreslauf eine Pendelbewegung um den Bereich des Gelben vollzogen wird, konnte ich feststellen (Figure 2). Dabei bemerkte ich von Anfang an aber auch, dass die subjektiven Farbempfindungen immer wieder in bestimmter Weise von dem abwichen, was die Vergleiche mit den Farbmustern vorgaben.

So wird der hohe Gelbanteil natürlicher Farbigkeit subjektiv generell nicht empfunden. Welche für die Jahreszeiten charakteristischen Abweichungen der Farbwahrnehmung es gibt, wollte ich herausfinden.

Zwei Farbenforscher sind dieser Untersuchung vorausgegangen:

Karin Fridell Anter ließ für ihre Doktorarbeit *What Colour is the Red House? Perceived Colour of Painted Façades* (Fridell Anter 2000) Architekturelemente in verschiedenen Jahreszeiten von Probanden in ihrer Farbwirkung beurteilen. Vereinfacht zusammengefasst waren ihre Ergebnisse, dass die Farben der Architekturelemente heller, farbstärker und weniger gelblich erschienen als die verglichenen Eigenfarben. Nach Jahreszeiten in typischer Weise abweichende Empfindungen konnte Karin Fridell Anter nicht feststellen.

Erst der Wahrnehmungspsychologe Michael A. Webster bestätigte in seinen Untersuchungen meine Vermutung: Er simulierte die Wahrnehmung der Farbigkeit einer Hochlandwiese in einem Experiment an einem kalibrierten Videomonitor (Mollon and Webster 1997). Ich nahm Kontakt mit ihm auf, und er bezog in einer weiteren Untersuchung auch die jahreszeitlich wechselnde Farbigkeit ein (Webster et al. 2007) und stellte fest, dass die Wahrnehmung durchaus nicht nur durch Lichtfarben sondern auch ganz erheblich durch die jahreszeitlich wechselnde Umgebungsfarbigkeit beeinflusst wurde.

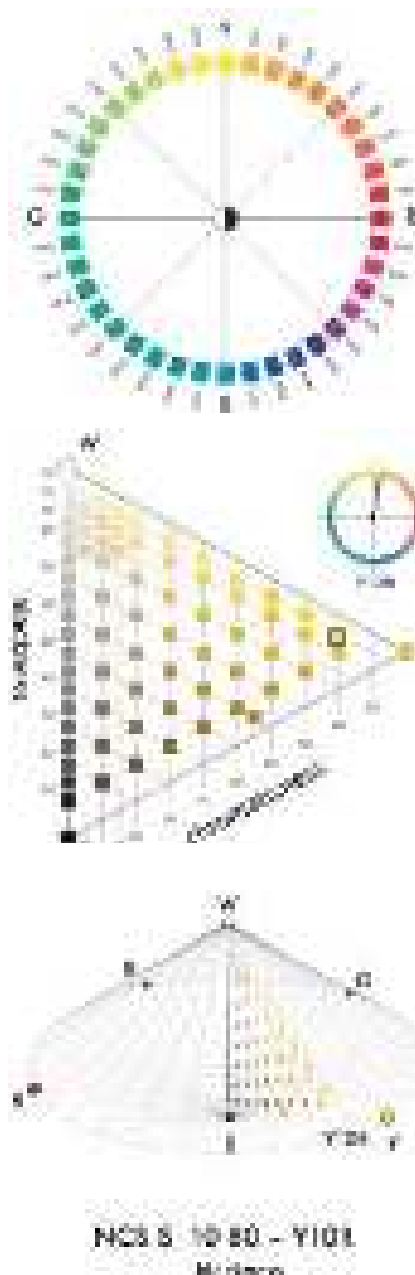


Figure 3. NCS Farbkreis, Farbdreieck und Farbraum, 2013. Quelle: NCSColour.com

Mit meinen Dessauer Beobachtungen habe ich eine ganzjährige Untersuchung durchführen können, die die subjektiv empfundenen Verschiebungen der Farbwahrnehmungen in einer Untersuchungsreihe erfasst und in Beziehung setzt zu den vor Ort durch Vergleich mit Farbmustern festgestellten Farbtönen.

Die im Vergleich festgestellten Farbwerte nenne ich den 'Farbbestand' im Unterschied zu den 'Farbempfindungen'. Gegenstand der Untersuchung war eine Parksituation in der mitteleuropäischen gemäßigten Klimazone, die mit sommergrünem Laubwald eine noch deutlichere jahreszeitliche Varianz aufweist als das von Trocken- und Regenzeiten beeinflusste indische Untersuchungsgebiet Websters.

Die in dieser Parksituation erscheinende Farbigekeit wird nicht nur ganzjährig ermittelt sondern auch in Beziehung gesetzt zur menschlichen Empfindung. So wird durch die Dessauer Beobachtungen und Farbinstallationen ein Farbraum eröffnet, der die Farberscheinungen der äußeren Natur und der Farbwahrnehmungen der inneren Natur des Menschen, in ein stimmiges Gleichgewicht rückt. Künftige Farbgestaltungen in Architektur, Garten- und Landschaftsbau werden auf die hier vorgelegten Erkenntnisse zurückgreifen können.

Das NCS-System

Als Referenz für die Empfindung unter neutralen Bedingungen diente bereits Karin Fridell Anter das NCS-Farbsystem®©, eine Farbordnung, bei deren Entwicklung man sich an den Empfindungen zahlreicher Probanden unter neutralen Laborbedingungen orientiert hat.

Bei den Dessauer Beobachtungen wurden die Abgleichungen der Naturfarben gleichfalls mit Farbmustern des NCS-Farbsystem®© durchgeführt. Hier

wurde allerdings ein modifizierter NCS-Atlas verwendet, der durch Schlitzte im Papier ein optisch direktes Vergleichen der Naturfarben mit den Farbmustern ermöglicht (Figure 1). Außerdem wurde ein grauer Karton statt weißem Papier als Grundlage für die aufgeklebten Farbmuster eingesetzt.

Hier folgt eine kurze Darstellung des verwendeten NCS-Farbsystems®© (Figure 3).

Der *Buntton* beschreibt die Ähnlichkeit einer Farbe zu den Elementarfarben Gelb, Rot, Blau und Grün im *NCS-Farbkreis*.

So liegt zum Beispiel der orange Buntton Y50R mittig zwischen den Elementarfarben Gelb (Y) und Rot (R), und der gelbgrüne Buntton G50Y ist mittig zwischen den Elementarfarben Grün (G) und Gelb (Y) zu finden.

Jeder Buntton im NCS-Farbkreis enthält ein Farbdreieck.

Das *NCS-Farbdreieck* liegt zwischen der Achse der unbunten Elementarfarben Schwarz (S) und Weiß (W) und jeweils einer bunten Vollfarbe (C).

Der *Schwarzanteil* (*Blackness*) ist der Grad der Ähnlichkeit mit Schwarz (S).

Der *Buntanteil* (*Chromaticness*) beschreibt wie bunt eine Farbe im NCS-Farbdreieck ist. Zum Beispiel weist der hier im NCS-Farbdreieck markierte Farbton einen recht geringen Schwarzanteil von 10 und einen hohen Buntanteil von 80 auf. Der markierte Farbton ist also ein kräftiges, etwas rötliches Gelb.

Aus den 40 im NCS-Farbkreis angeordneten NCS-Farbdreiecken entsteht der Doppelkegel des NCS-Farbkörpers.

Eine NCS-Bezeichnung wird von vier visuellen Eigenschaften abgeleitet, die Farbe beschreiben: Schwarzanteil, Buntanteil, Weissanteil und Buntton. Da Farbnuancen innerhalb des Systems in der Addition von Schwarzanteil, Buntanteil und Weissanteil immer 100 ergeben, kann aber bei der Farbnotation der Weissanteil ausgelassen werden.

Die NCS Bezeichnung 1080-Y10R beispielsweise beschreibt eine Farbe die sich zwischen Gelb (Y) und Rot (R) befindet, und folgende Eigenschaften aufweist: 10% wahrgenommenes Rot (die restlichen 90% tendieren nach Gelb), 10% wahrgenommener Schwarzanteil, 80% wahrgenommener Buntanteil, der Weissanteil von 10% wird nicht angegeben.

Das NCS-Farbsystem®© wurde unter den neutralen NCS-Laborbedingungen entwickelt. Das NCS-System®© ist besser als andere Farbsysteme dazu geeignet, die Farbigkeit pflanzlicher Natur zu erfassen, weil es über viele fein unterschiedene Gelbgrün-Töne verfügt – besonders in den Buntton-Stufen von G50Y bis G70Y.

