

Monochromatic design in a polychrome world. Why our cities have become increasingly gray: A dichotomy between production and reception in architectural color design

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Abstract

Color is a central component of human experience, yet when we narrow our focus to the practice of city planning and architecture, color only plays a marginal role in the initial phases of the design process. This paper reviews various approaches to using color on buildings: for example, the evolution of regional styles due to the availability of pigments and materials, the use of color as a form of decorative drapery, and the emphasis of a building's pure form without any additional color. Central to the paper is the analysis of the dichotomy between the reality of the process of actually experiencing a city and its buildings on the one hand and the design process on the other—a dichotomy between reception and production, thus, a contradiction between an “atmospheric world” of human perception and cognition and a professional world of imaginative design, in which the spatial atmosphere created by color, material, and light often emerges only as a by-product at the end of a conceptual and diagrammatic planning process. The paper proposes a different way of going about the architectural design process that encompasses holistic thinking in color, material, and light right from the start.

KEY WORDS

architecture, cognitive process, color design process, color education, urban design

1 | MONOCHROMATIC DESIGN IN A POLYCHROME WORLD

1.1 | Introduction

Our everyday world is full of colors. Just imagine the array of colors on buildings, streets, and squares, the changing vegetation of the seasons, atmospheres of light in the rhythm of the day, the changing shades of weather, the surfaces of interior spaces, the light shining through the

windows of cafés, restaurants, and apartments, the colors of shop window displays, a veritable rainbow of car paints, traffic signs, and advertisements—and just as vibrant, the colors, and patterns of our clothing as we make our way through these spaces. The color of our environment is nothing static, but constantly in flux.

Color is created by light. The reflections of light on various surfaces form the sensory stimuli through which we distinguish perceptual figures from the visual background and through which we can perceive spatial

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FIGURE 1 Identity through color and material (left to right): Siena, Italy, Photo Daniel Kordan, <https://twitter.com/earthescope/status/916913591927877632>; Malta Balconies, History of the Maltese Balcony, Photo <https://remax-malta.com/blog/the-maltese-balcony>; Murano, Italy, Photo Annhfhung, <https://fineartamerica.com/featured/murano-italy-annhfhung.html>; Jerusalem: Photo Karolina Lubryczynska, <https://www.flickr.com/photos/karolajnat/12484785905>.

depth, location, and shape. Different colors, brightness, and textures form encodings by which we can recognize material, light, shadow, and volume and accordingly, identify, sort, and categorize these and thus interpret them in our world of knowledge. Without color, we would not be able to perceive and understand the world as we do!

The colors of our world create identities that function as cultural and social identifiers (Figure 1). Many regions and cities possess a distinct identity through their own colorfulness: Siena and the Tuscan villages through the Sienna ochre tones of their roofs and facades, Jaipur's pinks, Jodpur's indigos or Jerusalem's buttery limestone. Architectures of different regions and landscapes are set apart by the color of their buildings either in harmony or contrast with the surrounding nature. We see this impactful contrast in the white houses of Greece's Cyclades Islands below vibrant blue skies or in the gray skies of winter highlighting colorful Scandinavian farmhouses. Both are examples of regional and cultural "dress codes"—stylistic peculiarities of different place-specific cultures in different eras that have evolved over centuries. Likewise, social subcultures often identify themselves through their own color and material conventions, such as the graffiti culture of Western metropolises or the murals of Latin American suburbs. Trends in popular culture also present themselves to the outside world essentially through their own color schemes. The colors in our world have a symbolic function. Based on conventions, colors can indicate facts, signal danger as a result of so-called "innate action patterns" or animate to mating rites in the animal kingdom. Last but not least, colors have a

psychological effect and can influence the vegetative nervous system.

1.2 | Colorful real world versus colorless design world

Color is such a central component of our experience that it is difficult to imagine the world without it: a world in which buildings and streets are draped in uniform shades of gray, in which there would be no materials and textures. Unthinkable? Not at all, because this precisely describes the method in which buildings and cities are created in the initial steps of planning and visualization: a world of diagrams, line drawings, or digital monochrome models made of wood, plaster, styrofoam, and the like.

Between the reality of the process of experiencing a city and the reality of the design process exists a fundamental dichotomy—one between reception and production, and thus a contradiction between an "atmospheric world" of perception and cognition on the one hand, and an imaginative design process on the other, in which the spatial atmosphere created by color, material, and light often emerges only as a by-product at the end of a conceptual planning process.

As a result of this type of planning process, our contemporary urban environment seems to have been increasingly mutating into a monochrome design world with a limited spectrum of white and gray tones. We find examples of this kind of architecture and urban planning in the large residential projects of suburbs, such as Berlin's Märkisches Viertel and Gropiusstadt, the prefabricated housing estates of the former Eastern Bloc, but also in the



FIGURE 2 Upper left: Ludwig Hilbersheimer Hochhausstadt, Großstadtarchitektur. Julius Hoffmann, Stuttgart 1927, Figure 8—upper right: GMP Europäisches Patentamt München. <https://www.gmp.de/en/projects/559/european-patent-office> (Accessed November 18, 2022)—lower left: Soane's design for a Grand National Entrance into the Metropolis to be situated at Kensington Gore. Soane Museum. Image: Soane Museum, <https://www.architectsjournal.co.uk/practice/culture/soane-curator-on-napoleons-impact-on-british-architecture> public domain—lower right: Frank Lloyd Wright Falling Water II, Dezeen Magazine, <https://www.dezeen.com/2017/06/08/frank-lloyd-wright-at-150-unpacking-the-archive-exhibition-moma-new-york/> (Accessed November 18, 2022).

