Science and Art

The Contemporary Painted Surface

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ROYAL SOCIETY
OF **CHEMISTRY**

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CHAPTER 23

Painted Surfaces in Contemporary Architecture[†]

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23.1   Framework

All architectures are made of solid materials that have colors like wood, concrete, stone or bricks. Color is an integral part of architecture and also a fundamental element of its decorum. This is how it has always been. The theme of colored surfaces in contemporary architecture is so vast that in treating it one risks stating the obvious. Western historical buildings typically have the colors of their construction materials. Even when the facade is painted, in most cases the paint is selected to imitate the underlying building material. Many frescoed facades or those painted in the color of the air (*e.g.* the Quirinale Palace in Rome or the Sant'Agnese church in Agone and the Collegio by Borromini in Piazza Navona) were the exceptions, to celebrate the value of the construction or to limit its impact on the urban scene.

[†]The authors contributed to this chapter as follows: Alessandra Battisti: Section 23.3.1, Aldo Aymonino: Section 23.3.2, Pio Baldi: 23.3.3, Franco Summa: Section 23.4.1, Kay Bea Jones: Section 23.5.1.

As in the theory of Paolo Marconi (1933–2013),[†] still one of the greatest experts in the restoration of the chromatism of Italian historical architecture, painted stucco is a sacrificial surface. It serves to protect the building and its constructive elements from external agents, but not only. It imitates the noblest building materials that make up the building in other parts. It provides a unitary and coherent element to an architecture that would have been unnecessarily more demanding from a constructive and economic point of view.

Often the columns of Roman monuments or the doorposts of Renaissance palaces were made of stone only at their bases, where they suffered the most impact of people and carriages. The upper parts of these columns were made of brick and covered with a plaster painted to imitate stone which gave continuity to the column, making it look like a single piece of marble. The main facade of Palazzo Massimo alle Colonne (by Baldassarre Peruzzi, 1532) in Rome is not composed of stone as it appears. It is made of painted plaster to simulate a travertine ashlar. One can identify hundreds of these examples that lead everyone to reaffirm the concept that for historical architecture, until the advent of the *modern age* in the twentieth century, color had the precise function of protecting and simulating construction materials, unless it provided pure decoration in the form of frescoed facades.

Modernity breaks once and for all the profound link between material and color in architecture, finally making this relationship free. Nevertheless, for modern architecture the color was not always a matter of design and was often denied. The architecture of modernity has been above all conceived as a composition of spaces, of (pure) volumes, and almost always has the color of its building materials or the non-color of the white plaster.

However, it cannot be said that the coloring of modern buildings and spaces is a direct consequence of constructive and technological choices. Construction materials were often chosen precisely for their characteristics and for their chromatic quality.

Just think, for example, of the veined marble walls at the base of the Neue Nationalgalerie by Ludwig Mies van der Rohe in Berlin, the green copper roofs by Renzo Piano in the Rome Auditorium or even the COR-TEN® steel guard-rails designed by Pietro Porcinai in the 60 s for the Brenner motorway to reduce their impact on the Alpine landscape between Italy and Austria.

The color manages to assert its autonomous space in the works of many masters of the twentieth century, even if minimalism and purism theorized the monochromatic nature of the construction material or the abstraction of white. The significant presence of the sense of color has been verifiable for modern buildings since the beginning of the last century. Theo Van Doesburg, in the fifteenth article of the Fundamental Principles of Neoplasticism (De Stijl Manifesto, 1918) claims that: "the realization of color in space time

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[†]See: Paolo Marconi quoting Marcello Paribeni, *Colore e "colorito" in architettura: il cantiere storico, le tecniche storiche di manutenzione contributo al problema del "Colore di Roma"*, Bollettino d'Arte, Ministero dei Beni Culturali.[1]

Figure 23.1   L. Barragán, *Cuadra San Cristóbal*, Atizapán, México, *A. Aymonino*, 2018.

makes a new dimension plastically visible". Le Corbusier painted the *brise-soleil* septa of the Brazilian Pavilion of the University of Paris (1930–1932)[2] and of the Unité d'habitation in Marseilles (1945) in cement to characterize the lodgings and in the algid Villa Savoye in Poissy (1930) he painted the interiors with more intimate nuances. Mies van der Rohe used colored marbles, as previously written, while Wright used the warm tones of earth and wood in the walls. Louis Barragan (Guadalajara, 1902) in Mexico imbue his solar architecture with color (Figure 23.1). With him, color becomes *solid* in the volumetric dimension of an emotional architecture[3] and *poetic*, with Giò Ponti using the *infinite blue* for the tiles at Sorrento Hotel Parco dei Principi (1960), and later Aldo Rossi using this for the *Blue of the Sky* of the Modena Cemetery.[‡]

From the mid-twentieth century the joy of color in architecture seems to have been successfully transferred to open spaces. It was a real turning point in the era of modernity and the purism of white buildings. Coloring architectural surfaces makes sense as much as they are visible and can be appreciated and experienced by more people. In modern cities since the end of the Second World War, open spaces are often more colorful than the buildings. Perhaps in this way a new need for happiness is projected into public spaces, creating a surprising and happy integration between architecture, art and society. In these squares and gardens, color becomes virtually volumetric, a pleasant habitable space.