Methode und Ort der Dessauer Farbbeobachtungen

In der Dessauer Farbbeobachtungsreihe im Park Georgium wurden die in den wechselnden Jahreszeiten auftretenden Farben nach der Empfindung ohne Hilfsmittel vor Ort beschrieben und die Beschreibung auf Video protokolliert. Diese Beschreibungen folgten der Methodik des NCS-Farbsystems®©, indem auch hier Buntton-Ebenen nach der Empfindung beschrieben wurden: „Wo befinde ich mich im Farbkreis?“ war zum Beispiel die Frage und die Antwort beispielsweise: „Es ist ein etwas rötliches Gelb, 10% rötlich, also Y10R.“ (Figure 4).



Figure 4. Bertolt Hering vor dem sogenannten Fremdenhaus im Park Georgium. Standbild des Videos 'Farbempfindungsbeschreibungen Juni 2013'.

Auch der Buntanteil wurde entsprechend der NCS-Begrifflichkeit beschrieben: „Wie weit befindet sich die Farbe von der neutralen Mittelachse des Farbraums entfernt, wie nah an der gedachten maximalen Vollfarbe?“ Eine Antwort war beispielsweise: „Es ist ein schwach bunter Ton, aber nicht ganz schwach, also 20% bunt, ein Ton mit einem Buntanteil von 20%.“ Mit diesen Angaben können wir die vor Ort

entstandenen Schätzungen der wahrgenommenen Farbe als 'Empfindungsangaben' in eine Aufsicht auf den NCS-Farbraum eintragen.

Die weitere farbliche Dimension des Schwarzanteils, den die Systematik des NCS-System® mit sich bringt, kommen in den Grafiken in ihrer Tiefendimension nicht zur Darstellung, da die folgenden Betrachtungen alle in einer Aufsicht auf den Farbraum stattfinden. In den folgenden Betrachtungen werden also nur Buntton und Buntanteil der Farbe besprochen.

Wenn die Beschreibung der Farbempfindungen, die auf Video (Hering 2013a) protokolliert wurden, umfassend durchgeführt war, was eine dreiviertel Stunde bis Stunde in Anspruch nahm, wurde die Farbigkeit der zuvor beschriebenen Gegenstände und wahrgenommenen Farbbereiche mit den Farbmustern des NCS-Systems® optisch direkt abgeglichen und notiert. Hierbei wurde ein Farbatlas verwendet, der einen direkten optischen Vergleich des Farbmusters mit der zu bestimmenden Farbe ermöglichte. Es gab also keinen Blickweg zwischen Muster und Landschaftsfarbe, der etwa über ein weißes Papier oder andere die Wahrnehmung irritierende Elemente geführt hätte.

Die jetzt verglichenen Farbwerte wurden in NCS-Farbbezeichnungen mit einem Hinweis auf das betreffende Objekt oder den Farbbereich als 'Farbestand' handschriftlich notiert. Die Beobachtungen inklusive der Vergleiche nahmen jeweils ca. zwei Stunden in Anspruch. Sie fanden an sieben im Jahr verteilten Terminen vormittags zwischen 9 und 12 Uhr statt.

Der Park Georgium ist Teil des zum UNESCO-Weltkulturerbe erklärten Gartenreichs Dessau-Wörlitz, des ersten englischen Landschaftsgartens in Kontinentaleuropa, der einen idealen Einklang zwischen Landschaft und Architektur herzustellen suchte (Kulturstiftung Dessau-Wörlitz o.D.).

Meine Beobachtungsposition war zehn Schritte südlich des Eingangs zur Südseite des Fremdenhauses beim Schloss Georgium, mittig innerhalb des halbrunden Kiesweges (Figure 5). Das Blickfeld betrug horizontal etwa 100° und erstreckte sich von einer Lindengruppe im Hintergrund links bis über die nahe am Fremdenhaus stehenden Platane rechts. Bei dem beobachteten Teil des Parks



Figure 5. Photographische Darstellung des Wahrnehmungsfeldes der Dessauer Beobachtungen. Georgengarten südlich des Fremdenhauses in Dessau-Roßlau, Deutschland. Photo: Bertolt Hering, Juni 2012.

Georgium handelt es sich, nach der Gesamtsituation zu urteilen, um einen Standort, der natürlicherweise eine Hartholzaue hervorbringen würde.

Bei dem jetzigen Zustand handelt es sich um einen im Stil des englischen Landschaftsgartens angelegten Park, der auch exotische und immergrüne Gehölze aufweist. Stieleichen, Spitz-Ahorn und Linden dominieren das Gehölz, es befinden sich aber auch Eiben, eine Japanische Lärche und eine Platane im Blickfeld (Figure 6). In der Entfernung ist durch eine Gehölzreihe hindurch eine Obstwiese mit Zwetschgen- und Apfelbäumen zu sehen. Die vorhandenen Wiesenflächen werden zweimal im Jahr gemäht. Die relative Konstanz des Grünen in den Jahreszeiten, die durch immergrüne Eiben und die gemähten Wiesen entsteht, unterscheidet den Ort von einem naturnahen Umfeld, das an diesem

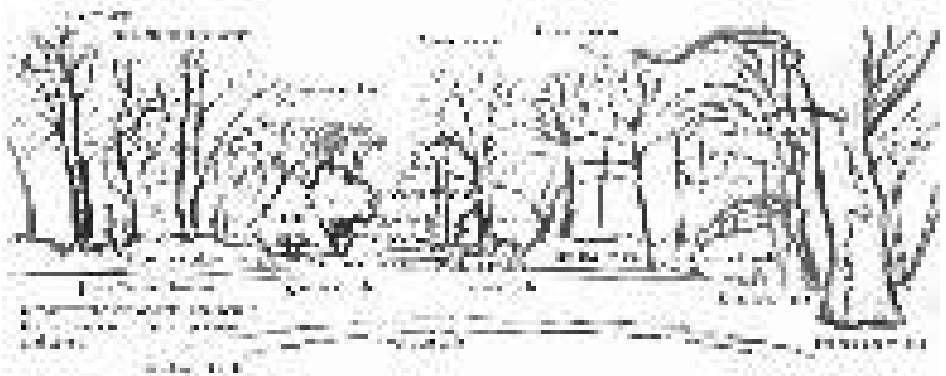


Figure 6. Gesichtsfeld der Dessauer Beobachtungen mit Eintragungen von Pflanzenarten. Skizze: Bertolt Hering, 2013.

Standort durch ausschließlich sommergrüne Gehölze geprägt wäre. Es ist eine vom Menschen geschaffene Parksituation, die Sichtachsen offen hält und ganzjährig grüne Elemente bietet.

Der Ort ist in für die Darstellung einer wirklich naturnahen jahreszeitlichen Farbdynamik nicht geeignet, denn der Winter wäre in einer naturnahen Situation weniger grün als hier, der Ort ist aber typisch für eine vom Menschen nach seinen Idealen geschaffenen Freiraumsituation, in der die Pflanzenfarbigkeit die Farbigkeit des Umfelds stark prägt.

Die Beobachtungen in Einzeldarstellungen

Die Beobachtungen fanden zwischen dem 6. Mai 2012 und dem 24. April 2013 an sieben über das Jahr verteilten Terminen statt. Die Darstellung hier beginne ich mit den Winter-Terminen und ende mit dem Herbst. In den folgenden Grafiken finden sich jeweils eine Aufsicht auf den NCS-Farbraum, der ermöglicht, die in der Abmusterung im optisch direkten Vergleich ermittelten Farbtöne eines Termins zu erkennen (im Diagramm eingetragene Farbpunkte, von denen die Pfeile ausgehen, nachfolgend als Farbpunkte bezeichnet) (Figuren 7–13). Sie stellen den 'Farbbestand' des Ortes dieser Jahreszeit dar und damit gewissermaßen die objektive Seite, die Eigenfarbigkeit des Ortes, die sich mit direktem Vergleichen und Abmustern bestimmen lässt.

Gleichzeitig finden sich an diesen Farbpunkten eine Pfeildarstellung. Sie zeigt an, wohin in der Farbwahrnehmung an diesem Termin und Ort die empfundene Farbe von der Eigenfarbe abweicht (Farbige Pfeile). Die Stelle im Farbraum, an den die Pfeilspitze zeigt, steht für den virtuellen Ort der beschriebenen 'Farbempfindung'.

Es wurde bewusst keine sichtbare Ausfärbung dieser empfundenen Farbtöne in den Grafiken angegeben. Sie würden die harmonische Wirkung des natürlichen Farbbestands und seinen farblichen Kontext empfindlich stören. Was die Verschiebung der Wahrnehmung an Eindrücken hervorbringt, kann an der Grafik nur abgelesen, nicht unmittelbar gesehen werden.

Zeigen die Pfeile beispielsweise genau auf die waagrecht nach links führende Grünachse, bedeutet dies, dass der entsprechende Farbton, wo immer er auch im Farbraum zu finden ist, als grün wahrgenommen wurde.