business and shopping districts of the inner cities of Cologne, Santiago de Chile or Detroit. The iconic role models of this kind of urban planning can already be found in pre-war visions of Le Corbusier's Ville Radieuse or in Ludwig Hilbersheimer's plans for Berlin, all of which are conveyed through monochrome models and drawings, in contrast to the traditional colorful architectural illustrations or urbanist vedute of the 18th or 19th century, in which color atmospheres are described in detail by means of color, light, and material, in order to give clients, but also the architect, an idea of the finished project. In contrast, representations and architectural competitions from the post-World War II period to the late 1980s are mainly executed as diagrammatic line drawings without the depiction of the material or color of the facades. Exceptions to this can be found in the architectural representations of American Modernism by Frank Lloyd Wright, whose diagrams, in addition to displaying an artistic ambition in itself, depicted the materiality and colorful palette of the planned buildings (Figure 2).

A concentration on function on the one hand and the idea of pure stereo-metric form on the other became a

central hallmark of modernism in architecture. Words such as atmosphere or beauty, which referred to the sensual experience of the environment, were replaced by the term "architectural concept" during the critiques of student design projects at architecture faculties. The presence of an "idea as such" was considered more important than the experience of the architecture by the users. The essential idea was meant to be expressed through architectural form; anything that was not considered essential to conveying the *pure idea* of forms, such as color, texture, and any geometry not directly resulting from function and construction, was understood to be merely added accessories. An example of this way of thinking was the postwar "de-stucco" campaigns in many German cities in which both the Bauhaus and the traditionalists joined up. Whole districts spared from the bombs were purposefully stripped of their ornamentation and looked afterward as if war damages to the facades had only been provisionally repaired.

Examples of such primacy of the idea over other design and planning aspects can be found, for example, in the city plan of Brasilia in the shape of a bird, visible



FIGURE 3 (Left to right): Le Corbusier, Ville Radieuse, Model, Paris, 1930, Photo ArchDaily; Areal View of Brasilia, Photo Wikimedia Commons; Original City Plan of Brasilia by Lucio Costa, Photo Wikimedia Commons.

only from above, or in the endlessly expandable nonhierarchical carpet pattern of the Ville Radieuse (Figure 3). Cities and buildings of this type are usually characterized by a monochrome color palette, especially when seen from the distance; colors often function as decorative dabs on the pure form, as in the balconies of Le Corbusier's Unité d'Habitation in Marseille, for example. The average architecture of investors had quickly joined this color equalization and resulting visual impoverishment; here too, white and gray tones characterized a uniform color appearance of buildings.

A number of reasons can be assumed for this development: no more restrictions imposed by the inherent color of the materials used, because nowadays any material can be colored in almost any way; the turning away from architectural regionalisms in favor of an international stylistic repertoire independent of historical and local evolutions; various ideologies of pure form; an increasing avoidance of taking aesthetic risks in designing architectural commodities which results in the dominant use of muted grayish and whitish tones; and, a widespread ignorance of the fundamentals of color and light by planners and architects. The main reason, however, can be found in the changed architectural design process itself.

1.3 | A planning universe without color? The role of material and color in architecture

The beginning of modernism in architecture and urban planning coincided with the beginning of an era when almost any shade of a facade color could be produced inexpensively. Before the mid-19th century, the color appearance of architecture was largely determined by the choice of materials used, and accordingly, the compositional and stylistic framework was limited by the range of natural materials available in each region. The possibilities for

designing facades with different color schemes were also limited by the selection of available pigments. On this basis, regional and stylistic building traditions emerged, which could be identified not only by the building forms and ornaments used, but also by their materiality and coloration. Exceptions can be found in specific buildings of advanced civilizations, such as temples or palaces, where walls were treated as decorative surfaces on which paintings, ceramics, or ornaments could be applied, using design materials from the dominant art forms of the time (Figure 4).

Because of the limitation to a range of only a few materials and pigments, local evolutionary building traditions did not have to rely on color theories. Color design principles pertaining to architecture did not emerge until architectural surfaces increasingly mutated into canvases, to which color could be applied independently of the underlying material surface (Figure 5). While the design principles used were initially borrowed from art, from the 17th century onward, the first color manuals which focused solely on architecture appeared in Europe and were disseminated in pattern books for master builders (Figure 6). One example is Schmidt (1790), *Der bürgerliche Baumeister*, in which 35 facade compositions are presented using 13 colors as sample compositions for builders and craftsmen.

With the development of new pigments and production techniques, especially for aniline colors, which made it increasingly possible to produce almost any shade of color, the connection between color and building material gradually disappeared: building surfaces could be decorated in almost any color, the example of Bruno Taut's redecoration of historicist facades in Magdeburg, Germany, in the 1920s exemplifies (Figure 7).

Architectural color design principles, which now played an increasingly minor role in the training of master builders and architects, were replaced on the one hand by color harmony principles taken from various theories of color in the arts, for example, in painting.

