

POLYCHROME CERAMICS, ARTISTIC DIAGNOSIS AND RESULTING AMBIENCES IN A MARINID MOSQUE, ALGERIA

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1. Introduction

Architectural heritage carries influential, powerful, symbolic, aesthetic and visual dimensions, inherently essential to the cultural identity of a people [1]. A sustainable approach to architectural heritage starts with its acknowledgment, documentation and preservation. Furthermore, this approach may enable architectural heritage to act as a vehicle for interpretation in contemporary design.

Algeria, in North Africa, is a land of rich and diversified architectural heritage built by its successive occupants; they included the Phoenicians, the Romans, the Arabs, the Spanish and the Ottomans and concluded with the French [2, 3]. In this context, the city of Tlemcen, located in the northwestern part of Algeria, remains one of the few places that still houses major representative monuments of Islamic art in Algeria. Its proximity to Spain and Morocco explains the presence of numerous vestiges whose architecture attests to a thriving art production [4]. Marcais [5, 6] documented the Arab monuments in Tlemcen, highlighting the valuable architectural heritage of the great royal city remains but, at the same time, stressing the need to preserve them.

The city of Tlemcen owes its Islamic heritage to its successive dynasties: the Almoravids (1040-1147 CE), the Almohads (1121/1147-1269), the Zayyanids (Abdelwadites) (1235-1556), and most particularly the Marinids (1248/1269-1465) who excelled in the art of faience mosaic [7-10]. Tlemcen's main monuments, which span the period from the thirteenth to the middle of the fourteenth centuries, have often been compared to the Andalusian monuments of Granada in Spain [11].

The Marinids in particular, during their quarter-century-long reign over the city, endowed Tlemcen with several monuments [12]. They are the *Sidi Boumediene* compound, the *Sidi Al-Halwi* Mosque and the entire city of *El-Mansourah*. One key feature, that established the ornamentation of this heritage, is the polychrome decoration with inlaid glazed pottery called *mosaic of faience* (also referred to as *zellij*). The *zellij* is complemented by stucco and wood decoration.

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Indeed, in architecture, everyone remarks on the colorful aspect of Islamic art. Blair and Bloom [13] state that the use of color deliberately destabilizes a static geometrical design by introducing a new dynamic in architecture, while Renan [11] compared the wall decorations to colorful vertical carpets (Figure 1). Islamic religious buildings are characteristically devoid of furniture. Ultimately, their surface treatment and the importance given to the choice of material coatings (ceramic for example) becomes of prime importance.



Figure 1. Wall decoration with faience mosaics inside the Madrasa of Sidi Boumediene, Tlemcen, Algeria. Source: Authors.

The colors enhance the character of the building, contributing to its image and its spatial ambience, allowing appropriation of the space and modifying the atmosphere of the place. According to Léger [14], color can totally change the atmosphere of a place by creating a new space. The simple act of coloring a wall has the power to adorn it, make it stand back, advance, or even destroy it.

The mural decorations in polychrome ceramics, moreover, provide a high aesthetic quality to architectural monuments. Several specialists of Muslim Art consider these mural decorations as full-fledged works of art [10, 15-17].

Colored decorative motifs allow an expression of patterns. It gives them a particular appearance and depth, and therefore perfection [18]. Accordingly, the colors in this Marinid ornamentation enhance the building character, contributing to its image and its spatial ambience. On walls, the play of geometry combined with colors makes these panels a work of abstract art, as Islamic art is devoid of figurative forms. According to Barnett's guide [19], non-objective art, unlike figurative art, depends on representative forms. It relies entirely on the emotional significance of color, form, texture, size and spatial relationships.

In this regard, the polychromatic compositions of the ceramic mural decorations in the Marinid *Sidi Boumediene* Mosque and their resulting ambience, offer a fertile field of investigation, which has yet to reveal all its intrinsic spatial and aesthetical value.

2. Objective of study and research methodology

The aim of this study is therefore to investigate the unexplored role of color ceramics in one work of representative architectural heritage belonging to the Marinid dynasty; *Sidi Boumediene* Mosque in Tlemcen, Algeria. The study has two specific objectives; first to inventory and document the colors of the mosaic of faience panels and analyze it as an artwork and secondly, to analyze the composition of the ceramics' color and their resulting ambience.