Es ist durchaus möglich, dass einzelne Töne in der Wahrnehmung nicht von ihrem Ort im NCS-System® als Eigenfarbe abweichen (farbiger Kreis ohne Pfeil mit schwarzem Punkt in der Mitte). Dies stellt allerdings eine Ausnahme dar. Meist bringt die Wahrnehmung erhebliche Abweichungen von den in der direkten Abmusterung festgestellten Eigenfarben in überwiegend bläulicher Richtung hervor.

Desweiteren kann derselbe verglichene Wert in unterschiedlichen Umgebungen im Blickfeld zu ganz verschiedenen Einschätzungen der Farbe in der Wahrnehmung führen. Umgekehrt können zwei unterschiedliche Eigenfarben in den Empfindungsbeschreibungen als derselbe Farbton beschrieben werden. Die jeweilige Nachbarschaft anderer Farben oder auch die Zuordnung zu Objektgruppen bringt im Simultankontrast jeweils andere Farbwirkungen hervor.

Van Kries (1902) hat die Funktion der Farbanpassung (Farbadaptation), die sich in der menschlichen Wahrnehmung permanent abspielt, zum ersten Mal in dieser Weise beschrieben: Die Reize der drei unterschiedlichen in der Netzhaut befindlichen Rezeptoren-Typen werden trotz verschieden starker eingehender Signale in der Verarbeitung als gleich hoch ausgepegelt. Dadurch ist gewährleistet, dass auch bei sehr einseitigen Farbreizen immer ein plastisches Bild der Unterschiede in der den Menschen umgebenden Farbigkeit entsteht.

Da es sich bei den folgenden Grafiken um Aufsichten auf den NCS-Farbraum handelt, in denen Aussagen über Buntton und Buntanteil nicht aber über den Schwarzanteil möglich sind, beschreibe ich Orte in diesen Ansichten mit verkürzten NCS-Bezeichnungen wie *_40-G50Y* (Buntanteil 40 - Buntton Grün 50 % nach Gelb neigend) und lasse das erste Ziffern paar aus, das der Bezeichnung des Schwarzanteils dient.

Die Abbildungen, die hier im gängigen Vierfarbdruck vorgelegt werden, geben die beschriebenen NCS-Farbtöne systembedingt nicht zuverlässig wieder. Besonders bei Betrachtung in Kunstlichtsituationen ist mit gravierenden Abweichungen zu rechnen, da der Vierfarbdruck mit einer farbigen Darstellung aus drei stark bunten Farben eine geringe Toleranz bei wechselnden Lichtsituationen aufweist, die sich stark von den breitbandigen Reflektionsspektren natürlicher Objekte unterscheidet. Um eine verlässliche Farborientierung zu erhalten, empfehle ich die Anschaffung von *Original-NCS-Farbmustern* oder *Kleiner Naturfarben-Kanon* (Hering 2013).

Winter – 30. Dezember 2012

Zum Farbbestand

Der Bestand der verglichenen Farbtöne dehnt sich zum Jahreswechsel auf einen relativ kleinen Teil des Farbraumes aus (Figure 7). Er bildet die Form eines liegenden Achtecks, deren Engstelle im Bereich von *15-G80Y* liegt, während an seinen Außenpunkten deutliche Häufungen von Farbwerten auftreten, im grünen Bereich bei *25-G35Y* und *40-G50Y* und im braunen Bereich bei *30-Y25R* und *05-Y30R*. Es ist typisch für 'Vegetationsfarben', dass sie fast ausschließlich auf der gelbhaltigen Seite des Farbkreises auftreten.

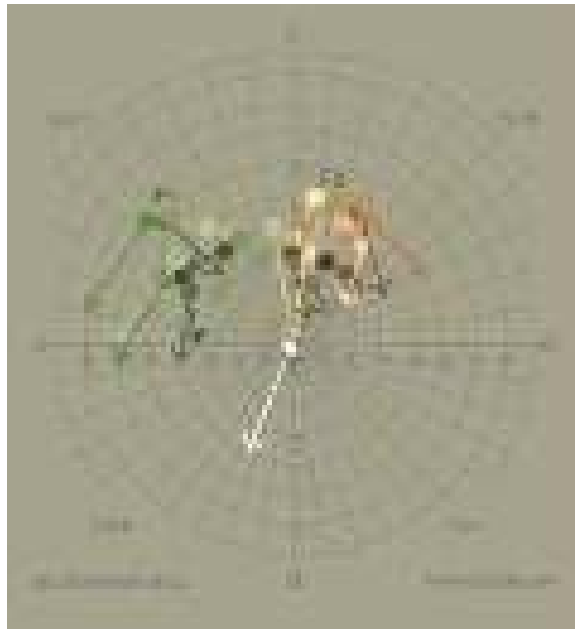


Figure 7. Farbbestand und Wahrnehmungsverschiebungen am 30. Dezember 2012. Diagramm: Bertolt Hering.

Zwischen 20-G60Y und 20-Y10R beziehungsweise 10-G75Y und 10-Y sind hingegen Reihenstrukturen zu erkennen, die mögliche Übergänge zwischen Grün- und Braunbereich wie in der herbstlichen Verfärbung zu markieren scheinen. Die Wetterlage war ein typisches Weihnachtstauwetter, nachdem der Wintereinbruch bereits Anfang Dezember erfolgt war.

Betrachtet man, wieviel Töne im grünlichen und wieviel im rötlichen Teil des Farbkreises zu finden sind, ist trotz des Termins Ende Dezember fast noch ein Gleichgewicht zwischen grünlichen und rötlichen Tönen festzustellen. Die Brauntöne überwiegen nur leicht. Dies ist auch als Folge der menschlichen Gestaltung im Park zu sehen. Immergrüne Eiben und gemähte Wiesen sorgen hier im Winter für den bleibend grünen Anteil ähnlich wie bei Rasenflächen.

Zu den Farbempfindungen

Vor Ort erscheint die Farbigkeit des Parks noch sehr vielfältig und geradezu spätherbstlich, obwohl der Beobachtungstermin kurz vor dem Jahreswechsel war. Im Unterschied zum verglichenen Farbbestand (Farbpunkte) entsteht in der Farbwahrnehmung ein größerer Farbraum.

Es finden starke Verschiebungen zur Grün- und Rotachse statt, während insgesamt die Wahrnehmung der Farbigkeit auch weniger gelb ist, wie dies von Webster and Mollon (1997) und Fridell Anter (2000) bereits beschrieben wurde.

Die als grau empfundenen Töne weisen an diesem Termin eine besonders erstaunlich große Buntheit auf, beispielsweise 4020-Y10R und 3020-Y10R. Der in einem metallenen Bauzaun vorhandene helle Neutralgrau-Ton des Farbbestands (00-N) hingegen wird blau-grün (20-B25G) wahrgenommen.

Entsprechend der Zweiteilung des Farbbestandes in eine grüne und eine braune Seite, unterscheiden sich auch die Richtungen der in der Wahrnehmung stattfindenden Verschiebungen. Bei der Grüngruppe ist ein recht genau zu erkennendes 'Fluchtzentrum' bei 40-G50Y festzustellen (F1). Von hier aus werden die vorhandenen gelbgrünen Töne aus der Mitte des grün empfundenen Bestands heraus meist grüner wahrgenommen als sie im Vergleich mit NCS-Mustern waren. Die Verschiebungen der gelblicheren, schwächer bunten Töne scheint eher vom Fluchtpunkt aus dem Braunbereich (F2) beeinflusst. Die Grenze zwischen den beiden Gruppen verläuft zwischen 30-G60Y (Grüngruppe) und 20-G60Y (Olivton der Braun-Ocker-Gruppe).

Die Braun- und Ockertöne scheinen in der Wahrnehmung aus dem Bereich zwischen 10-G95Y, 45-Y15R bis 30-Y35R wegzustreben (F2). Die Bewegung findet auch überwiegend in grünbläulicher Richtung statt, aber am rötlichen Rand des Farbbestands sind deutliche Verstärkungen der Rot-Wahrnehmung nach außen hin festzustellen.

Überwiegend driften die Wahrnehmungen des Bestands zum Blaugrünen, nur an den rechten Rändern der Fluchtgebiete F1 und F2 verschiebt die Wahrnehmung die empfundenen Farben in Richtung von Blauviolett.

Spätwinter / Vorfrühling – 9. März 2013

Zum Farbbestand

Dem 9. März 2013 war ein lang andauernder schneereicher Winter vorangegangen. Am Beobachtungstag fiel leichter Schnee-Nieselregen. Vor Ort waren keine Vorfrühlings-Zeiger zu sehen, in näherer Nachbarschaft aber war die Haselblüte zu beobachten.

Die Ausdehnung des Farbbestandes im Farbraum ist im Vergleich zum vorangegangenen Beobachtungstermin im Dezember noch viel weiter eingeschränkt und unbunter geworden (Figure 8).