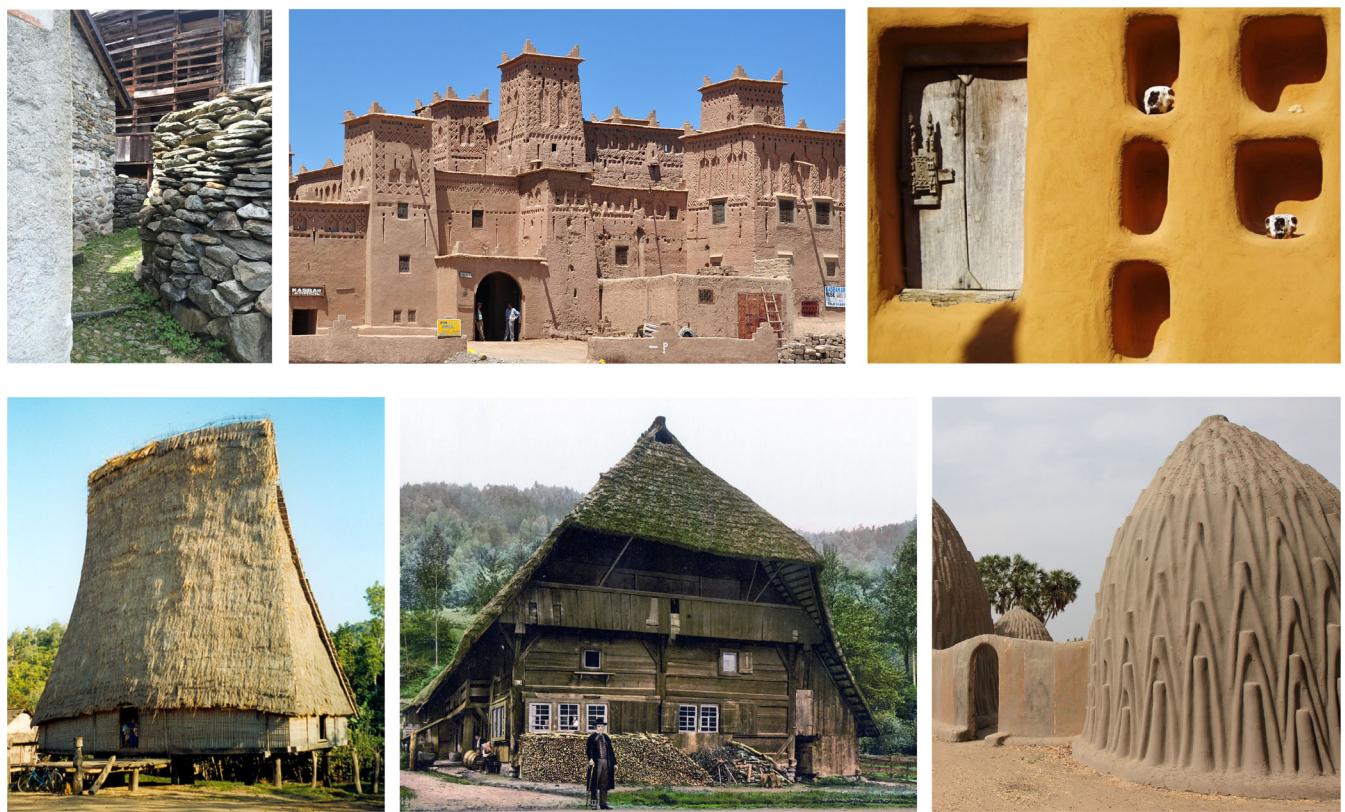


FIGURE 4 Indigenous buildings' color is determined by the material used: (top, left to right) Rock slab buildings, Ticino, Switzerland, Photo Ralf Weber; Kasbah Amridil, Skoura, Morocco, Photo Vincent van Zeijst, Wikimedia Commons; Dagon cob house, Mali, Photo Josef Stuefer, Wikimedia Commons; (bottom, left to right) Communal house of the Xo Dang, Central Highlands, Vietnam, https://vovworld.vn/en-US/colorful-vietnamvietnams-54-ethnic-groups/rong-house-of-the-xo-dang-544_109.vov#&gid=1&pid=2; Black Forest house, Germany, <https://www.loc.gov/resource/ppmsca.00288/>; Musgum clay dwellings, Pouss, Cameroon, Photo Bruno Trédez, Wikimedia Commons.