The first objective, beyond the inventory of the colors used, consists of an artistic analysis of the mosaic of faience panels and floors, considered as works of art by several specialists of Muslim Art [10, 15-17]. The approach is based on the aesthetic and artistic study of an artwork, as developed in Barnett's guide [19]. The Barnett analysis consists firstly, in placing the work studied in its historical and cultural context; when, where and why was the work made? By whom and for whom? The analysis also involves examining the material, its limitations, the description and comparison of the colors employed in each polychrome component.

The second objective aims to analyze color composition and its resulting ambience. This focuses on the effects of colors when juxtaposed, as their appearance depends on how they are placed in the composition alongside other colors. The effect the arrangement of these colors has on the ambience created in the space is also addressed. For this purpose, the analysis relies on a combination of approaches including the color analysis from Barnett's guide [19]; the laws of color contrast established by Itten [20]; and Goethe's treatise of colors [21]. The color analysis in Barnett's guide defines the artistic color concept through Van Gogh's study of his own artwork as the "marriage of complementary colors, their mixture and their oppositions, the mysterious vibrations of tones in each other's proximity, to express the thought behind a brow, by the radiance of a bright tone against a dark ground" [19]. The laws of color contrast (established by Itten) analyze the three dimensions of color: the tint (color), the value (brightness), and the saturation level (purity or vividness of the color) [22, 23], and attempt to bring out the relationship between these dimensions using color contrasts based on Itten's work [20]. Goethe's treatise of colors [21] develops¹ the effects of colors, such as in distant-close, warm-cold, by analogy with natural phenomena and the environment (sky, sun, fire etc.).

The integrity of the information and the authenticity of the colors explored hereby, are based on three sets of information. First, travelers' tales were considered, such as those by *al-Hasan ibn Muhammad al-Wazzan al-Fasi*, better known as *Leo Africanus*² [5, 24]. Second, surveys and construction drawings dating from the colonial period were investigated. The monuments of Tlemcen and their surroundings were first identified and drawn by military engineers and scientific explorers. Starting from 1872, surveys were undertaken by Edmond Duthoit and Edouard Danjoy, followed by the then-formed Service of Historical Monuments [4]. Finally, field investigations were carried out, using in-situ observations and photographic surveys.

3. The polychrome ceramics in the *Sidi Boumediene* Mosque

3.1. *Sidi Boumediene* Mosque; case study

The relatively well-preserved architectural ensemble of *Sidi Boumediene* Mosque, where polychrome ceramics were extensively used, was selected for this specific

study. An additional reason for this selection resides in the spiritual value bestowed upon this building by worshipers and visitors alike.

The *Sidi Boumediene* Mosque compound, located in the neighborhood of *El Eubbad* within the city of Tlemcen, was built in honor of *Abu Choaïb Madyane (Boumediene) El Andaloussi*. *Boumediene* was a teacher, writer, poet and an eminent reference of Sufism in Algeria and the Maghreb. The architectural ensemble includes the *Sidi Boumediene* Mosque, built in 1339 by the Marinid Sultan, Abu Hassan Ali. It also includes the tomb of *Sidi Boumediene* himself, a *Madrassa* (religious school) built in 1347, and a small palace [7].

Sidi Boumediene Mosque stands out as a landmark and an attraction in the city of Tlemcen. It is the lavish ornamentation, composed mainly of flat ceramic decorations that make this building stand out as a remarkable heritage legacy [11]. The mosaic of faience, in general, covers the base of the walls, the floors of the courtyards, the porches and doorframes, as well as the upper part of the minarets. The artistic use of color is superimposed on the ceramic tile work with geometric and floral arabesque forms. Color creates specific ambiances while highlighting architectural components, exposing spatial richness and a distinctive prowess in its construction [24].

The visual attractiveness of the colored ceramics, the geometry of the patterns, and the fractals in this important heritage have been broadly recognized in *Sidi Boumediene* Mosque's architectural heritage. However, little has been done in terms of studying the design and arrangement of the colors and their resulting ambience. This shortcoming reinforces the main objective of this research, which is to explore the polychromy.

3.2. Color and materials in the ceramics of *Sidi Boumediene* Mosque

In *Sidi Boumediene* Mosque, the dominant pigments used, as described and classified by Marçais [5], are as follows:

- White: half-matt, slightly greenish, very small cracks.
- Manganese brown: generally used very thickly, so as to form an almost black tone.
- Yellow: an iron yellow, rather impure and produces a spotted yellow.
- Copper green: has an intrinsic value and a very variable tone. In the same context, it can appear as very dark and very deep, or very clear, leaning towards celadon or turquoise colors.
- Cobalt blue: quite rare. It does not seem to have been used in Tlemcen before the second half of the sixteenth century; it is clear and almost pure.