Während Ende Dezember noch drei Farbtöne im direkten Vergleich mit NCS-Mustern mit Werten eines Buntanteils von höher als 30 % festgestellt wurden, ist es jetzt nur noch einer im Orange-Braun-Bereich. Das Feld des Farbbestandes, das im Dezember noch an den grünen und braunen Rändern stärker besetzt war, ist jetzt in sich gleichmäßiger verteilt und insgesamt näher an Grau-Braun gerückt, während es bei 10-Y20R und auch bei 30-Y40R am rötlichen Rand des Braunen eine Verdichtung gibt, als würden die Töne hier auf einem Maximum stofflich möglicher Rötung auflaufen.



Figure 8. Farbbestand und Wahrnehmungsverschiebungen am 9. März 2013. Diagramm: Bertolt Hering.

Zu den Farbempfindungen

In der Wahrnehmung wurde die Schwächung der Grüntöne der Wiese, die lange unter dem Schnee abgedeckt waren und vergilbten, nicht bemerkt. Es wurden Stärken der empfundenen Buntheit von 50% Buntanteil angegeben. Der Gelbanteil eines als mittleres Grün empfundenen Tons war der höchste in der gesamten Jahresbeobachtung. Im von braunem Gehölz bestimmten Umfeld wurde ein sehr gelbliches Grün (30-G60Y) als mittleres Grün empfunden.

Das vom verglichenen Bestand her schon sehr einheitliche Feld zeigt auch in seinen und der Wahrnehmung stattfindenden Verschiebungen eine hohe Einheitlichkeit. Es lässt sich jetzt ein Fluchtzentrum (F) um 35-Y20R beschreiben, wobei die Parallelität vieler Verschiebungen auf ein längliches Zentrum zwischen 30-Y und 45-Y35R hindeutet, aus dem fast alle Verschiebungen hervorgegangen sein können. Eine Zone einer gewissen Indifferenz der Verschiebungen

liegt bei 20-Y40R, da in diesem Bereich gegenläufige Zuordnungen stattfanden. Es zeichnet sich ab, dass durch das ganze Jahr hindurch am rötlichen Rand des Braunen eine auf diesen Bereich eingeschränkte von der Gesamtverschiebung unabhängige konstante Verschiebung zur Rotachse hin zu beobachten ist.

Die Gesamtverschiebung in der Wahrnehmung des Farbbestands dieses Termins findet in eine blau-grünliche Richtung statt und wird offenbar vom überwiegenden Braun bewirkt. Es liegt nahe, zu vermuten, dass das Fluchtzentrum der Verschiebungen in der Farbwahrnehmung in der Nähe des an diesem Tag statistisch mittleren Farbtons (hier Braun) zu suchen ist. Das Fluchtzentrum liegt aber mit einem höheren Buntanteil – nicht nur an diesem Tag – außerhalb des Bestandsfeldes, was darin begründet sein könnte, dass die Farbanpassung (Farbadaptation) die Empfindung des Bestandes insgesamt so weit verschiebt, bis ein grau empfundener Mittelpunkt des Farbraums innerhalb des Bestandes erreicht wird.

Die Gruppe der im direkten Vergleich als Gelb beschriebenen Töne wird – ähnlich dem Märztermin – etwas grünlich wahrgenommen. Indifferent in den Abweichungen, also offenbar schwer einzuschätzen, war die Farbigkeit der im gelbgrün empfundenen Töne mit großer Buntheit um 55-G65Y herum.



Figure 9. Farbbestand und Wahrnehmungsverschiebungen am 24. April 2013. Diagramm: Bertolt Hering.

Erstfrühling – 24. April 2013

Zum Farbbestand

Auffällig im Bestand am 24. April ist die hohe Buntheit einzelner Töne (Figure 9). Das Feld des Farbbestandes wird – im Vergleich zum 9. März – geradezu explosionsartig geweitet. Hierzu führen Blütenfarben wie die des Scharbockskrauts (*Ranunculus ficaria*, 80-Y) und des Wiesenveilchens (*Viola hirta*, 40-R40B), aber auch die Tatsache, dass dies der einzige Tag in der Beobachtungsreihe ist, an dem ein optisch direkter Vergleich mit der Himmelsfarbigkeit möglich war (30-R80B).

Unter den bunten Tönen vom Flächenanteil her präsenter ist das frische

Grün der Eichen (*Quercus robur*, 50-G80Y) und des Spitzahorns (*Acer platanoides*, 50-G60Y). Die Grüntöne der Gräser der Wiese entsprechen dem photosynthetisch aktiven Maximum wie dies bei anderen den Boden bedeckenden Pflanzen

und Keimlingen oft zu beobachten ist. Die frisch aus der Erde sprossende Pflanze weist sofort ein maximales Grün (Buntton-Ebene G40Y) auf, während in der Gehölzschicht in jungen Blättern zuerst gelbgrüne Vorstufen des Chlorophylls vorhanden sind. Den größten Anteil im Blickfeld nimmt aber immer noch das braune Gehölz ein, da der Laubausbruch erst im Beginnen ist.

Zu den Farbempfindungen

Die Heiterkeit der entfalteten Farbigkeit wirkte an diesem milden, sonnigen Tag fröhlich. Neben Scharbockskraut und Veilchen waren in direkter Nähe des Beobachtungsortes auf der nordwestlichen Seite des Fremdenhauses auch blühender Hohler Lerchensporn zu sehen. Das frische Grün der Bäume erschien als Feld von leuchtenden grünen Pünktchen im noch überwiegend dunklen Gehölz.

Die grün empfundene Gruppe (um 30-G45Y) zeigt eine Verschiebung direkt auf die Grünachse zu. Das Grün wird nicht mehr stärker empfunden als der direkte Vergleich es im NCS-System einordnet, wie das sehr deutlich noch Anfang März der Fall war, sondern im Buntanteil gleich stark oder sogar bereits schwächer eingeschätzt. Dies ist auf eine größere Präsenz der grün empfundenen Töne und die damit einher gehende Anpassung in der Wahrnehmung zurückzuführen.

Die Abweichungsrichtung ist etwas uneinheitlich, mal mehr in bläulich-grünlicher, mal eher in rein grünlicher Richtung. Die Gruppe der grau empfundenen Töne (um 12-Y) driftet leicht zur grünlichen Seite und befindet sich jetzt in etwa auf der Gelbachse des NCS-Systems.

Ein einheitliches Fluchtzentrum ist bei der Wahrnehmung an diesem Tag nicht festzustellen. Es scheinen vielmehr für die verschiedenen Farbgruppen etwas unterschiedliche Ausgangspunkte der Verschiebungen zu gelten. Außerdem gibt es an diesem Tag mehr der allgemeinen Tendenz zuwider laufende Verschiebungen ('Querschläger') zu beobachten (65-G50Y).

Hellere grün empfundene Töne gehen in ihrer Verschiebung von etwa 55-G55Y aus (F1), und dunklere, grün empfundene Töne etwa von 20-G60Y (F2). Die leicht grünlich gelb erscheinenden Töne (80-Y und 50-Y) scheinen von einer parallel verlaufenden Linie (F3) verschoben zu werden. Die rötlich-braun empfundenen Töne sowie ein violett-blau empfundener Ton haben ihr Fluchtzentrum etwa bei 35-Y30R (F4). Die Verschiebungen der Töne auf der blauen Seite des NCS-Kreises setzen die Verschiebungen beschriebener Fluchtzentren fort: Himmelsblau und Blütenviolett folgt F4.

Vollfrühling – 6. Mai 2012

Zum Farbbestand

Die Belaubung ist jetzt weitgehend abgeschlossen. Die Bestandsfarben auf der grünen Seite des Farbkreises haben einen auffällig hohen Buntanteil. Buntanteile um die 50 sind im übrigen Jahr eine Ausnahme, Anfang Mai aber stellen sie hier über die Hälfte der grünen Bestandsfarben (Figure 10).

Die Farbtöne des vegetativen Grüns spielen sich in einem locker besetzten Feld ab, das Anhäufungen bei 50-G50Y zeigt. Eine Verdichtung zeichnet sich an der Grenze ab, die das normale vegetative Grün-Maximum bei 60-G40Y

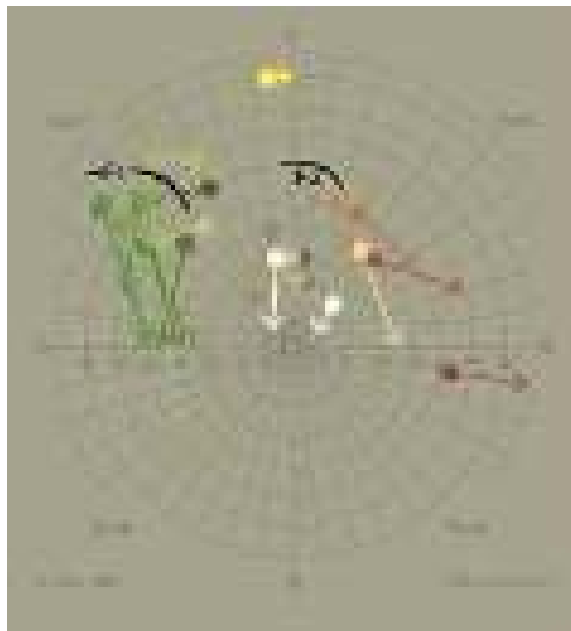


Figure 10. Farbbestand und Wahrnehmungsverschiebungen am 6. Mai 2012. Diagramm: Bertolt Hering.

bis 40-G40Y darstellt. Es ist ein stofflich möglicher Anschlag, der sich mit dem voll ausgebildeten Chlorophyll deckt. Eine Japanische Lärche liefert mit 20-G30Y eine Ausnahme, die im Farbbestand bläulicher, noch weiter nach Grün abweicht.