In the years between 1960 and 1980 the Brazilian landscape architect Roberto Burle Marx created a series of public gardens as paintings, coloring their planimetric surface in free abstract forms, making popular modernity in the third dimension of open spaces(Figure 23.2).

In that same period and always in Brazil, Lina Bo Bardi painted with the tones of the four seasons the four sports courts in the concrete tower of SESC Pompéia, at once circumventing both international sports conventions and functionalist ideas of using colors in architecture.[4]

[‡]The Blue of the Sky is the title of an article by Aldo Rossi on his addition to the San Cataldo Cemetery, Modena, 1978.[32]

Figure 23.2   R. Burle Marx, *Banco Safra roof garden*, São Paulo (Br), *Courtesy of L. Finotti*, 1956.

23.2   Concepts

The field of interest of this synthetic overview refers to those contemporary artifacts that have been intentionally painted or composed with earth, metal, wood, ceramic or other applications expressly designed to give a color to the architecture, but also to the recovery of existing buildings, to landscape projects and public space.

After the end of the last century (after the end of modernity?) we could say that color, freed from the slavery of matter and also from that of construction, assumes an increasingly new and decisive importance for architecture. In particular, as we shall see, painted surfaces play a strategic role in the research and in the works of some authors and weaker social realities. Thus, the painting of architectural surfaces, often plastered, takes on new meanings as well as those of a performative nature that it has already had in the past for the simulation of materials. Color becomes a *milieu*, a landmark and a background for the recognition and the social emancipation of local communities, but also for the senses (aesthetic, psychological, relational) and narration in architectural and urban space. This chapter deals with colored surfaces by analyzing precisely those three non-opposing concepts – performative, social, narrative – which often characterize the new role of color in architecture.

23.3   Performative

The first concept is that of color as an architectural *performative device*.

It is the paradigm based on the use of color as a conceptual principle of an operational aesthetic and as capable of developing significant

technological performances. The performative painting compared to the coloring itself means placing at the center of the architectural project of color not the use, but the appreciable innovative result in predominant ecological terms. But not only this. For many years, for example, the big hi-tech companies have studied the so-called "media facades",[5] those made of sensitive materials such as LED walls, which can become screens and project information, images, advertising, through connection networks and/or can simply take different colors at different times. In the restructuring of the Manifattura Tabacchi in Rome by Aldo Aymonino with the Seste Office (2012), color, *via* LED and painted surfaces, was the design device used to make the building less severe and sad (Figure 23.3).

An example that clearly highlights the performative role of the chromatic surface, even in a very simple and not technologically advanced way, is the famous *Kilometro Rosso* (2007) by Jean Nouvel,[6] built in Brembo's Science Park near Bergamo (I). It is a red wall along the motorway 10 meters high and one kilometer long. The red has an essential communicative value, because it is visible at high speeds and can clearly signal the presence of the industrial brand. It takes on the meaning of a cut, of a *caesura* between the chaotic environment of the highway and the calm and active world of research.

Also, we could say that performative, in an urban perspective, is the role of the color masterplans that in Italy have been designed since the end of the last century with the aim of ensuring a modification of the historical urban fabric consistent with its value, which the plan makes legible through its rules.

The principle of performance projects architecture onto the contemporary, making it the terminal or interface of a system of physical or immaterial relationships that can substantiate its existence. It is the re-contextualization of the idea of color within a new and not necessarily material intervention space.
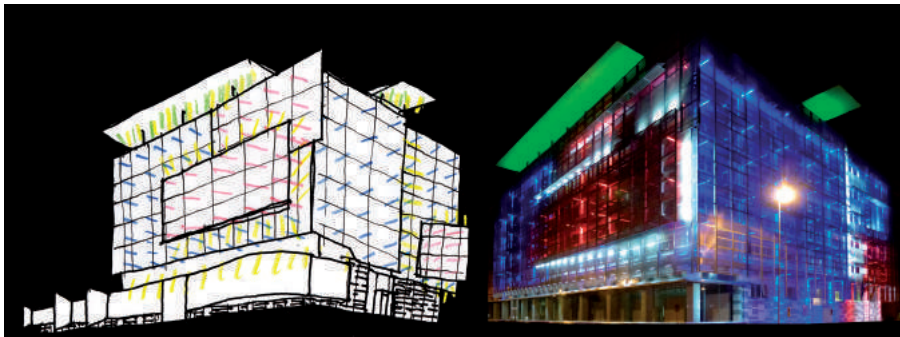
Figure 23.3   A. Aymonino with Seste Engineering, *Ex Manifattura Tabacchi*, Roma, sketch and photo, *A. Aymonino*, 2016.