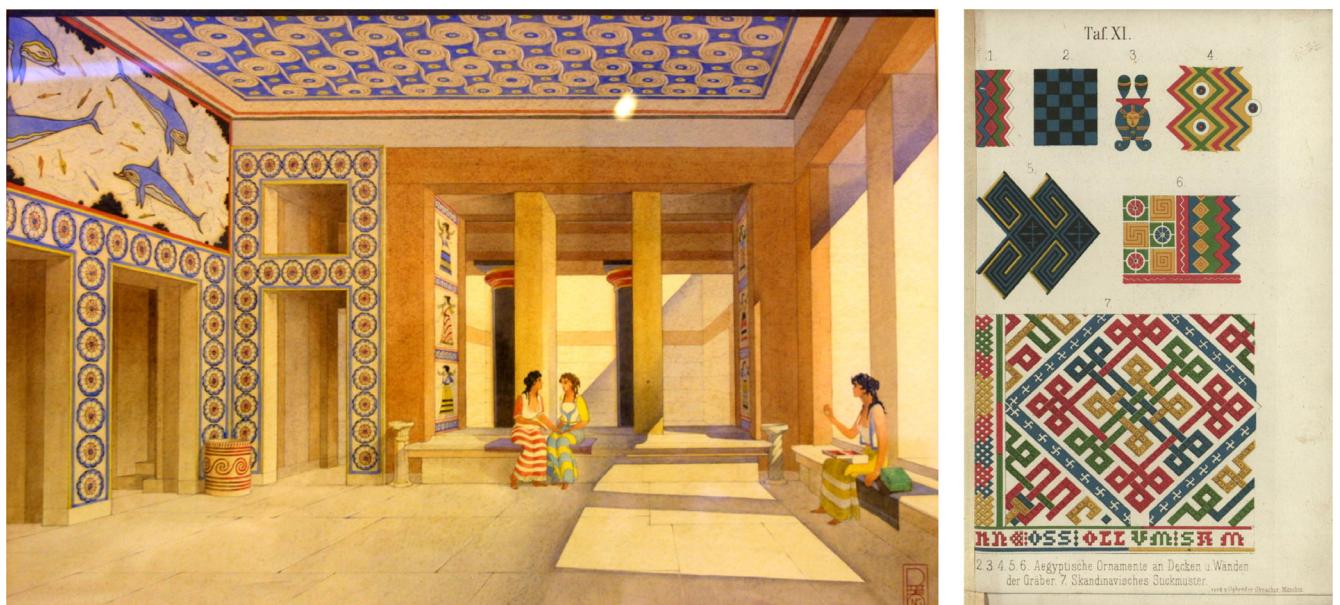


FIGURE 5 Architectural surfaces as a canvas: Knossos Palace Reconstruction (left), Michailidou A, Knossos: A Complete Guide to the Palace of Minos, Ekdotike Athenon, Athens, 1993, p. 80, ill. 38; Plate XI (right), Gottfried Semper (1834).¹



FIGURE 6 Plate 71, *Der Bürgerliche Baumeister* [The Common Builder], Schmidt 1790.²

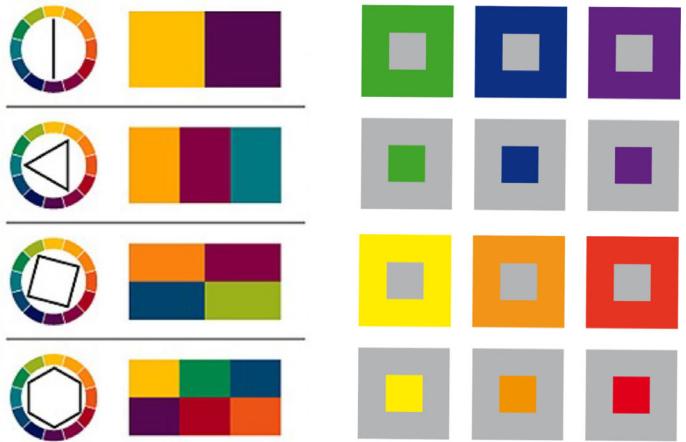


FIGURE 7 Bruno Taut (left), Redecoration of Facades, Otto-Richter-Street, Magdeburg, Germany, 1920s, Photo; Stadtarchiv Magdeburg and Kulturhistorisches Museum Magdeburg; Abstract Color exercises without reference to applications (two right): Johannes Itten, 1961, Wikimedia Commons, and Interaction of Color: App for iPad, Josef Albers, Yale University Press, 2013.

Furthermore, at many art academies, pedagogical concepts of color evolved independent of any practical application. Well-known examples are Adolf Hölzel's color exercises that were later further developed by his student Johannes Itten (Figure 7). Even though these exercises had little relevance for architecture, they were very popular at the Bauhaus and at many North American architecture departments where former Bauhaus teachers and students assumed teaching positions from the 1930s onward.

This independence from practical applications in architecture through the teaching of color theory as such is a major reason for the increasing separation of color from the material effect in the design of architecture. A decisive break took place around the beginning of architectural modernism and the Bauhaus. Tom Wolfe,³ in his book *From Bauhaus to Our House*, characterizes architectural modernism as a *white modernism*. Indeed, we know of Walter Gropius later buildings and settlements almost only in white. (Incidentally, the interior painting of the



FIGURE 8 Buildings as an expression of pure form, bereft of any material expression: Walter Gropius (left), Meisterhäuser Dessau 1925/1926, UC Berkeley CED Slide Library; Richard Meier (right), Santa Barbara House, CA, 2001, <https://www.architecturaldigest.com/gallery/malibu-homes-slideshow>.

Bauhaus' master houses in Dessau becomes an interchangeable decoration that has nothing to do with the material of the house.) The idea of whiteness as the embodiment of pure form, as it was taught by the teachings of the Bauhaus professors who emigrated to the USA, was further developed by the adepts of the second generation and finally found its echo again in the European architecture in the 1960s and 1970s. We experience the exaggeration of this whitewashing during the 1980s in the buildings of the so called New York Five group of architects with Peter Eisenman as the best-known representative (Figure 8). Here, the various materials of a building, such as plaster, wood, enamel, steel, or plasterboard are all kept under a unifying whitewash, dematerializing the building, so to speak. Pure stereometric forms dominated. These were completely independent of the color and textural properties of the material. (The much less influential counterpart to this white modernism can be found in Fritz Schumacher's brick modernism in Hamburg or Frank Lloyd Wright's buildings in the United States, which are characterized by a unity of form, color, and the material used.) This increasing separation of the building from its constituent materials, however, is based on a longer tradition, namely of understanding architecture as a kind of "cladding" or "clothing" of a building. A prominent part of Gottfried Semper's Tectonic Theorie⁴ is the concept of "Bekleidungstheorie" (frequently translated as theory of cladding), in which the appearance of a building does not necessarily follow the function and materiality of the building. Gottfried Semper⁵ (p. 197) writes in original German: "Die Bekleidung der Mauern war also das

Ursprüngliche, seiner räumlichen, architektonischen Bedeutung nach das Wesentliche; die Mauer selbst das Sekundäre." ["Cladding of the Walls was the original, and, according to its spatial and architectonic meaning it was the essential (activity of architectural design), the wall itself was secondary." Translation by the author].