Der Bestand weist drei deutlich zu unterscheidende Gruppen und zwei einzelne Blütentöne außerhalb des Bestandsfeldes auf.

Bei der braunen Gruppe auf der rötlichen Seite des Farbkreises gibt es eine etwas stärkere Ausdehnung, die bis zur Bunttonebene Y50R führt, während das Rotmaximum der Vegetation Ende April noch bei Y40R lag. Ähnlich wie Ende April gibt es aber auch durch Blütenfarbigkeit verursachte

Einzelfälle, die außerhalb des Bestandsfeldes liegen: Löwenzahn mit 70-G95Y im hochgesättigten Gelbbereich, und in rötlicher Richtung weit abgelegen vom Feld: Rotklee-Blüten mit 35-R10B.

Zu den Farbempfindungen

Die im Bestand sich abzeichnenden drei Gruppen sind in der Empfindung Grün-Gelbgrün, Grau und Rotbraun zuzuordnen. Zwei einzelne Blütentöne liegen außerhalb des Bestandsfeldes.

Die Verschiebungen zum nach der Empfindung beschriebenen Grün gehen einen direkten Weg zur Grünachse hin und führen mit einer leichten Abweichung nach Blau (Figure 10, rechts in der Grafik) auf sie zu. Dies bedeutet ungewöhnlicherweise eine Schwächung der Buntheitsempfindung gegenüber dem in der Abmusterung ermittelten Buntanteil. Ein längliches, etwa parallel zur Grünachse verlaufendes Fluchtzentrum zwischen 65-G45Y und 30-G70Y (F1) kann angenommen werden. Gelbgrün empfundene Töne werden hingegen mit einer größeren Buntheit wahrgenommen. Sie ragen farblich aus dem Bestand der mehrheitlich bereits grün empfundenen Töne heraus.

Offenbar führte der Bunttonunterschied zu der Wahrnehmung einer größeren Buntheit bei dem statistisch seltener vorhandenen Buntton, obwohl in der grün empfundenen NCS-Bunttonebene G40Y ein maximaler Buntanteil

von 60 von zwei Einträgen erreicht wird und in der gelbgrün empfundenen Bunttonebene von G70Y nur ein maximaler Buntanteil von 50 mit nur einem Eintrag auftritt.

Alle anderen Verschiebungen lassen sich an diesem Termin Anfang Mai aus einem gemeinsamen gelben Fluchtzentrum (F2) um 50-Y ableiten.

In der Gruppe der gelbgrün empfundenen Töne bedeutet dies, dass die Abweichungen in der Empfindung (Pfeilspitzen) dahin gehen, wo die grün empfundenen Töne um 45-G50Y herum im Vergleich zu finden sind (Farbpunkte).

Die überwiegende Abweichungsrichtung Anfang Mai ist zur Rot-Grün-Achse zu einer bläulichen und rötlicheren Wahrnehmung hin. Bei den gelbgrün und rot empfundenen Tönen geht die Abweichung weiter nach außen jeweils in gelbgrünlicher und rötlicher Richtung.

Die Verschiebungen in rötlicher Richtung (aus F1) sind an diesem Termin besonders stark.

Ende Frühsommer – 24. Juni 2012

Zum Farbbestand

Der Farbbestand zeigt ein sehr klare Zweiteilung zwischen einem gelbgrünlichen und einem bräunlichen Feld. Man kann von einer eindeutigen Polarisierung des Farbbestandes sprechen (Figure 11).

Das Übergewicht liegt dabei auf der grünen Seite des Farbkreises. Die Töne auf dieser Seite bilden ein recht kompaktes Feld, das sich in etwa zwischen 50-G50Y und 20-G35Y erstreckt. Zwischen den Buntton-Ebenen 60Y und Y liegt eine große Zäsur, die nur von einem Blütenton (Lindenblüte 40-G80Y) gefüllt wird. Die stärkste Verdichtung im Gelbgrün-Bereich zeigt die Gruppe bei 35-G40Y.

In der bräunlichen Gruppe lässt sich eine Linie angehäufter Farbtöne erkennen von 30-Y20R bis 05-Y15R. Auffällig ist die starke Beschränkung des Bestandes in der rötlichen Richtung. Es tritt bei der Abmusterung des Bestandes nur ein einziger Farbton auf, der die Bunttonebene Y30R erreicht. Die Farbigkeit einzelner



Figure 11. Farbbestand und Wahrnehmungsverschiebungen am 24. Juni 2012. Diagramm: Bertolt Hering.

verfärbter Blätter erreichen einen für die Jahreszeit untypisch hohen Buntanteil (Platanenblatt eines abgebrochenen Astes 45-Y20R).

Zu den Farbempfindungen

Interessant ist, dass die eindeutige Polarisierung des Farbbestandes in der Wahrnehmung vor Ort nicht wirklich bemerkt wird. Sowohl die Grüngruppe wie die Braun/Ocker-Gruppe werden in der Wahrnehmung soweit differenziert, so dass die Zäsur zwischen den Buntton-Ebenen 60Y und Y mit Verschiebungen in der Wahrnehmung von beiden Seiten überbrückt wird. Dabei kommen stark gegenläufige Empfindungen zu Stande. Zum Beispiel wird ein Ton, der als 30-Y abgemustert wurde, in der Wahrnehmungsbeschreibung bei 28-G50Y eingeordnet, während umgekehrt ein Ton, der in der Abmusterung als 30-G50Y bestimmt wurde, in der Empfindung bei 20-G70Y eingeordnet wird.

Dies deutet an, dass die Wahrnehmung hier vor einer Zuordnung zu Empfindungen zwischen den Farbbereichen vielleicht auf gegenständlicher Ebene unterscheidet, und die Steuerung der Farbanpassungen in beiden Bereichen danach parallel durchführt. Eine Unterscheidung zwischen in der Wahrnehmung separat zu beurteilenden Bereichen muss also auf einer hohen Verarbeitungsebene durchgeführt werden, da hier Gestaltphänomene mit einfließen.

Die grün und gelbgrün empfundene Gruppe, die im Bestand ein recht kompaktes Feld bildet, wird in der Wahrnehmung in Grün und Gelbgrün aufgespalten. Die grün empfundenen Töne scheinen aus einem Zentrum bei 60-G60Y zu fliehen und die gelbgrünen von einem Bereich bei 50-G40Y weg zu streben.

Auf der rötlichen Seite des Farbkreises werden braun-graue Töne bei 05-Y15R fast violett empfunden, während man bei braun, ocker und orange empfundenen Töne etwas vereinfachend zusammenfassen könnte, dass sie aus einem Bereich abgeglicherer Töne bei 20-Y20R hervorgehen (F3). Bei Y05R verläuft eine scharfe Scheidegrenze, die Töne auf der Bunttonebene Y bereits als gelbgrün wahrnehmen lässt: 20-Y wird nach 25-G50Y verschoben, während 20-Y10R als 10-Y40R wahrgenommen wird.

Bis auf die besonders bunten Töne verschiebt die Wahrnehmung insgesamt nahezu parallel in eine bläuliche, etwas violette Richtung. Die Fluchtpunkte können zu einer Linie verbunden vorgestellt werden, von der diese Parallel-Verschiebung ausgeht.

Hochsommer – 12. August 2012

Zum Farbbestand

Die Polarisierung des Farbbestandes in zwei Gruppen wird durch jetzt auftretende gelbgrüne Töne etwas überbrückt, dennoch zeichnet sich zwischen G60Y und G70Y eine deutliche Zäsur ab (Figure 12). Vereinzelte Töne tauchen im hochgesättigten Bereich bei Y20R und Y30R auf. Eine rotviolette Blütenfarbe taucht auf.

Die Grüntöne bilden ein Feld, das sich zwischen 50-G50Y und 25-G30Y erstreckt. Es ist im Vergleich zum Bestand von Ende Juni in gelbgrünlicher Richtung auf 60-G60Y zu weiter gestreckt. Diese Streckung verdeutlicht, dass im Bestand die helleren Grüntöne eher gelblicher sind und einen höheren Buntanteil

haben als die dunkleren, die überwiegend bläulicher sind und einen geringeren Buntanteil aufweisen.