23.3.1   Innovative Colors for Climate Mitigation in Contemporary Architecture

When we delve into the role of color innovation in architecture as a passive tool that can meet the needs generated by climate change – and therefore mitigate extreme phenomena such as overheating or desert climates – we find ourselves exploring a function that dates back to ancient Greek and Roman traditions, not only in response to the aesthetic and protective aspects found in Daniele Donghi's teachings,[§] but also to those cultural and functional aspects of a physiological/perceptive type linked to the physical and mental well-being of inhabitants, affected by the brilliance, gradation and *albedo* of colored materials. In contemporary architecture, color has now taken on myriad different meanings, dictated by a hyper-technological market and by speculative operations that force architecture to adapt to various different lifestyles, controlling the quality of surfaces and their response to new performance-related needs by using materials where the decisive interface between technology and new ways of living often depends on the role of color. "Our environment is filled with color, which, day and night, in public and in private, sometimes loud and sometimes quiet, demands our attention. This explosion of colors means something. We are exposed to a constant stream of colors. We are programmed by colors. They are an aspect of the codified world in which we have to live."[7]

Take a few of the thermochromic materials used as temperature sensors thanks to their color fluctuations.[8] As far back as 1987, at the World Teleport Association Conference entitled *Design for the Information Age*, Mike Davies announced the appearance of future buildings with these words: "Look up at a spectrum-washed envelope whose surface is a map of its instantaneous performance, stealing energy from the air with an iridescent shrug, rippling its photogrids as a cloud runs across the sun, a wall which, as the night chill falls, fluffs up its feathers and turning white on its north face and blue on the south, closes its eyes but not without remembering to pump a little glow down to the night porter, clear a view-patch for the lovers of the south side of level 22 and to turn 12% silver just before dawn." While this statement may have seemed fanciful thirty years ago, today, thanks to smart materials that can change their color and transparency, as well as computerised control systems, some buildings can respond to changes in climate and environment, turning what was once science fiction into reality, almost as if to prove Arthur C. Clarke's Third Law: "Any sufficiently advanced technology is indistinguishable from magic."[9]

[§]"The coloring and painting of a building's walls is done both to preserve them and to improve their appearance."

23.3.1.1 Nanotechnologies and Smart Materials: Cool Colored Materials for Building Envelopes

Among the geo-engineering-based solutions used in architecture to mitigate climate change phenomena, the most relevant and consolidated category is that of highly reflective materials, also referred to as 'cool materials' due to their low surface temperatures, followed by phase change materials (PCM) and thermochromic materials. The category of cool materials is vast and comprises: a first generation, including natural materials with high reflectivity; a second generation, based on the development of artificial white materials designed to have a high *albedo* equal to or higher than 0.85; a third generation of cool materials, known as 'cool colored materials', including colored coatings that feature high reflectivity in the infrared spectrum of solar radiation (NIR), thus appearing like traditional dark materials but with a low surface temperature; and a fourth generation, based on nanotechnological additives like thermochromic paints or PCM-doped cool materials. As has already been observed,[10] previous research into highly reflective materials primarily focused on their effects on outdoor temperatures, thus focusing only on microclimate parameters such as air temperature and surface temperature variations and, as regards that particular aspect, a consistent review has been carried out.[11] Nevertheless, recent studies have highlighted the importance of including other parameters as well, such as mean radiant temperature (T_{mrt}) and, above all, comfort analysis (in terms of PET or UTCI), since it appears that 'cool colored materials' have different side-effects on architectural thermal comfort, depending on the surface of application, on their exposure to solar radiation and on the combination with other elements.[12] In general, increasing reflectivity facilitates the reduction of daytime surface temperatures during the day, whereas during the night the *albedo* of materials becomes ineffective due to the absence of solar radiation. However, since more radiation is reflected during the day, less heat is stored in reflective materials compared to conventional ones, thus leading to small reductions in night-time surface temperatures. Cool colored materials can be applied on roofs (*i.e.* cool roofs), walls (*i.e.* cool walls) and pavements (*i.e.* cool pavements). A field study conducted in Athens that specifically involved the replacement of an urban park's traditional pavements with 'cool pavements'[13] showed that reflective pavements could reduce surface temperature in an urban park by up to 7.6 °C under non-shaded conditions. As regards thermochromic materials for building envelopes, such innovative materials can change their optical and thermal properties in a dynamic way, responding to their environment, changing their color and solar properties: moving from darker to lighter shades as the temperature rises. This change is reversible, which means that, as temperature decreases, these materials turn back to their original color. A multidisciplinary team developed eleven thermochromic coatings for building envelopes using thermochromic pigments in

an appropriate binder system and investigated their performance compared to similarly colored highly reflective (cool) and common coatings.[14] The results demonstrated that the surface temperatures of thermochromic samples were lower than the temperatures of color-matched cool and common coatings by a maximum of 7 °C and 11 °C, respectively. (However, problems to do with durability and stability arise when applying thermochromic materials to buildings and urban structures, even with limited outdoor exposure, and thus further research is required).

23.3.1.2   *High-performance Pigments in Contemporary Architecture: Case Studies*

The thermochromic furniture designed by Jürgen Mayer changes its color in response to the heat released by its user. In recent years, there have been significant developments as regards materials and coatings that react to 'stimuli' in the external environment. In particular, thermochromic pigments, which were developed in response to the need for control and safety (*e.g.* so as to ensure that frozen products were not overheating), are now used in everyday products and they open up infinite possibilities for experimentation in interior design and fashion. Some examples include wallpapers that change color by touch and chairs that record the form of whoever sits on them. Systems based on plastics that react to temperature changes are currently being researched at the Fraunhofer Institute. According to experts, the demand for intelligent polymer sheets for use as thermal sensors is expected to increase. They are applied to the facades of buildings, for example, so as to optimise the use of air conditioning inside.¶

Another high-profile 'demonstration' project is Diller and Scofidio's Brasserie Restaurant on the ground floor of Mies van der Rohe's seminal Seagram Building, where the architects clad the interior facades with smart materials, enhancing their design from a box to an interactive place of flexibility and transformability. Transformability is the key word of the United Network Studio's (UNS) facade project for the La Defense office complex in Almere too, where the facades are clad with glass panels in which tinted sheets reflect different colors depending on the time of day and the angle of incidence, thanks to the material employed: a film generally used for packaging. This material turns interior facades into highly reflective, prismatic parts that appear to change color when the sun goes past the building and crosses the office.