The mosaics of faience are the heirs to the Byzantine mosaics, which were made of colored glass paste and smalts. The Marinid mosaics of faience are made from multi-colored tiles on stanniferous enamel. They form an assembly of varnished pieces with different tones, cut according to a template and recessed into each other.

3.3. Description of the polychromatic elements of *Sidi Boumediene* Mosque

The chromatic analysis of the colored component elements of *Sidi Boumediene* Mosque follows the visual encounter that a visitor may have in gradually discovering the site. In exploring the site, viewing both at a distance and close-up, induces different perceptual experiences. Hence, the mosque has been sequentially explored, starting from external elements such as the porch and its details, to the stairs leading to the

entrance. Once inside the compound, the focus is then centered on the courtyard and its colored paving. The minaret, visible from all perspectives, is addressed as a separate component.

1) The monumental entrance to the mosque consists of a porch adorned by a seven-meter high horseshoe arch that encloses it. Eleven steps covered with colorful mosaics, ultimately provide the arcade entrance with a majestic base (Figure 2).

On the front porch, a triple festoon of brick, enameled with a green netting pattern, divides the frame into two parts. The first is the keystone, formed by a large circular border around the hanger. The second is formed by two spandrels. The finishes of this framework, the impostes that support it and the spandrels are in the form of arabesques. They are in floral decor with interlacing double palms, regularly repeated in mosaic tiles using four tones: white, brown, green and yellow iron. This ensemble is framed by a green-toned ceramic net (Figure 3).



Figure 2. Monumental access porch of Sidi Boumediene Mosque. Source: Authors.



Figure 3. The front porch with a triple festoon of bricks inlaid with an enameled green netting pattern. Source: Authors.

The frieze that crowns the portal is decorated with inlaid bricks of brown enamel plates and green bands, above five radiating rosettes around eight-sided stars (Figure 4). The intrados of the arch carries regular geometric white, yellow and brown ocher coatings. An epigraphic band, in black on a white background, announces the porch. It is dedicated to Sultan Abu al-Hassan and surmounts the floral decoration (Figure 4). In most cases, the *jafr* or “science of letters” is a poem devoted to the glory of God. In decorative Muslim art, it is common to incorporate Qur’anic verses, or a Hadith of the Prophet, or simply a poem. The subtle ornamentation of the porch marks the threshold that gives access to an introvert interior.

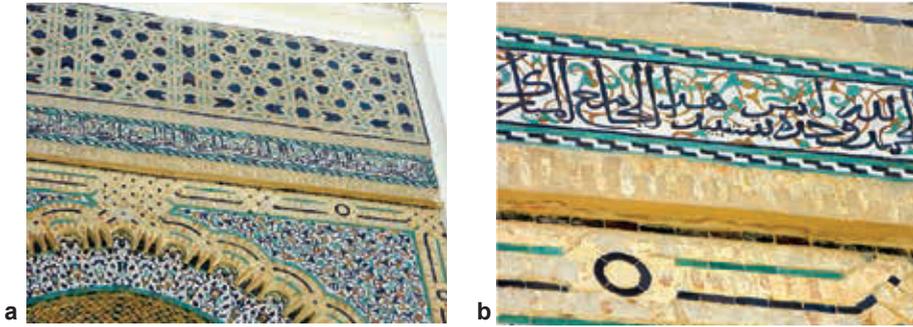


Figure 4. Distant view (a) and close-up view (b) of the epigraphic inscription detail in cursive composed of arabesques. Source: Authors.

2) The square courtyard of the mosque, delimited by the arch of the prayer hall in front of the main entrance, has an onyx basin for ablutions at its center (Figure 5). This courtyard is covered with simpler mosaics than the more ornate porch.



Figure 5. The courtyard of Sidi Boumediene Mosque, with polychrome mosaic of faience. Source: Authors.

3) Similar to the porch and the doorframe, the minaret located at the northwest corner of the mosque, is richly decorated with polychrome mosaic (Figure 6).