Das Erreichen der Bunttonebene G30Y nicht nur durch Ausnahmen (drei von 36 Einträgen) ist charakteristisch für den Hochsommer. Es stellt in der Jahrespendelbewegung das Grünmaximum dar. Die quantitative Präsenz der Grüntöne im Blickfeld ist noch größer als ihr Übergewicht in der Anzahl der Farbtöne. Die Taille des X liegt bei 15-G85Y.

Ausnahmefarbtöne im Gelborange-Bereich, wie die des Laubs eines jungen Ahorns, der vielleicht zu sehr an Trockenheit gelitten hat (1050-Y20R und 2070-Y30R), die Töne einer Linde im Licht und eine Blütenfarbe bilden Außenpunkte des Farbbestands.

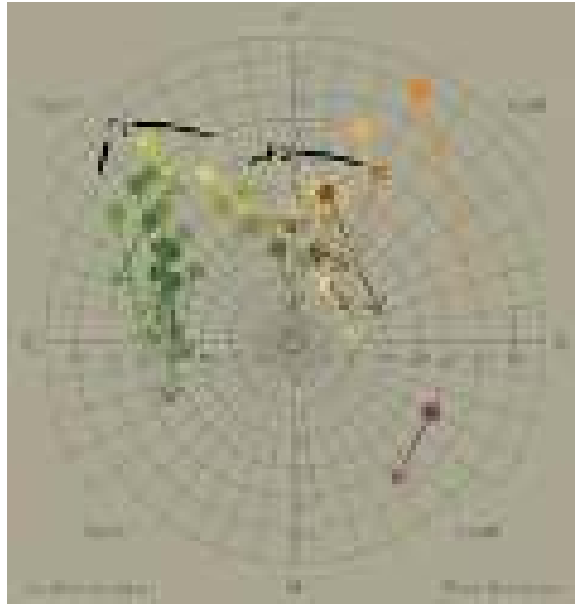


Figure 12. Farbbestand und Wahrnehmungsverschiebungen am 12. August 2012. Diagramm: Bertolt Hering.

Zu den Farbempfindungen

Zwar sind im Bestand zwischen den polarisierten Feldern Zwischentöne eingetreten, aber Wahrnehmungsverschiebungen, die diese Distanz in der Wahrnehmung überbrücken würden, sind jetzt weniger vorhanden als Ende Juni.

Die Abweichung der Grünempfindungen von festgestellten Eigenfarben verläuft etwa senkrecht zur Grün-Rotachse. Die Einzelrichtungen sind aber heterogener als im Mai oder Juni. Auffällig ist die starke Konzentration der Grünempfindungen um 25-G herum.

Die Zuordnungen in den Empfindungsbeschreibungen zeigen keine größere Varianz als das Feld der im Vergleich ermittelten Töne, wie man das bei einer Ausdifferenzierung in der Wahrnehmung erwarten würde. Statt von einem Fluchtpunkt zu sprechen, von dem aus die Differenzierung in alle Bereiche erfolgt, ist man hier geneigt, eher eine Art Sogfeld anzunehmen, das diverse Töne auf den Bereich um 25-G zusammen fasst. Die schräge Lage des Grünfelds im Farbraum bleibt dabei erhalten.

Zwischen 20-G50Y und 70-G55Y verläuft eine Scheidegrenze der Zuordnungen zu Gelb und Grün. An der Spitze dieser Linie könnte man einen Fluchtpunkt (F1) der grünlich empfundenen Grüntöne sehen, im Bereich 50-G60Y eher den Fluchtpunkt für grünliche Töne mit einem Buntanteil von 40 bis 30%.

Die Zuordnungen im Gelboliv-Bereich sind teils gegenläufig. Überwiegend aber setzt sich die von (F1) ausgehende Verschiebungsrichtung in den Braunbereich fort. Auffällig ist, dass im Feld der braunen Töne kein Zentrum für Verschiebungen mehr zu finden ist.

Von einer Linie 70-Y30R bis 30-Y ausgehend könnte man sich die Verschiebungen im Braun-Ocker-Orange-Bereich vorstellen (F2).

Die Verschiebung in der Wahrnehmung verläuft insgesamt in bläulicher leicht violetter Richtung.

Vollherbst – 6. November 2012

Zum Farbbestand

Der Bestand zeigt nun insgesamt eine größere Häufigkeit höherer Buntanteile um 40 und 50 % und hat sich deutlich in Richtung Gelb verlagert, was durch den in den Blättern ablaufenden Chlorophyll-Abbau zu erklären ist (Figure 13). Die gelben Carotinoide, die zuvor von dem grünen Chlorophyll 'maskiert' oder versteckt wurden, werden jetzt sichtbar.



Figure 13. Farbbestand und Wahrnehmungsverschiebungen am 6. November 2012. Diagramm: Bertolt Hering.

Jetzt sind Reihenstrukturen zu erkennen, die zeitlichen Verfärbungsfolgen entsprechen: 30-G60Y nach 30-Y30R und 20-G70Y nach 20-Y. Die Anzahl der Töne auf der grünlichen und auf der rötlichen Seite des Farbkreises ist etwa ausgeglichen, wenn man die Grenze bei der NCS-Bunttonebene Y sieht. Das Feld ist insgesamt recht kompakt, was auf das Nachrücken der Grüntöne zu gelblicheren Werten und auf die erwähnten Reihenbildungen in der Mitte des Bestandsfeldes zurückzuführen ist. Die Taillierung des Bestandsfeldes bei den Bunton-Ebenen G70Y und G80Y ist allerdings immer noch erkennbar.

Es fehlen durch die bedeckte Wetterlage die an

sonnigen Tagen entstehenden Differenzen direkt beleuchteter und beschatteter Objekte, sodass die Farbenpracht des Herbstes sich hier nur in seiner – im Vergleich zur Lichtfarbigkeit – gedämpften Eigenfarbigkeit zeigt.

Verdichtungen zeigen sich – abgesehen von den bereits erwähnten Reihen – bei 40-G50Y, 10-Y20R und 20-Y30R. Der Gelbbereich (sichtbare Carotinoide) ist deutlich stärker besetzt als zuvor. Auffällig ist die Verdichtung dunklerer Töne um 10-Y20R. Die Verfärbung hat leicht den Zenit bei Y in Richtung eines wärmeren Gelb (Y10R) überschritten, was auf das Erreichen des Endes des Vollherbstes schließen lässt.

Zu den Farbempfindungen

Deutlich ist eine Annäherung an die Verschiebungen in der Wahrnehmung, die im Winter zu beobachten sind: Die Gruppe der empfundenen Grün-Töne mit seinem Bestandszentrum um 40-G50Y wird nicht mehr wie im August im Inneren des Farbkreises als wesentlich schwächer bunt empfunden, die Empfindungen im gelbgrünen Farbbestand gehen nahezu rechtwinklig zur Grünachse. Jetzt im Herbst wird also ein im verglichenen Bestand gelberes Grün als Mittelgrün empfunden (G50Y). Das Fluchtzentrum der Grüngruppe (F1) erstreckt sich zwischen 55-G50Y und 35-G80Y, während Gelbgrün, Gelb und Braun empfundene Töne aus einem Bereich von 60-Y bis 60-Y30R weiter nach links in Richtung Blaugrün zu fliehen scheinen (F2).

Dieser Unterschied eines Driftens der Farbempfindungen je nach Jahreszeit nach Blaugrün oder Violett wird als zusammenfassendes Ergebnis der Beobachtungen festzustellen sein.

In diesem Herbst-Diagramm kann man gut erkennen, wie aus dem grün empfundenen Farbbestand heraus die Empfindungen noch der Übergangszeit entsprechend senkrecht zur Grün-Rot-Achse verschoben werden, während die Empfindungen im Gelb-Braun-Bereich bereits 'winterlich' nach links in Richtung von blaugrün driften. In Verlängerung wäre dann das März-Diagramm zu betrachten, in dem das Fluchtzentrum aus einem warmen Gelbton heraus auch den Grünbereich bestimmt, der dann viel bunter und kühler grün wahrgenommen wird.