¶A material develops thermochromic qualities, *i.e.* the capacity to vary color in response to a change in temperature, when we add thermochromic pigments in a coating. The thermochromic effect is caused by changes in crystal structure. Typical thermochromic materials include inorganic metal oxides (*e.g.* zinc oxide, vanadium oxide), polymer blends or liquid crystals, which, on warming, do not change directly from the crystalline to the liquid state. In particular, thermosensitive hydrogels for sun protection are the subject of ongoing research. Thermal lacquers are already available on the market for many different applications and can easily be applied to most material surfaces. The reaction temperature can be adjusted and the color changes defined. Thermochromic resins can be mixed with conventional moulding materials and used for the production of plastic components.

Innovative pigments have made it possible to formulate red/pink-colored surface coatings that reduce the heating effect in sunlight compared to surfaces with the same hue in the nursery school on Boulevard de Grenelle in the heart of the 15th *arrondissement* of Paris, where the French group Périphériques, in partnership with the Terreal paint factory, has developed a specific range of nine enamelled colors to meet aesthetic expectations and create a brightly colored facade. 'Grâce à une mise en oeuvre à claire-voie et à une pose sur la diagonale, la perception des couleurs est enrichie et offre à chaque élément deux faces aux teintes différentes: l'une dans la lumière, l'autre dans l'ombre', in the words of the architects themselves.[15] As well as a cooling effect, there are other benefits that come with using these pigments, such as increased service life and improved comfort levels for building occupants.

23.3.2 Ephemeral, Changeable, Unstable

In the last three decades the tools of the architectural language have developed a wealth of devices able to change the spatial understanding of architecture. The translucent, the opalescent, the meshes, the wraps created by polymer sprays, glass that shows different degrees of transparency according to the angle from which it is observed, or is able to pass from complete transparency to opacity in fractions of a second. The perception of the volumes in which we daily move is changing.

LEDs have changed the night figure of the cities, but not only this. The traditional building volume is often reduced to support an 'other' language that connotes the surrounding area much beyond its actual physical and dimensional consistency.

Today color, with the double meaning of fixed and mutable *cromia*, serves to draw precise points of reference in the isotropic mesh of the territory-city and at the same time to give local identity. This semantic device is used with paradoxically similar objectives from opposing economic social tribes. It is difficult to imagine two more culturally and financially different worlds than those represented by the skyscraper of the Rogier Tower in Bruxelles of Samyn and Partners and by Vila Brasilândia in São Paulo by Boa Mistura. Yet both use chromatism (though interpreting it with techniques that are the opposite of technological sophistication) to draw some landmarks in the urban landscape and 'to make place' for the communities of people that they live and work close to.

In the case of the old Manifattura Tabacchi in Rome, the recovery strategy is inspired by orders of problems of different scales, impacts and significance. The first of these refers to an urban/representative framework: the restructuring of the building in question should be the first step of a major urban redevelopment of institutional significance. The second concerns areas more related to the specific function and use of the building: proposing an 'exemplary' restructuring that can serve as a model for the future. The building is required, therefore, to look at the city and its specific methods of

use, while at the same time satisfying the need for its urban and institutional roles and perfecting its internal operations as a place of work in the service of citizens. The choice of the colored LEDs and of the top yellow canopy enhance the characters of innovation that the whole project of the building recovery wants to express. It is conceived like a colored *urban lantern*.

23.3.3   The Color Masterplan of Historical Architecture

The restoration of elevations in historical centers, until not many years ago, was considered an intervention of ordinary maintenance that could be carried out in a silent-assent regime. The urban planning instrumentation at the local level often, as far as the coloring is concerned, limited itself to reiterating some simple prescriptions:

- replicate the pre-existing colors
- do not use colors that are dissonant with respect to the decoration of the surrounding historical context.

This last indication, which appeals to general good environmental sense, is in truth rather generic and certainly does not identify sure lines of behavior; the other prescription is only apparently significant. In fact, the replication of the pre-existing tint tends to provoke a sequence of variations that are generally quite predictable because the colors found on site are those – altered – of the last painting, surely different from the penultimate and the antepenultimate, not only for probable intentional variations, but also due to a phenomenon of the natural weighting of color with time, caused by atmospheric pollution.

A plan for the color and restoring of the historical elevations can constitute an important and effective urban planning tool, as long as it does not propose itself as a set of additional rules, or it would have the counterproductive effect of discouraging the object of its goal.

It should be clarified that attention should also be paid to all the elements of the facade: window frames, signs, balconies, railings, tiles, canals, gutters, lanterns, must be restored so as not to constitute disturbing or dissonant elements for materials and shapes. The decisions to be made on the color finish must therefore be based on a series of historical, technical and analytical data, analyses and surveys that are in agreement, to make it possible to draw up the general restoration project.