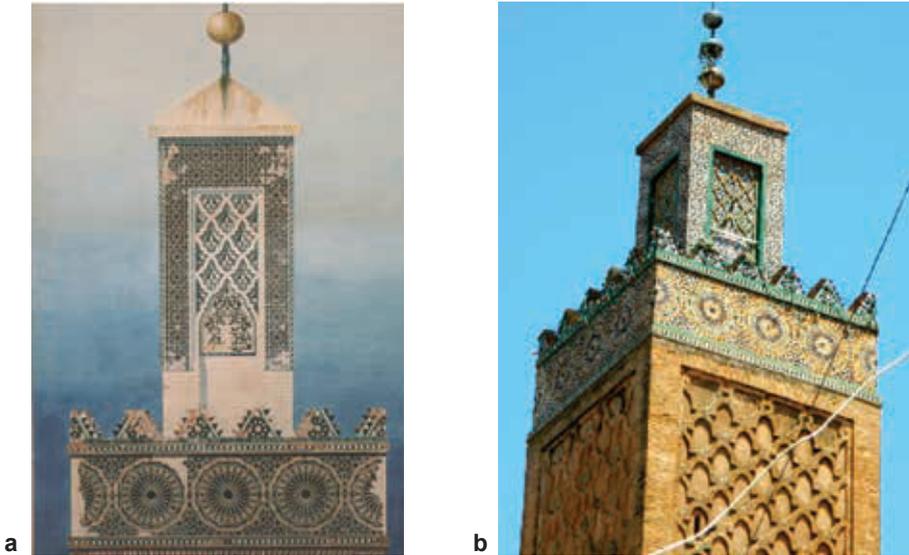


Figure 6. The top part of the minaret of the mosque with a geometric and polychrome decor of rosettes. Source: Figure (a): water color by Duthoit 1872 (authorized by © Ministère de la culture (France), the Médiathèque de l'architecture et du patrimoine (Paris)); Figure (b): Authors.

4. Chromatic composition of the architectural elements and the resulting ambience

The tonal range of the ceramics that cover the architectonic elements of the mosque is not very varied. The resulting vivid effect lies in the purity of each color and its value compared to the other tones. The color analysis in terms of hue, saturation and brightness that are carried through, identify the colored features used in the different architectural elements.

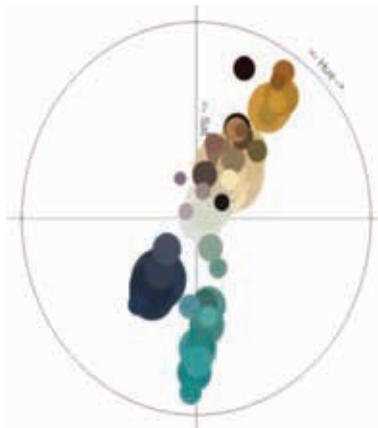


Figure 7. Chromatic survey of faience mosaics used in the architectural elements.

The shape and size of the colored spots in Figure 7 differ from one element to another. The purest hues are located on the outer fringe of the circle and become less pure, or less saturated, as they move further away from the circumference. Hence, the green and the ochre-yellow are both pure colors and similar in brightness. When the colors used are compared with each other, they form different contrasts.

As Indicated in Table 1, the encounter with colored sets can be appreciated in two ways. From a distance one can contemplate the colorful ornamentation and obtain a general overview with an optical mixture of colors, resulting in a specific atmosphere (Figure 8). Up close, the intricate designs and the variety of their colors can be appreciated differently [26].



Figure 8. The décor in rich polychrome ceramic of the porch contrasts with the surrounding white and sober walls. Source: Authors.

Both inside and outside the building, the choice of decorated elements appears an intentional and deliberate act. Generally, they are representative and allegorical elements with complex scenery and can be contemplated from afar. The colorful appearance attracts the attention because of the foreshortening effect of the colors. These various elements modulate the perception of the polychrome mosaic composition, according to an optical forward or withdrawal movement.

4.1 The porch and its components

The access to the mosque is the subject of a particular staging and is enhanced by the magical work of colors (Figure 2, Figure 3). This richly colored frontage serves as an announcement and a preamble to the monument. Its colored appearance contrasts with the white background of the adjacent walls (Figure 8, Figure 10) which captures and reflects the light.

Color highlights the architectural objects and creates animation, particularly in an achromatic environment [27]. The resulting impression from the color combinations can be best evaluated through an analysis of the different types of chromatic contrasts. In this regard, the warm/cold contrast above a neutral background (Figure 5, Figure 9) causes a perceptual effect of relief, allowing only an approximation of the object, and thus suggesting a strong invitation to find out more about the object itself. Furthermore, the colored spots of the porch (green, ocher-yellow, black and white), placed side-by-side, provide a pointillism effect.