The spread of an international style developing within architectural modernism was accompanied by a loss of regional building styles. Regional building forms are commonly based on functional typologies, climatic peculiarities, locally available materials, and thus also their colors. Global stylistic and functional egalitarianism, on the other hand, tends to result in an architecture in which regional color features disappear in favor of various shades of white and gray.

Chromophobia is the title of a book by David Batchelor,⁶ in which he uses the term "chromophobic impulse" within Western intellectual thought to describe the fear of corrupting the purity of a design idea by using color. In this view, color is often understood as something added on, an ingredient superimposed on the form, something childish, feminine, decorative or even vulgar, and it is thus associated with something superfluous and cosmetic. Architects seem to share this purism in their dress code: Their clothing is usually black—and their buildings are usually in shades of white and gray.

As stated earlier, this reluctance vis-a-vis architectural polychromy, however, is not only due to the modernist ideology of omitting everything superfluous to pure form, but certainly also has to do with the planners' growing ignorance of the scientific principles of color and light in architecture and the design principles that can be derived



FIGURE 9 (Left) RALClassic palette of most used colors. The table of the 15 most used colors in the internationally used RAL standard, published annually by the RAL German Institute for Quality Assurance and Labelling, lists the following shades in 2016: RAL 9010 Reinweiss/Pure white, RAL 9016 Verkehrsweiß/Traffic white, RAL 9003 Signalweiß/Signal white, RAL 7035 Lichtgrau/Light gray, RAL 9006 Weißaluminium/Aluminum white, RAL 7016 Anthrazitgrau/Anthracite gray, RAL 9002 Grauweiß/Gray white, RAL 7012 Basaltgrau/Basalt gray, RAL 9001 Cremeweiß/Cream, RAL 1013 Perlweiß/Oyster white, RAL 7004 Signalgrau/Signal gray, RAL 9005 Tiefschwarz/Jet black, RAL Umbragrau/Umbra gray, RAL 9011 Eisengrau/Graphite black, RAL 7047 Telegrau/Telegrey. Image: courtesy RAL Color International. (right) Paint Alpineweiss on wallpaper Photo Ralf Weber.

from them. A glance at the curricula of European architecture colleges reveals a widespread absence of courses on color. This is in stark contrast to interior design or most design disciplines: here, color is an integral and essential part of the training. Interior design thrives on atmosphere: it requires materials that can be experienced by the senses and thus more than just conceptual form. A lack of knowledge about the effect of color in the perception of space and form leads to design risk avoidance. One thinks that one can have a higher margin of error with gray and white tones than with complex color compositions. However, visual impoverishment is the accepted consequence. The same risk aversion is a common denominator among many investors. The majority of planned buildings today no longer have individual clients who are approachable as persons who define the design specifications, but rather anonymous property developers for whom profitability has priority. Architecture has long since become a commodity, a form of investment. The resale risk and the loss of product value are reduced with tones that are as neutral as possible, this is, for instance, also true in the US automobile industry where white is the preferred color. Since the industry wants to appeal to the most universal taste possible for sales, standardization and a turning away from regionally typical materials and colors are the result. It is not for nothing that the plaster color Alpina White is one of the most popular colors among investors, and that the table of the 15 most used colors published annually by the German RAL Color Institute lists primarily gray and white shades (Figure 9).

Exceptions, which show that regional color palettes can certainly be applied, are urban areas that follow design statutes, for example, the Vauban eco-settlement in Freiburg, Germany or the Hafencity in Hamburg, Germany. These rules regulate not only characteristics of the building forms but also the color scheme.

1.4 | Design process: Concept instead of materiality

What are the reasons for the above-described tendency towards an increasingly monochrome planning world? In my opinion, the main cause lies in the change of the cognitive process of the planning process itself. Compared to the traditional building and design process, in the last century more and more intermediate planning steps have been added from the initial conception of a building to its realization.

Historically, the traditional design process has always taken place “within the material”. Ideally, simple buildings within a certain typological canon that changed only very slowly in evolutionary terms, such as residential buildings, required hardly any initial design drawings or even design models. That there would first be a design and then one would search for a suitable material was unthinkable in traditional indigenous architecture, but also in the palatial and sacred architecture of many cultures. Buildings were constructed from certain proven and regionally available materials. Thus, the first planning

ideas for a building took place within a possible range of materials that were very narrow for certain components—form and material-formed design units. Exceptions were sacred or palace buildings, where substitute materials were often sought to simulate the appearance of another material for reasons of cost. One example is *stuccolustro*, which imitated marble, but soon acquired a material independence without being considered an inferior substitute material. Color-treated plaster, which was also often painted, also formed such a class of materials.

Traditionally, the planning process was based on a certain range of materials from the very beginning; it is rather unlikely that thinking about the construction and materials, and thus the final appearance of the building, began only after the functional and spatial design was completed. Even though the working drawings of most buildings were executed in monochrome, the material used always existed in the designer's mind. Although the Gothic stone cathedral was shown in outline as a line drawing, this by no means implied a material-less form.