The facade is the surface on which all the deterioration processes induced by the environment on the building itself (atmospheric pollution, meteoclimatic factors, biological deterioration, *etc.*) take place in the initial phase. It follows that the facade, subjected to incessant deterioration and weakening, is affected, with a certain frequency, also by reparations, maintenance renewals and protections.

Traces of such interventions are often identifiable, albeit in a small part and in a situation of stratified superimpositions, and can constitute precious

technical indications and historical traces to be preserved. The facade is therefore a privileged place for the accumulation of information, a sort of limestone archive to be protected and treated with care.

In any case, even with different methodological commitment, the choice of colors and materials to be programmed for restoration work is subordinated to the determination of what can be called the chromatic history of a building (parallel to the history of restoration and maintenance), and that is the sequence of all the coloring applied on it, from the original one to the most recent one.

The methods, now well known, used for the determination of previous painting, are substantially of three types: historical research (bibliographic, iconographic, archival, *etc.*), direct analysis on samples of plaster appropriately taken from the building, affinity and typological criteria. In this regard, it should be noted that such methodologies of analysis preparatory to the interventions to be carried out should not be applied separately, but that, on the contrary, precisely their complementarity and interrelation can lead to more reliable results, since documentary evidence, verified on site and related to the type of building, can provide decisive results.

23.4   Social

The painted architectural surface as *social action device* is the second concept that I explore in this chapter.

This quite radical idea is the focus of many contemporary works on buildings and public spaces. Almost always the authors are not architects, but artists who use the architectural surface as a medium in the city to make their artworks visible beyond the commercial circuit of galleries or exhibitions, freely communicated to everyone.

Frescoed facades have always existed in historical architecture, but the aims of the artistic intervention were the decoration of the architectural apparatus, the simulation of a different and "nobler" material or the historical celebration. For contemporary architecture the use of painting or graffiti on the facade is a drastic choice, often with radical meaning, that can form a dialogue with the architecture that supports it, as in the case of Franco Summa's works, or using the facade as canvas, only with people watching. Even when the work is conceived autonomously by the support, then becomes an integral part of it, this gives the hosting architecture a different symbolic and economic value. Who does not remember the murals of Diego Rivera, David Alfaro Siqueiros and José Clemente Orozco that started to appear on the walls of Mexico City after the 1910 revolution?

The mural is a form of collective art that belongs to the viewer. It is a social action that can contribute to the growth of a country and its culture. This idea affirmed itself all over the world at the end of the last century as street art or urban art through the works of renowned writers: Keith Haring, Paul Morrison, Gordon Matta-Clark, Jean-Michel Basquiat and Bansky,[16] just to name a few of them. Today these artworks are taking on a different role in

Figure 23.4 Topotek1, BIG, Superflex; *Superkilen* SUK, Copenhagen, Denmark. *Iwan Baan*, 2012, Bjarke Ingels Group, 2012. Reproduced under the terms of the Creative Commons Attribution License, CC BY 2.0, [https://creativecommons.org/licenses/by/2.0/].

their respective cities. In recent years, architecture has become more aware of the value of urban art as a tool for regeneration, often through processes of shared planning (made in co-authorship with citizens) rather than only participated[17] (made with social approval).

Today, artists conceive of the urban environment no longer as merely a background or a stage, but the object of the art work itself. Artists are giving public evidence to the citizens' requests, transforming urban space and abandoned or degraded buildings into places of value, intercepting the desires of beauty of the inhabitants, creating relationships between public actors, clients, institutions and citizens. Also many times it is the same citizens or artists who spread their stories about buildings, such as the intervention of Dan Pitera with the Detroit Collaborative Design Center.[18]

Often for urban art or graffiti works, the traditional concept of authorship, as previously stated, could be questioned by the sharing of the creative process and/or the project implementation is self-managed and *hic et nunc*, exceeding the long bureaucratic times of approvals and public permissions.

Gravalos–Di Monte in Zaragoza[19] use with citizens' collaboration graffiti, colors and urban tattoos to regenerate the abandoned spaces of the suburbs as boxes of the goose game, triggering a new cycle of social life in the neighborhood. Topotek1 and BIG in Copenhagen, Denmark have invented the Superkilen (Figure 23.4) by elevating a road to a park almost exclusively with color (black, white, red). The transition of the colors from the road to the facades is the manifestation of the belonging of the color to the public space domain. Among many others, the work of Boa Mistura is a leading

proponent of architecture in this field, such as 'Luz Na Vielas' in São Paolo,[20] where the color on the buildings redeems the public space, filling it with happiness and social pride (Figure 23.5).

The basic idea underlying the interventions of Boa Mistura is that of positivity: changing the aesthetics of a site does not just mean giving it an acceptable face, but, through a visual change, helping a process of social and cultural re-evaluation of a place which in many cases was previously negatively connoted (crime, poverty, abandonment, discomfort) to create aggregation. For example, this is what underlies the idea of interventions in the already quoted favela Vila Brasilândia of São Paolo in Brazil, as well as the intervention in the Chorrillo district of Panama.