This optical phenomenon is not that of *camaieu*, where colors are closer in their tonalities and fused together by the brain. From a distance, the colored spots with different tones create an optical mixture in the observer's eye: the human eye tends to accentuate the differences by eliminating similarities [27]. This color combination reinforces the repeated colors and their after-images. It synthesizes an overall picture of warm hues [28]. Noted color theorist, Josef Albers [29], explains that color is the most relative element in art and astutely observes how some colors appear to shift in appearance when placed next to others.

Likewise, the clear/obscure contrast and the contrast in brightness provide the walls with flickering effects. For instance, the walls are enhanced by the ocher-yellow spots which gleam in the sun and thus highlight the brick color. This interplay of colors confers the polychrome adornment with qualities of brilliance, warmth and colorfulness. Similarly, the irregularity of the small mosaic pieces catches the light. This creates a play of shadow and light, making the walls scintillate and vibrate and suggesting a light volume.

The general view helps see how the details fit into the entire monumental gate. These architectural details are described and further analyzed below.

4.1.1. *The calligraphy above the porch decoration*

The viewing distance transforms the perception one has of the building. From the overall vision and physical masses, the visitor moves to the graphic universe of the ornamentation. The cursive calligraphy is one element in the composition of intertwined leaves and stems (*tawriq*) in a set of curves and counter curves. This filigree foliage decor is made up of a succession of spirals inscribed in tangent circles (Figure 4). The colored (green and ocher) floral patterns mingle, intertwine and contrast with the black calligraphy. According to Paccard [18], in a similar way to colors, floral forms create either continuity and complement each other, or they create a contrast, which makes them stand out. This visual phenomenon suggests ingenuity and synchronization.

Similarly, the colors used are very dark brown, white, green and ocher-yellow. On the epigraphic frieze, the dark tone is reserved for the calligraphy. The latter emerges in contrast with the clear colors of the *tawriq* patterns (floral decoration). The black and white contrast (clear/obscure contrast) highlights the calligraphy. It also highlights the green color of the foliage, which becomes a key element in the composition. This entire setup is composed of arabesques on a white background.

In this floral composition, the color contrast is greatly pronounced. It creates a raised pattern effect. The calligraphy and the floral decor, in dark brown, seem to stand out from the white background (contrast between advancing and receding colors). "The clear/obscure is needed to develop not only a sense of proportions, but also a connection between the dark form, thought of as positive, and the white as negative" [20, p

40]. For painters, white and black are the strongest means of expression for light and darkness. From the point of view of their effects, white and black reflect the ultimate opposition or contrast [20].

4.1.2. Polychrome decoration of the arch: keystone, impost and spandrels

In the flower arrangement that adorns the keystone and the impost of the arch, the colors of the leaves are set in yellow, green, black and white. The color contrast (hue, temperature and brightness) is visibly accentuated. The dark brown floral decor stands out from its white background. It creates a counterbalance effect (Figure 9).



Figure 9. Distant view: Figure (a), and close-up view: Figure (b) of the floral decoration: mosaic tile work with a combination of leaves and stems interwoven into a set of curves and counter-curves. Source: Authors.

The black on white makes the shape smaller, while the tone-on-tone of the color with its background makes it appear infinite [27]. In addition, color is never perceived alone, but always according to its setting. "A color that appears dark in one palette, for instance, may be judged lighter in another context, while a hue that appears bright in one palette, may appear less saturated among other colors" [30, p. 7]. The black graphic design of leaves is accentuated, because clear colors appear brighter on a dark background and darker on a lighter one. The green and ochre-yellow tones, in proximity to the black leaves (thus creating a dark background), appear larger and radiate outwards. However, they appear duller close to the white leaves, therefore creating a compensation effect.

The intrados and spandrels are an ensemble of stylized motives. They are underlined by a series of green strips, within which geometric and floral motives are alternated. These green strips accentuate the arch and envelop the scalloped brick, as well as other details of the porch. They also strengthen the edges of the composition. The principle of the frame is derived from Byzantine design. However, for Muslim artists, the frame could cut an endless network of patterns. Paccard [18] designates this

a**b**

framework, which cuts the patterns in random places, as a window that opens onto an unlimited world.