In planning and design processes used today, the material used is *rarely* a primary starting point. Planning processes usually begin with an analysis of the structural and urban status quo, the formulation of a formal concept, and the accommodation of the spatial program into it, or vice versa: as the development of such a concept out of the spatial program. Subsequently, decisions on floor plans and sections are used to develop a spatial concept, which must be translated constructively in the further planning steps and thus take on materiality. The material which primarily forms the textures and colors of the surfaces that, through reflection of light, shape the appearance of architecture and thus the tangible atmosphere of the building and its spaces, often becomes important at a relatively late stage in the design process. Materiality, mood, and atmosphere thus emerge—sometimes accidentally and not always consciously anticipated—as a consequence of the design, but do not *a priori* form its design-forming core.

The contradiction between atmospheric, that is, *lebensweltlich* (lifeworld) experience, and the planning process, which proceeds from abstract formal concepts, becomes clear. The fact that this dichotomy has repeatedly triggered discontent, albeit unfortunately more from voices outside the architectural community, can be seen in the debates of the 1970s and 1980s, in which sociologists such as Alexander Mitscherlich⁷ or journalists such as Jane Jacobs⁸ reacted vehemently to the development of internationally exchangeable satellite towns and the conversion of lively inner-cities into financial districts. Thirty years later, the German philosopher Gernot Böhme characterized architectural modernism as an international style of functionality, which, with its core idea of economizing

construction, rationalizing building processes, and universalizing typology, formed the pendant to capitalism as an economy of scarcity, but at the same time led to increasing unease among non-architects. In response to this purism derived from function, an aesthetic surplus was offered by the architectural style of postmodernism that developed in the 1980s and 1990s—a style that, according to Böhme, is characterized by “plurality and individuality, integration into historical contexts and recourse to traditional stylistic elements, and a return to ornamentation”⁹ (p. 42) Postmodern architecture, as a counter-program to white modernism, is again usually characterized by a new, sometimes very strong colorfulness. As well, another movement trending in architecture is a return to regional materials and traditional craft techniques. For example, the so-called critical regionalism of the Ticino architects Mario Botta, Fabio Reinhart, and Bruno Reichlin continues to be rooted in the concepts of modernism, but again thinks, designs, and builds “in the material” and the typical regional craft techniques (Figure 10).

The British architectural theorist Charles Jencks¹⁰ describes Postmodernism through the principle of double coding, that is, built meanings, which are intended for both architects and users. (Ultimately, postmodernism is as much conceptual as a compilation of architectural quotations comprehensible only to one's peers.) Thus, the experience of the user plays a stronger role. Böhme characterizes this development as a result of late-stage capitalist, aesthetic economy, in which commodities, which include buildings, acquire a staging value, an aesthetic packaging that satisfies desires beyond mere basic needs. Postmodernism becomes a style for staging, architecture becomes scenic, and a form of packaging for consumers—the building becomes a “decorated shed” (Venturi).¹¹ Color and material become part of the branding scheme, not least among architects themselves. The used materials are not necessarily determined by the function and construction or the urban context of the building, but from their recognition value: the signature style of the architect often determines the material. Just as art painters can be identified by the ductus of their brushstrokes, so a Frank O. Gehry building can be recognized by his signature aluminum cladding, a Zaha Hadid by the curved fiberglass panels of the outer skin, or a Sauerbruch Hutton by the color schemes of the facades (Figure 11).

The criticism, however, that material and colorfulness fall into the category of decor, that is, a form of superimposed accessories, remains for most of today's architecture. Contemporary Modernism, resurrected as a style after the interlude of Postmodernism, is also primarily conceptual. Design is based less on the user's *lebenswelt* experience than on concepts favored by the architectural profession itself. This dichotomy between the modes of



FIGURE 10 Robert Stern (left), Roy O. Disney Animation Building, Burbank, CA, 1994, <https://www.britannica.com/biography/Robert-A-M-Stern>; Mario Botta (right), Chiesa di San Giovanni Battista, Mogno, Switzerland, [https://de.wikipedia.org/wiki/San_Giovanni_Battista_\(Mogno\)#/media/File:Botta_Mogno.jpg](https://de.wikipedia.org/wiki/San_Giovanni_Battista_(Mogno)#/media/File:Botta_Mogno.jpg).

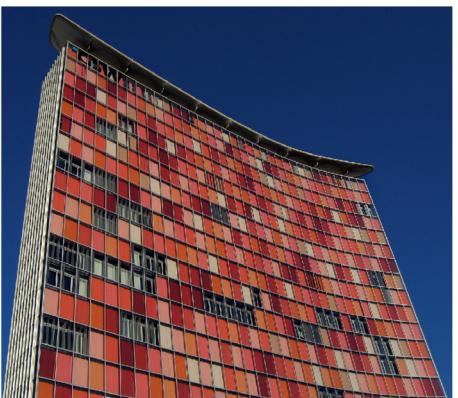


FIGURE 11 Frank O. Gehry (left), Disney Concert Hall, Los Angeles, CA, <https://www.terragalleria.com/california/picture.usca35319.html>; Sauerbruch Hutton (center), GSW Headquarters Building, Berlin, Photo Emanuele, Wikimedia Commons; Zaha Hadid (right), Innovation Tower, Hong Kong, <https://www.wikiart.org/en/zaha-hadid/innovation-tower-at-the-hong-kong-polytechnic-university-2014>.