Urban art is a social project, it is the projection of an idea in the environmental context for a transfiguration that aims to illuminate significant social values. Urban art is always dealing with the solid context of intervention, transforming it with colors into a work of art that is at the same time profoundly autonomous and deeply linked to the architectural characteristic of the place. It's like giving a second chance to a building or to a place by turning it into a landmark just by re-inventing its physical space with color.

23.4.1 Color as a Social Tool for Understanding the Different Dimensions of Architecture and Urban Sites

The habit of painting facades of buildings can remind us of the parietal interventions, currently in great vogue, of the so-called street art. It could appear as a recovery of that frescoed architecture of the past centuries,

Figure 23.5   Boa Mistura, *Luz Nas Vielas*, São Paulo (Br), Favela of Vila Brâsilandia. Reproduced with permission from Boa Mistura, 2015.

but there are substantial differences. In particular, the lack of relationship between the contents and the figuration forms and the architectural, social and urban context. In the street-art interventions, in general, any environmental reference which might make them contextually significant is missed. Instead, the possibility of environmental requalification through the hypothetical cathartic ability of the masterpiece is relied upon.

The assumption of the city as the artistic working area implies a necessary interpenetration with the environment, aiming at the knowledge and at the conceptual assimilation of the customs and the senses of the context. That considers its cultural, memorial, symbolic, social, psychological, historical dimensions and of course, the spatial and environmental ones. This is, in other terms, a way to enter into 'consonance', to absorb, almost through an osmotic process, every dimension and sense of the city – obvious or not.

In the finalisation of an idea, of a 'draw' that has to be realised, every constitutive element of the environmental dimension must be considered and valued. It must be found in its specificity the possible diapason, the reference, the element or the elements to start and generate the elaboration of a work that 'rewrites' the sense of the context, powering up new dimensions, new perspectives, new meanings. To make, therefore, an 'invention', in the Latin sense of *invenire*, 'to find' but also 'to create'. The environmental artwork, when it really is the case, never appears shut down; it is not presented as an artistic object that is completed and simply located in a determinate urban place, but it is given as sign–form–color that consciously and dynamically affects the context, transfiguring and giving it a new meaning, becoming, at the end, an essential constructive part of the environment.

In 1975 I conceived an installation to exalt a specific urban aspect of Città Sant'Angelo, a historical village of the hill site in Abruzzo: the main street; a road axis that passes through the entire extension of the historical centre following the hill's profile up to the visual and physical conclusion on the scene of an eighteenth-century church elevated on a stairway.

This particularity is assumed as appropriate at the elaboration of a substantial modification, not only in the urban environment, but also in the way the citizens perceive and live the daily paths.

The work *A Rainbow at the End of the Street* (F. Summa, Città Sant'Angelo, 2013) highlights the poetic sense of the transfiguration realized through the coloration of the twenty-four steps of the stairway (Figure 23.6). The church, suspended on the colors, proposes a rainbow that can be climbed color by color as a metaphor for a possible rise from the material to the spiritual. *Il Giardino Incantato*,[21] an urban place overlooking a Mario Botta building, is interpreted as a garden-square with a malleable-pictorial visionary presence.

Figure 23.6   F. Summa, *Un arcobaleno in fondo alla via*, Città S. Angelo, Italy, *F. Summa*, 1975.

It is rhythmically divided by sixteen colored slabs, and appears to be a physically and emotionally accessible place inside a garden-square. Pescara, 2017 (Figure 23.7).

23.5   Narrative

The third concept is that of *color as a narrative device*.

   It expresses the need to give sense to the architectural project, to discover with different eyes and through stronger figures what architecture in other ways already expresses or implies. Rem Koolhaas describes it in a superb way in the project for the Prada Foundation in Milan (2008–2018)[22] when he paints the old industrial warehouse with a golden patina, as if to say that

Figure 23.7   F. Summa, *Il giardino incantato*, Pescara, Italy, *F. Summa*, 2018.

the existing is the value to be taken into account in an epoch and in a city where the rampant tendency in urban planning is to demolish and rebuild everywhere, a city that seems unaware of its history and disinterested in its heritage.

> "A narrative architecture," as Giancarlo De Carlo wrote, "is capable of listening, welcoming and annexing the tensions of the city and its inhabitants. An architecture that must become a 'process', undermining the consolidated vision of the building as a perfect *and concluded* unicum."[22]

Even in a strict etymological sense, the use of color as a narrative device reveals different meanings. It tells the story of the building and of those who live in it and reveals a new dimension that can only be perceived for example through color, as in the research of the German study founded in 1989 by Matthias Sauerbruch (Constance, 1955) and Louisa Hutton (Norwich, 1957). Their work is characterized by the importance given to the color, used not as a simple decorative element but as a fundamental part in the definition of the significance of spaces.[23]

Their book *Sauerbruch Hutton: Color in Architecture*[24] presents nine colored projects, but also introduces the complexities inherent in the practice of designing and thinking about color: how to materialize color; how to use color to manipulate or to address impressions of space and form; how to perceive color in the built environment; and how to connect the color with the place. In the project for the Brandhorst Museum of Modern and Contemporary Art in Munich, the facade has been managed as a large abstract mosaic of twenty-three colors, made vibrant by the superimposition of narrow colored modules and horizontal and vertical bands. The effect achieved through the use of colors by the German office is that of integration with the context with an almost chameleonic mimicry that gives a fascinating and pointillist three-dimensionality to the new architecture. Their latest Italian Museo del Novecento in Mestre (Figure 23.8) is conceptually very similar to the previous one. It consists of the recovery of an old convent and is characterized by the polychrome ceramic coating made of strips placed diagonally across the two new additions that at

Figure 23.8 Sauerbruch & Hutton, *M9 museum in Mestre*, Venice. *P. Baldi*, 2018.

the same time appear abstract and integrated to the existing urban fabric through the use of color that decomposes in the facade the colors of the architectural materials of the surrounding historical city.