4.1.3. Polychromy of the stave of the bow or intrados

Within an architectural context, color changes its appearance. It becomes rather free flowing and mobile, contrary to its stable and static nature [27]. In this context, geometric motifs are combined with vegetal patterns. Indeed, on the surface of the intrados (Figure 10), there is an oblique weft. The latter creates brown diamonds of identical shape. The resulting geometric characteristic of the diamonds, and depending on their direction, appears to make them interlock with each other.



Figure 10. Underside geometric design of the arch (a), and as documented in 1872 (b). Source: Figure (a): Authors, Figure (b): water color by Duthoi 1872 (authorized by © Ministère de la culture (France), the Médiathèque de l'architecture et du patrimoine, Paris).

These black surfaces are surrounded by ocher-yellow stripes. Their arrangement is based on a clear/obscure contrast. This results in a play of light, shadow and relief. According to Itten [20], light colors tend to recoil, while dark colors move forward. At the same time, this combination of tones designates a contrast of quality. The latter is the contrast between the bright yellow ocher and the dull brown, because of its mixture with the black. This further accentuates the brightness of the ocher-yellow and provides it with the brilliant effect of the gold color. The Marinids yearned for the golden color, as it influenced happiness and continuity [31]. This panoply of colors enhances and enriches the white plaster coating. It generates a graphic of the grids, with a play of light and shadows that animate and enliven the arc.

On the intrados, the combined diamond-patterns are geometrized vine leaves. They are called “shoulder and step”, (*ktaf ou darj*) [18]. The shoulder is the curve and the step is the small right angle that succeeds it (Figure 10). The intersection of broken lines determines a spearhead shape. The motifs are highlighted by a white outline, emphasizing the design of geometric leaves. In the adornment of the intrados, the *ktaf* and *darj* grid is essential. It serves as a structure for the floral decoration. The strip

frieze on the leaves acts as a counterpart. It is accentuated by the use of contrasting colors. It creates an effect referred to as a 'counterbalance of values' [16], in the same ceramic mosaic panel.

The yellow palm leaf, placed near the brown one (almost black), is added to the floral composition of the intrados. It affirms the clear/obscure contrast in addition to the quality contrast. It is the opposition between the saturated bright yellow ocher and the dark brown, considered as a dull color [20]. In this case, the yellow color illuminates the chromatic ensemble. It replaces gold, gild and spark. It represents the energy and the wealth of the Marinid dynasty. In this case study, yellow is similar to the color of the brick and consequently creates harmony.

In this composition, the complementarity of shapes is associated with an opposition between two values or two colors; black and white (the white on black highlights the lines of the pattern), raw brick and glazed brick. The function of this opposition is to disrupt the relationship between form and background. This combination of shapes and colors allows the transformation of the architectural context into a lively and significant space.

4.2. The stairs

A staircase, allowing access to the mosque, leads to the monumental door. Eleven steps provide this arcade with a majestic base (Figure 2). The stair risers are decorated with a mosaic of small multicolored diamonds. The patterns are totally different from the rest of the porch decor, but their tones are identical. This chromatic unit enables a visually pleasing continuity with the architectural elements [18]. The colored fragments in diamond shapes are smaller than those that adorn the courtyard of the mosque. Framed by a green ceramic surround, they are the unique decoration of the staircase.

The green, black (dark brown) and ocher-yellow colors enhance and contrast with the white marble steps. The latter illuminates the space through its high level of light reflectance. Similarly, the polychrome decoration contrasts with the neutral tones of the sidewalls that flank the stairs. These colored arrangements break the monotony of the long white walls.

4.3. The courtyard paving of the Mosque

The subtle ornamentation of the porch and the stair risers mark the threshold to an inward focused interior space: the square courtyard of the mosque. The decorated facades are introverted, inwardly facing. They surround the faithful on all sides, to form a "box of dreams", in which everything is wealth and poetry [16].

The courtyard is covered with mosaics on a square grid (Figure 5). Much less complex than the ornate porch, the floor inserts are composed of small diamonds of various colors, organized in 45° diagonals. They are multiplied to infinity, interrupted only by the walls. Tiles are assembled side by side and arranged diagonally in rows of diamonds with the same nuance. They are also set in bands, through an arrangement of tones: manganese brown, copper green, iron yellow, and white. The diagonal bands, joined to each other, form a checkerboard design, thus highlighting a grid floor plan. The square is a basic geometrical element that can be multiplied infinitely and forms a grid. The extension of motifs is interrupted by frames or friezes, beyond which they appear to pursue their invisible repetitions.