Zusammenfassung und Deutung der Ergebnisse

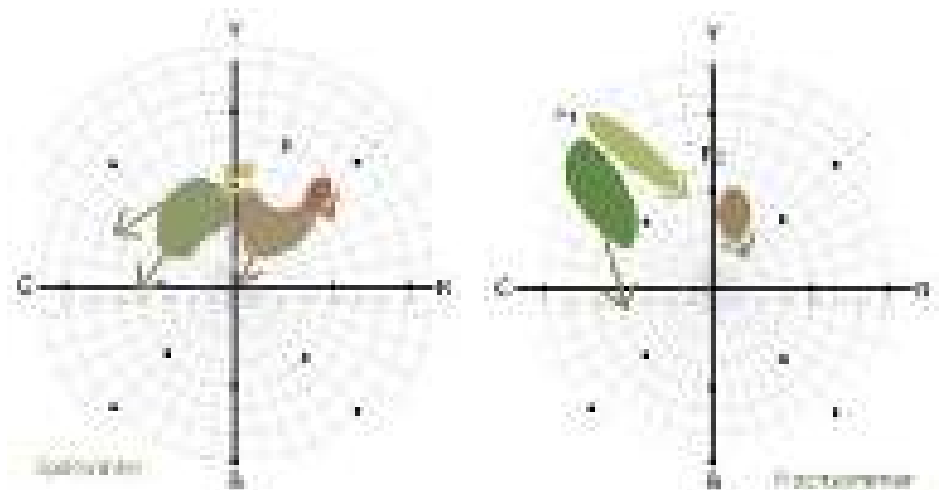
Betrachten wir den Jahresablauf im Überblick, ergibt sich folgender Ablauf:

Der spätwinterliche, gelbbraune Farbbestand (um 10-Y10R am 9. März, Figure 8) wird in der Wahrnehmung auf der grünlichen Seite des Farbkreises nach Grün, Blaugrün und Blau hin eingeordnet und auf der rötlichen in der Wahrnehmung nach Rotorange verschoben.

Gelbgrün-Töne des Farbbestands erscheinen grün, graunahe Oliv-Töne blaugrün und Braun erscheint als mittelgrau.

Der Erstfrühling (24. April, Figure 9) bringt eine explosionsartige, U-förmige Ausdehnung des verglichenen Farbbestands zu höheren Buntanteilen, vor allem in die Richtungen Gelbgrün, aber auch in Einzelfarben (Blüten) nach Gelb und Blau-Violett.

Die Verschiebungen verlaufen in der Grundtendenz senkrecht zur Rot-Grün-Achse in Richtung Blau. Die Farbtöne erscheinen also blauer, wenn sie ohne den Vergleich mit Farbmustern wahrgenommen werden.



Figures 14 und 15. Schematische Darstellung der Wahrnehmungsverschiebungen.
Diagramme: Bertolt Hering.

Der Vollfrühling (6. Mai, Figure 10) mit dem massenhaften Laubausbruch bildet im verglichenen Farbbestand einen Schwerpunkt bei 50-G50Y. Der gelbgrüne Bestand bei G50Y wird als grün wahrgenommen, Brauntöne erscheinen jetzt stärker rötlich. Die Verschiebungen in der Farbwahrnehmung verlaufen jetzt überwiegend nach Blau, Violett und Rot. Die sommerlichen verglichenen Farbbestände (Juni bis August) bilden einen Schwerpunkt um 30-G40Y aus, der nun dunkler und weniger bunt ist als die Farbigkeit des Vollfrühlings. Der Farbbestand ist stark gespalten in eine grün empfundene Gruppe um 30-G40Y herum und in eine braun empfundene Gruppe um 20-Y20R. Die Verschiebungen in der Farbwahrnehmung verlaufen überwiegend nach Blau, Violett und Rot, wenn auch nicht mehr so stark ausgeprägt in der Rotempfindung wie im Vollfrühling.

Die Laubverfärbung im Herbst (6. November, Figure 13) bringt eine Verschiebung des Farbbestandes insgesamt nach Gelb und Braun mit sich. Zwischen den im Sommer stark polarisierten Gruppen sind jetzt Farbbänder zu erkennen, die dem Chlorophyll-Abbau in seiner zeitlichen Abfolge entsprechen. Die Wahrnehmung der gelbgrünen Werte um 40-G50Y ist jetzt mittelgrün bei einem Buntanteil von 30, während die Verschiebung der verglichenen gelben und braunen Töne bereits wie zuvor im Winter nach Blaugrün und Blau erfolgt.

Zusammenfassend ist festzustellen: Der winterliche Farbbestand (Zentrum des Gesamtfeldes bei 10-Y10R) bringt Wahrnehmungsverschiebungen nach Grün und Blaugrün (links und links-unten im Diagramm, Figure 14) hervor, während der Farbbestand im Sommer (Grünschwerpunkt bei 30-G40Y) von Wahrnehmungsverschiebungen nach Blau und Violett (rechts unten im Diagramm, Figure 15) begleitet wird. In den Übergangszeiten (Frühling und Herbst)

durchschreiten die Verschiebungen die Richtung nach Blau (senkrecht im Diagramm, Figures 9 and 13). Die Verschiebungsrichtungen verlaufen nie wirklich parallel, vielmehr sind Verschiebungen aus Zentren ('Fluchtzentren') heraus zu erkennen. Die Verschiebungsrichtungen streuen in verschiedenen Winkeln aus den Fluchtzentren heraus.

Diese Fluchtzentren der Wahrnehmungsverschiebungen liegen meist im höher gesättigten Bereich radial außerhalb des Farbbestandes, als würde von einem überwiegenden Mittelton eines Farbbestandes aus eine Verschiebung bewirkt.

Die Verschiebungen einzelner Farbwerte in der Wahrnehmung erfolgen aus ihrem jeweiligen Kontext von Umgebungsfarben, weshalb im Farbraum benachbarte Töne in der Wahrnehmung sehr unterschiedlich eingeschätzt werden können. Es treten Scheidegrenze der Zuordnungen zwischen benachbarten Tönen auf. Zum Beispiel wird häufig sehr klar zwischen Grün und Gelbgrün unterschieden.

Als mittleres Grün empfinden wir im Sommer das voll entwickelte Blattgrün, das auf der NCS-Bunntonebene G40Y liegt, in den Wechseljahreszeiten Frühling und Herbst werden Grüntöne auf der Bunnttonebene G50Y als mittelgrün empfunden. Im Winter können noch gelblichere Grünwerte als mittelgrün empfunden werden.

Wir können so wie 'Grün' auch alle anderen Farbbegriffe durch die Jahreszeiten hindurch verfolgen und an Hand der Dessauer Beobachtungen feststellen, welche Farbwerte in den verschiedenen Jahreszeiten als 'Gelb', 'Rot', 'Blau' oder auch als 'Grau' empfunden werden. Die als 'Grau' empfundenen Werte des Sommers und des Winters unterschieden sich kaum, was vielleicht damit zu erklären ist, dass im Sommer eine Polarisierung des Farbbestands in eine quantitativ starke Grün-Gruppe und eine Braun-Gruppe zu beobachten ist. Offenbar wird die Wahrnehmung auf den Braunbereich angepasst. So kommt es trotz vorherrschender Grüntöne zu einer ähnlichen Grauempfindung wie im Winter.

Es ergibt sich so ein für europäische Parklandschaften typisches Bild der in den Jahreszeiten wechselnden Farben und unserer Farbempfindungen in ihrem Zusammenhang, wie sie in den Farbempfindungs-Oktogonen (Figures 24, 25 and 26) entwickelt wurden und ausgeführt sind.

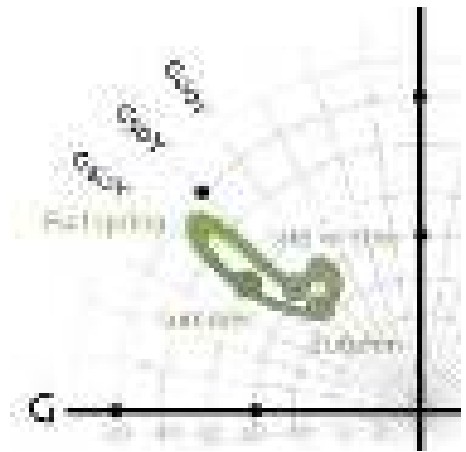


Figure 16. Schematische Bewegung der verglichenen Farben, die als 'Mittelgrün' wahrgenommen wurden.
Diagramm: Bertolt Hering.

Das Zentrum eines Farbraums bilden die neutral empfundenen Töne. Ihnen wurde gesondert die Farbinstallation in dem Rundbogen-Fenster über der Tür der Südfassade gewidmet (Figures 27 and 28). Dort sind grau empfundene Töne des Jahreslaufs im Park Georgium zusammengetragen. Sie geben den Schlüssel zu Farbgestaltungen an die Hand, die sich auf einen natürlichen, menschlich empfundenen Farbraum beziehen.

Ausblick auf die Anwendung der Untersuchungsergebnisse: Die Dessauer Farbinstallation

Ausgehend von den Dessauer Beobachtungen konnte ich von 2012 bis 2016 mehrere Farbinstallation am Fremdenhaus, das die Graphische Sammlung der Anhaltischen Gemäldegalerie Dessau beherbergt, in dem vom Büro Otto Koch im K.I.E.Z. e.V. organisierten Programm „Kunst der Gegenwart in Beziehung zum Georgium“ realisieren.