A similar approach can also be found in the work of the Spanish Mansilla + Tuñón[25] with the MUSAC de Castilla y Léon of 2005, and the Town Hall in Lalin (Spain) of 2011.

Still in the early 2000s for Enric Miralles and Benedetta Tagliabue, the large colored tapestry on the roof of the Santa Caterina Market in Barcelona (2003) is the giant image of a photo taken from a Mediterranean fruit and vegetable counter printed as a puzzle of 325 000 hexagonal tiles of 67 colors. This is in reference and homage to the works of Gaudì, clearly one of the most representative architects of Catalan modernism.

The same type of theme, with the painted surfaces that tell the joy of the market, is developed with great quality in the internal vault of the Rotterdam market by the Dutch architect group MVRDV in 2014 (Figure 23.9).[26] In the 'Didden Village' (Rotterdam, 2009), a project to increase the height of a traditional nineteenth-century house, MVRDV uses symbolically the colors that become the hallmark of the two simple volumes superimposed on the existing building. In the designer's concept it is like a 'crown at the top of the monument'. Didden Village can represent a prototype for a new type of expansion of historical cities where color plays a strategic role.

Jean Nouvel uses the same bright color of the Kilometro Rosso for the tenth temporary pavilion of the Serpentine Gallery in 2010, at Kensington Gardens, London. Red is chosen with a narrative intent. It tells about the city. Red like the telephone booths, the double-decker buses and the main doors

Figure 23.9   MVRDV, *Markthal*, Rotterdam, *Courtesy of M. Mantelli*, 2018. Reproduced with permission.

of the houses of London. The red pavilion, so lively and intense, creates a strong contrast with the green lawn where it is inserted to pay homage to the city.

23.5.1   Prodromes of Neo-Fauvism

Color is architecture's most troublesome material. Even as the medium was abstracted, theorized for relativity and phenomenologically re-perceived as its own subject during modernism, chroma was then sanitized from the built environment. Instead of producing color-coded environments, material ethics and truth served as an aesthetic. The predominance of form for form's sake continued the hierarchies of Plato's legacy in building design. In contemporary architecture, transcending the clarity and simplicity of black and white is typically a foray into shades of gray. Only daylight is more seductive, uncontrollable, sensuous and unstable than color. No wonder modern architects – employed to manage and characterize so much in the way of international nation-building, Western hegemony and global construction – became chromophobes.

In the last decade, NMDA has proposed some daring color insertions in projects and buildings all over the world. The firm's website even mentions relationships of color to culture and locus in the portrayed work. Perhaps Neil Denari is poised to lead a Neo-Fauvist revolution in urban form. Denari's radical color is not immediately apparent. His singular chromatic preference has been for a bright eye-grabbing accent to the tectonically assertive semi-transparent massing of torqued or tilted rectangular forms with silvery finishes.[27] In this way, he perpetuates the minimalist tradition of singular color accents to neutrally toned architecture. Urban insertions are his forte, and each artifact speaks boldly to its unique surroundings. Beyond formal objects or surfaces, spaces are often rendered as colored light. It is in these sweeping ethereal suggestions that the problem of color's embrace begs some attention. For the preceding generation of 'white' architects, the minimalists of the senses and those seduced by formal mind games, color got in the way. Color as a foreign body acts as something out of control, more often associated with the exotic, the feminine, oriental, infantile or vulgar. When color is supplemental, superficial or cosmetic, it may also be conceived of as trivial or – alternately – dangerous.[28]

Yet in the context of these challenges to color's troublesome nature in architecture, Denari's New Keelung Center in Taiwan is of the greatest interest (Figure 23.10). The grand public project is also distinct from Denari's other predominant uses of red hues. "Since Keelung is a rainy city, often shrouded in wet, heavy air, the chartreuse sections of the complex, in combination with specially designed lighting, will push through the gauzy atmosphere providing vitality and life."

Denari's portrayals of the massive metallic form in the harbor essentially feature lime yellow light emitted from within and reflected in that water. In some depictions, the light appears in competition with the rising sun and
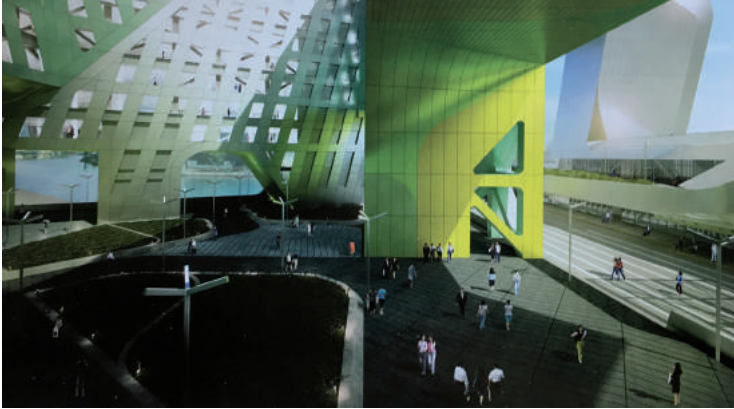
Figure 23.10   Neil M. Denari/NMDA, *Keelung Harbor Terminal*, Taiwan, in construc-
tion, NMDA, 2012. Reproduced with permission from Neil M. Denari.