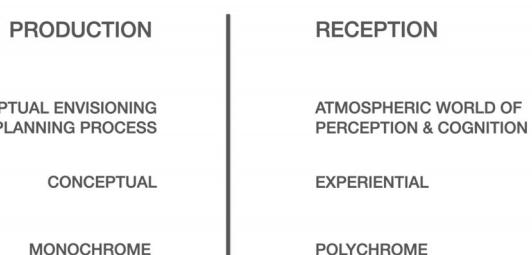


FIGURE 12 Comparing the design process (production) and the process of experiencing architecture (reception) as a contradiction between an imaginative design process and an “atmospheric world” of perception and cognition. Diagram Ralf Weber.¹²

production and reception also implies a detachment between the conceptual world of the designer and the lifeworld of the user (Figure 12). The American

sociologist Richard Sennett¹³ speaks of a loss of the connection of architecture to the human being from the onset of modernity to today. He asks whether architects actually ask themselves the question: “How do the ultimate users, i.e., the inhabitants of the houses, live in them?”

The second important reason for this detachment lies in the way of dealing with the mental process through which an idea can be envisioned. It is common to use both two- and three-dimensional representations in the course of the architectural planning process: one often starts with two-dimensional functional diagrams or even initial floor plan idea—both are not spatial. Sections, which are intended to aid in understanding height and construction principles, do not provide a spatial idea of the building or urban space, certainly not from the perspective of “being in space”. The same applies to the delineation of both facades or interior walls, which, as

projections neither convey an idea of space from the perspective of the user nor the actual three-dimensionality of the surfaces. At this stage of the planning process, the discrepancy becomes visible: one wants to create a three-dimensional world that can be experienced but uses inadequate two-dimensional simulation for the initial ideas. Furthermore, spaces are planned as if the designers were outside of it, although a scenographic design attitude from the perspective within the space would be quite possible. Another drastic change from two- to three-dimensional representation of a design idea begins with the fabrication of models. Often, these again allow only a non-realistic view from the outside, certainly not from the perspective of being within, but often from the bird's eye view of the designer. Interior models are used to test a concept that is already nearly finished, but do not function as a fluid, sketch-like medium during the design process. An architectural model rarely represents the material of the finished object, but acts as an abstraction of another material, in this case, for example, cardboard, wood or styrofoam, similar to the line drawings of the designs, which do not represent the material of the walls. Working drawings for the realization of the building (here, too, one is still designing and modifying) are again projections in which materials are symbolically represented by different types of hatch marks. In three-dimensional digital renderings, too, generic material wallpapers from the digital libraries of the drawing programs are ultimately "mapped" onto the body surfaces with interchangeable arbitrariness.

With each step of applying different media in the planning process, the complexity and thus alienation of the respective design state from the original conception increases. In his theory of the (artistic) working process as making and matching, Ernst Gombrich¹⁴ has shown how much the medium used in each case limits the boundaries of the imagination. He describes the artistic creative process as a process of schema and correction: as an adaptation of artistic expressive abilities to personally and socially developed schemata. It is not the imagination that decides, but the individual ability of the artist to express something in a certain representational scheme. The better the skills are, the more scope there is for the imagination. In the end, the artist will represent only what an artist can represent and mentally comprehend. (In his own way, Gombrich thus anticipated Neil Postman's catchphrase "The Medium is the Message" long before.) If one applies this theory to a step-by-step planning process in respectively changing media, the limitations of the imagination thus increase with each change of the medium of imagination. Thus, the cognitive discrepancy between idea and its planning visualization increases. At some stage in the process, the planning

visualization becomes the guiding idea—*the leitmotif*, which however, often no longer corresponds to the original idea, since this could never be developed to its full extent precisely because of the limitations of the media used. The process of alienation from the original idea increases with each visualization stage—new conceptual schemes within the limits of the respective decreasing bandwidth of ideas are formed. The more phases the design process has, the more the initial ideas become constrained. A design process with fewer phases, as in traditional design in building, does not impose these limitations and is therefore more grounded in the reality of the material.

Another difficulty in the planning process is that at its beginning there are often no spatial images of a building or a room in the mind of the designer, but these develop only gradually from working with diagrammatic representations. The very planning stage, in which a spatial and only later a material structure is developed from spatial programming processes, only takes place when large parts of the concept have already been developed. Materiality (and thus also visible colorfulness) arises from an abstracted concept, but not from an initial spatial idea: the idea of materiality arises not so much from a will to design, but from the process itself.

Of course, there are other schemes of design processes, in which one starts with a central idea, which already contains a conception of Gestalt and thus material qualities at the beginning. In this more or less scenographic process, the switch to other cognitive modes of imagination takes place only later in the process, when the main idea has already been formulated. In this type of process, the original idea and planning conception are closer together.

Another reason for the cognitive distance from a life-world conception is that the forms of representation used in architecture, apart from perspective, all produce ideas for which one assumes a learned understanding of conventions and codes. Floor plans and sections are projections, isometry, and axonometry are representations in which one looks through the walls of a building from the outside, diagrams work with codings, which do not simulate the visual habits of the user.