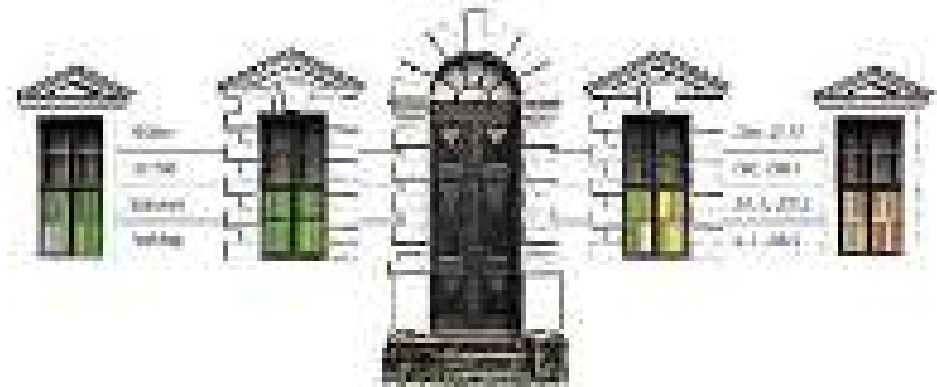


Figure 17. Entwurf der Fensterinstallation mit den eingetragenen Frühlings- und Sommerfarben 2012. Diagramm: Bertolt Hering.

Die Farbinstallation in den Fenstern der Südseite des Fremdenhauses

In den Fenstern der Südfassade fügte ich nach und nach entsprechend den vier Beobachtungsterminen von 6. Mai 2012 bis 24. April 2013 die vor Ort festgestellten verglichenen Farbtöne ein (Figures 17–22). Von links nach rechts werden die Farben der Wahrnehmung, von Blau über Grün und Gelb nach Rot spektral auf den Fenstern angeordnet (Figure 23). Die Farbwerte sind als Acrylfarben in mattem Aufstrich auf grundiertem Papier aufgetragen. Jeweils vier senkrechte Felder füllen eine Fensterscheibe. In die Umgebung fügt sich die Farbinstallation, die auf den ersten Augenblick durchaus bunt wirkt, zu jeder Jahreszeit unaufdringlich ein. Es ist wahrzunehmen, dass die Farbigkeit der Installation nicht den Farbraum der sie umgebenden Parklandschaft verlässt.



Figure 18. Das Fremdenhaus mit der Farbinstallation in den Fenstern im winterlichen Zustand des Parks. Photo: Bertolt Hering.



Figure 19. Das Fremdenhaus mit der Farbinstallation in den Fenstern im Erstfrühling. Photo: Bertolt Hering.



Figure 20. Das Fremdenhaus mit der Farbinstallation in den Fenstern im sommerlichen Zustand des Parks. Photo: Bertolt Hering.



Figure 21. Das Fremdenhaus mit der Farbinstallation in den Fenstern im herbstlichen Zustand des Parks. Photo: Bertolt Hering.

Die Farbfelder in den Fenstern der Südseite des Fremdenhauses wirken wie eine Spiegelung der Farbigkeit des Ortes in eine abstrahierte Ordnung hinein und gleichzeitig reflektieren besonders die dunkleren Farbfelder die Farbigkeit des jeweils um das Fremdenhaus herum gegenwärtigen Parks.



Figure 22. Gespiegelte Natur, bewahrte Farbigkeit vergangener Jahreszeiten und Wahrnehmungsnotizen überlagern sich. Photo: Bertolt Hering.

Installation der Farbempfindungs-Oktogone südlich des Fremdenhauses

Aus den Empfindungsbeschreibungen der Dessauer Beobachtungen lassen sich Aussagen darüber treffen, welche Töne an diesem Ort zu welcher Jahreszeit zum Beispiel als 'Grün', 'Blau', 'Rot' oder 'Gelb' empfunden wurden. Die Farbbegriffe kreisen in Anpassung an die wechselnden Erscheinungen im Jahreslauf meist in einem recht eng abzusteckenden Feld im Farbraum. So kreist zum Beispiel die Verortung des Grünbegriffs, wie er im Park empfunden wurde, im mittel- bis schwachgesättigten Gelbgrün-Bereich des Farbraums (Figure 16).



Figure 23. Die zwei rechten Fenster mit gelblichen und rötlichen Tönen der Dessauer Beobachtungen. Photo: Bertolt Hering.



Figure 24. Gesamtansicht der Farbinstallationen im Park Georgium im August 2013.
Photo: Bertolt Hering.



Figure 25. Bertolt Hering. Das Farbempfindungsoktogonal des Herbstes. Acryl auf Holz, 2014. Im Besitz der Kunstsammlung Sachsen-Anhalt.

den eingelassenen Metallständern am sogenannten Schlangenweg südlich des Fremdenhauses realisiert. Der ausgewählte Ort liegt im Mittelpunkt des bei den Dessauer Beobachtungen betrachteten Gesichtsfeldes und bietet einen Ausblick auf die Farbinstallation in den Fenstern des Fremdenhauses. Die Oktogone auf ihren Ständern erscheinen wie ausblühende Kristallisationen des farblichen *genius loci* an dem Ort, auf den sich die Empfindungsbeschreibungen beziehen.

Aus den acht Richtungen ergibt sich die Oktogon-Form der Tafeln, die aus Multiplexplatten gefertigt und mit UV-Schutz-Lack beschichtet wurden. In der Mitte der Oktogone steht für jede der vier Jahreszeiten ein in dieser Jahreszeit grau empfundener Ton und der handschriftliche Verweis auf die Jahreszeit, deren Farbeempfindungen die jeweilige Tafel repräsentiert. Ende August 2013 wurde die Installation der mit Lack gestrichenen Tafeln an in den Bo-



Figure 26. Bertolt Hering. Die vier Farbempfindungsoktogone. Acryl auf Holz, 2014. Kunstsammlung Sachsen-Anhalt.

Für Farbgestaltungen im Außenraum kann der Farbenatlas *Kleiner Naturfarben-Kanon* (Hering 2013) einen verlässlichen Bezugsrahmen liefern, der die Wirkung und Bedeutung einer eingesetzten Farbe frühzeitig abschätzbar macht.

Die grau empfundenen Töne im Bogenfenster der Südseite des Fremdenhauses

Eine besondere Rolle im Farbraum kommt den grau empfundenen Tönen zu, denn sie bilden die Mitte des Farbraums (Figure 27). Alle Empfindungen gehen gewissermaßen von dort aus in die verschiedenen Richtungen.

Zur Komplettierung der Farbinstallation wurden im Juni 2016 in die sechs Fensterfelder verschiedenen Jahreszeiten entsprechende Töne eingesetzt, die zuvor vor Ort in den Dessauer Beobachtungen als grau empfunden worden waren.



Figure 27. Entwurf für das Bogenfenster. S = Sommer, H = Herbst, W = Winter, F = Frühling. Skizze: Bertolt Hering.

Danksagung

Das Projekt *Farben der Jahreszeiten im Georgengarten* wurde realisiert im Programm *Kunst der Gegenwart in Beziehung zum Georgium* von Büro Otto Koch im K.I.E.Z. e.V., gefördert durch das Land Sachsen-Anhalt, Lotto Sachsen-Anhalt und die Stadt Dessau-Roßlau. Vielen Dank an die Anhaltische Gemäldegalerie Dessau für die Unterstützung der Installation und Ausstellungen im Fremdenhaus beim Schloss Georgium (Graphische Sammlung der Anhaltischen Gemäldegalerie Dessau), und an NCS – Natural Colour System®.



Figure 28. Die Installation der grau empfundenen Töne im Bogenfenster des Südeingangs zum Fremdenhaus im Park Georgium. Photo: Bertolt Hering.

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Jem WAYGOOD, Waygood Colour, trained as a designer and landscape architect, has worked as an environmental artist for many years designing and making public artworks throughout the United Kingdom. During this time he became increasingly interested in colour and now specializes in colour palette design. Most recently he has focused on protected landscapes in the United Kingdom, advising managers on the use of colour for development in Areas of Outstanding Natural Beauty, which is an area of countryside in England, Wales, or Northern Ireland, which has been designated for conservation due to its significant landscape value.

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«Социальные трансформации»*

СОЦИАЛЬНЫЕ ТРАНСФОРМАЦИИ

Выпуск 27

ENVIRONMENTAL COLOUR DESIGN: THEORY AND PRACTICE

Сборник научных статей

Издательство
Смоленского государственного университета

Корректор *Л.В. Пузырёва*

Подписано к печати 02.11.2017. Формат 60х84.
Бумага офсетная. Печать ризографическая. Усл. п. л. 12,5. Уч.-изд. л. 15,25.
Тираж 100 экз. Заказ № 60063-2017.

Отпечатано в ООО «Реновация».
214000, г. Смоленск, ул. Коммунистическая, 5.
Тел. 8 (4812) 356-000, 356-111.