focuses viewers' attention to the building near grade with both planted land-
scapes and hardscapes. So luminous is the ambience that the building seems
to be in its own timeless glow. As more of his projects come to fruition, we
will watch his spectra of atmospheric light and color evolve and come to life.
This is the promise of a richer, luminous, deep sensual architecture of its
time, of its place and for its colorful citizens.

23.5.2   Some Italian Tales

In Italy, in Rome, the Palazzina Papanice by Paolo Portoghesi in the early
70 s refers to the Baroque tradition with an organic form that affirms its
identity in color: the blue of the sky, the green of the plants, the brown of
the trunks, the gold of the sun. "In the vertical band design of the majol-
ica, the allusion to the colors of nature, overlaps the 'musical' rhythm of
their weaving, while inside, where the colored bands run horizontally, the
ceilings of the living room are continually rippled by a series of concentric
degrading cylinders."[29]

   The linear park between Caltagirone and Piazza Armerina, 1999, by Marco
Navarra makes the landscape narrative with a continuous strip of color:
"This is a landscape project and it is about, in details, the acknowledgement
of ancient agricultural, natural and historical landscapes in an area of Sicily
in the threshold between Erei and Iblei, through the building of a new land-
scape (…). "

   The *Black House* by Tierstudio (Alberto Bertagna and Sara Marini) in
Urbania, 2012,[30] completely covered with slate slabs, is significant in
this text for the precision and the intentionality of the narrative use of
color (Figure 23.11). The blackboard changes over time and from black to
very clear; it records the context. The black house is camouflaged in the
winter sky, but inside it is white to mark the relationship with the inner
intimacy.

Figure 23.11   S. Marini, A. Bertagna, *Casa Nera*, Urbania, *Courtesy of F. Mantovani*, 2018. Reproduced with permission.

Figure 23.12   M. Ricci with RicciSpaini AA, *Ghella EcOffice*, Roma, Italy, *Courtesy of M. Mantelli*, 2017. Reproduced with permission.

In the brutalist building by Alvaro Ciaramaglia recovery intervention in Rome, designed with the RicciSpaini AA office, color is a plot of the inner history of the regeneration of the building itself wishing a cheerful architecture made of cement, transparencies and colors even at night, and the internal feeling of an almost non-urban work environment between the hanging gardens and the linden trees (Figure 23.12).

"When they asked Goethe what his favorite color was, he said: *I like rain-bows*. Here's what I love about architecture: if it's good, it contains all the colors of the spectrum of life, if it's bad, the colors will fade to fade away from the ruins of Byzantium to the streets of New York, from the roof of a Chinese pagoda to the top of the Eiffel Tower, each building tells a story, even better, different stories."[31]

The use of painted surfaces to support and enhance the narrative value of the architectural work is a design device capable – as in art and fashion – of describing and interpreting the resistance of contemporary architecture to the digital revolution when it drastically cuts the sphere of meanings and emotions by pushing them in a non-material world. Reporting these values to the reality of physical space, the painted surfaces seem to express not only a return of importance of color in architecture and even more in public spaces, but also a new desire to make cities happier.

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Science and art are increasingly interconnected in the activities of the study and conservation of works of art. Science plays a key role in cultural heritage, from developing new analytical techniques for studying the art, to investigating new ways of preserving the materials for the future.

Following on from the 2014 title *Science and Art: The Painted Surface*, this book consists of a series of chapters written together by scientists, art historians, conservators, curators and artists dedicated to conservation, execution techniques, languages and conceptual topics. **Science and Art: The Contemporary Painted Surface** largely covers execution techniques, material's conservation and languages of artists, representative of twelve different countries, all protagonists of the development of innovative significant techniques and methodologies.

The book opens with a focus on widely historicized artists, such as Jackson Pollock, Lucio Fontana, Enrico Baj, Piero Manzoni and Joseph Albers. Its core is dedicated to the work of major worldwide renowned living artists, in a perspective that, while considering the Sixties as the historical starting point of contemporaneity, does not neglect to offer a view on the work done in the immediately preceding years. Several interviews with artists are included. Final chapters are dedicated to contemporary design, net art, and painted surfaces in contemporary architecture.

Presented in an easily readable form for a large audience, the book guides readers into new areas uncovered by the link between science and art, and will be of interest to artists, art historians and curators, as well as those who appreciate art.

Reviews of Science and Art: The Painted Surface (2014)

'*Science and Art* provides an excellent read for art historians, who will instantly recognise the famous pieces that have been studied, while giving them insight into how a painting was constructed, what it is made from, or how the colours would have looked when they were freshly painted'

Chemistry World, 6 November 2014

'*Science and Art* is recommended for students, teachers, and the general public who are interested in chemistry or other sciences and art, as well as applications of the former to the latter'

J. Chem. Educ., 2016, **93**, 810–810

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