1.5 | World of experience versus conceptual world

As a consequence of the conventional kind of conceptual planning procedures, our built environment is based on the experiential needs of the beholder, but rather is a result of conceptual thinking. (This is especially obvious in the common practice in student projects in

architectural education.) However, as Weber has shown in his *Aesthetics of Architecture*,¹² the sequence of perception and judgment does not primarily run along the path of concepts or values acquired through experience, but starts with sensual perception and spontaneous judgments based on it, before concepts and values take hold and form the final overall judgment. We can categorize immediate value judgments based on sensory perception as aesthetic judgments in Kant's¹⁵ tradition and call them judgments based on atmosphere or spatial mood as in Meisenheimer¹⁶ who makes the distinction between *Körper und Leib* and Böhme's⁹ interpretation.

Even if it is not the immediate intention of the design process, a perceptible atmosphere nonetheless results from any realized design. Even if the environment is envisioned in a "dematerialized" way in the design process—meaning that form, and thus also space, has a primacy in the initial conception—its perception is always based first on a recognition of materials through color and texture. Even if the resulting atmosphere of a building or an urban space should be perceived as incidental or even ignored by planners, it inevitably arises in the eye of the beholder, because the environment is perceived as a reflection of light on materials (color, texture, shadow) and thus possesses a richness of messages that we cannot find in pure geometric form when its materiality is neglected in the design process.

So why should not the design process incorporate this atmospheric effect from the outset? Buildings and spaces have atmospheric design properties that are perceived directly through the senses. One example is the tectonic effect of buildings, that is, the perceived distribution of visual compositional masses and dynamic directional properties. Whether buildings, their components, and decorative elements appear light or heavy, depends on the effect of articulation and material, light, and thus color. Human well-being depends strongly on the mood of the spaces in which human life takes place. Different human activities are supported or hindered by different light and color moods, because color and light are mood modulators. Last but not least, atmospheres triggered by color and material have an influence on health.

Since August Schmarsow,¹⁷ who defined architecture as the art of spatial design, space has been one of the central concepts of architectural theory. But how space is defined varies widely. Böhme writes that space is defined by architects primarily as Euclidean, that is, measurable space, largely ignoring the distinction between *topos* or *spatium*, that is, space as topological and metrical space. In the philosophical concept going back to Descartes, also described as Cartesian space (*spatium*), space is described by dimensions and coordinates in a reference system

and, in contrast, locational space (*topos*) is defined by positional relations to each other and to the perceiving human being. While the former concept is an abstract notion, the *topos* represent a space in which one resides. It thus represents a living space. Here, again the dilemma of designing becomes obvious: one cannot be bodily present in one's imaginative space during the imaginative process—the space in the design is always a conceptual space, but not a lifeworld space. *Lebensweltlicher Raum*, Böhme writes, is described by categories that represent our feelings—by spatial atmospheres—the moods of space. "Atmospheres are tuned spaces."⁹ (p. 47).

1.6 | Re-materialize the material world in thought

The subordinate inclusion of the material in the design in today's planning practice certainly has to do with Semper's understanding of architecture as clothing: as if architecture were something that could be clothed according to respective fashions. The distinction between building and architecture has been propagated since the 19th century, primarily by John Ruskin,¹⁸ who proposed that architecture is essentially an immaterial artistic idea and building is very deeply rooted in the everyday, the handicraft, the material.

For the purpose of inserting color again at the beginning of the design process, one should think from the outset in terms of atmospheric situations, for which spatial and constructive correspondences must be formulated in the further design process. Defining the fundamentals of such a design process is difficult, because atmosphere is described in adjectives, while space is described in geometric concepts such as dimensions, proportions, accessibility, physical-technical parameters of light, temperature, etc. To formulate an equivalent, a translation of atmospheric, that is psychological, into physical properties seems too complex. Psychological aesthetics would be called upon here; however, unlike designers, architects usually have little interest in psychological studies that seek to understand the effect of their design by users.

Is it possible to call for such a radically different approach in the design process instead of a process that has alienated architects from "thinking in the material"? Yes, one can: other design professions are leading the way. Stage designers think atmospherically from the outset, especially in terms of the moods a space is meant to evoke. Product designers think haptically from the outset, this would not be possible in a "material-less" process. An object is always made of certain materials and therefore also conceived in these materials. A landscape and

garden designer must think “in the material” from the start, that is, in vegetation and space, an example being Pückler's¹⁹ writings on the staging of the landscape. In interior design, museum, and exhibition design, the so-called scenographic approach gains more importance, when an experience is to be staged, “set in scene”. Such approaches also exist in architecture: the Swiss architect Peter Zumthor²⁰ explicitly points out the connection of architecture with physical life. For him, architecture is ideally a shell and describes his essential design parameters in his book *Atmosphären*—The goal is to make atmospheric space the object of design. Böhme concludes that architecture gets close to stage design. But the design of lifeworld should anticipate what takes place in these worlds. Thus, lifeworld spatial design is also always scenographic.

It is necessary to consider ways of thinking that are intrinsically holistic and do not separate the material from the concept of imagination; as well as ways in which forms imagined in design are always made of materials that naturally possess texture and color. Contemporary architecture rooted in regional building traditions, such as that of the Swiss architects Gion Caminada or Peter Zumthor, automatically include materiality in the design. Why should the architecture of an international style not also be able to be designed atmospherically?

Ultimately, it is a matter of recalibrating the planning process to place focus on the user experience.

ACKNOWLEDGEMENT

Open Access funding enabled and organized by Projekt DEAL.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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How to cite this article: Weber R.

Monochromatic design in a polychrome world.
Why our cities have become increasingly gray: A dichotomy between production and reception in architectural color design. *Color Res Appl.* 2023; 48(5):543-556. doi:[10.1002/col.22876](https://doi.org/10.1002/col.22876)