It is important to note how colors are the common denominator to both surfaces; those of the ceramics covering the floor of the patio and those of the porch. This produces a harmonious continuity. In this assortment of grids and shapes, there is an aesthetic unity and color is one of the items that ensures this unity. "Color palettes offer a way to unify the interior with the exterior and can visually connect one interior space to another." [30, p.7]. The formal design of the pavement, where geometry is associated with color, plays a contrasting role and highlights the fountain in the middle of the patio.

As discussed earlier, color combinations between light (ocher-yellow, green and white) and dark (black) tones create a weaving effect. The strips of dark diamonds print their trail on a white background. Each tone acquires a value as opposed to another tone. There is a whole range of variations on the weaving principle, with interesting similarities found in the textile arts [16].

In addition, the accumulation of patterns and the incessant repetition of the same form cause an optical effect of scintillating rotations, which make the ocher-yellow shine. The decor encases the entire floor surface, like an enveloping membrane. The relation between colors provides an impression of movement. The affinity between colored surfaces and the contact between tones makes the color a plastic work of art.

At the pavement level, color creates a uniform frame effect, a lattice that enhances the geometry. The combinational logic of colors inside this frame creates visual effects, accentuating the perspective within this architectural space. Contrasting colors (black, white and yellow) accentuate the design of both frames and patterns. The results are optical phenomena of vibration, because the eye is often undecided between clear and dark forms.

The frame is a linear geometric distribution of these compositions, creating a network combination. For the viewer, the visual result is a space in dynamic motion. The latter is enlightened by white, illuminated by yellow and punctuated by green. The black serves to emphasize and express these nuances. Yellow is considered to be the warmest color. Under the sun, it shines and reflects daylight. It procures a bright atmosphere, a warm ambience, and engenders a sense of belonging to the space [21]. Yellow is a color that gives a feeling of warmth and well-being; it is an active color and its role is to illuminate this space [21].

The colored floor is open to the sky. It decorates the sparsely furnished space and is darker than its monochromatic surroundings. Principally, it highlights the central patio space, accentuates its stability and provides a recognizable landmark for visitors. The color difference between the ground and its flanking sides allows the contours of the architectural elements, such as the embrasures and pillars, to be traced.

4.4. The Minaret

Well above the architectural ensemble of *Sidi Boumediene* rises the minaret at its northwest corner (Figure 6). The main vocation of this pinnacle is to provide the *muezzin* with a higher point for the five daily prayer calls. It also has a symbolic and political role as it is seen as an indicator set up to show the way to the faithful [32]. Hence, it is visible within and beyond the city. The svelte form of this architectural element dominates the monument. It is considered to be one of the most attractive still-standing specimens of its kind [5]. Its elegance resides in the balance of its proportions and the variety of its intermediate sections. Finally, in order to be perceived from afar, a richly encrusted multicolored mosaic decorates its top. The minaret appears to invite the viewer to come closer.

The minaret is built and decorated in adorned and scalloped brick, where light and shade play a distinct role. The tile mosaic that adorns this pinnacle is composed on each side by a frieze of four rosettes of elaborate geometrical construction. Two half-rosettes appear on the other faces (Figure 6). A tangle of white threads limits the surfaces. The black is enclosed within the yellow. It forms a star with twenty-four points surrounded by broken lines. The green ceramic band frames the ensemble.

The polychrome rosettes of the minaret create a double contrast. First, the clear-obscure one and second, the contrast of value or quality “bright, dull” [20, p. 37]. The latter emphasizes the spark of the yellow color and forms a bright spot in the “dark and dull” [20, p. 37] surface that surrounds it. In the unfolding of the friezes, the whole is punctuated by yellow dots which add luminous touches throughout.

A row of crenellations crowns the main body of the tower. They carry a mosaic decoration that unfortunately has been badly impacted over time. This adornment is composed of white star-shaped polygons on a black background. The different colors assigned to the different forms, allow them to be distinguished from each other. Interpretation of the forms can also be accentuated by alternating clear shapes with dark ones [16]. The pattern stands out as a white active form on a dark background, allowing it to highlight the geometrical forms. Bands of green tones underline the ceramic panel. With the clear-obscure contrast, the entire surface takes on a plastically animated character. The pattern is highlighted and stands out as a dark active form on a white background.

Color contrasts reinforce the principle of counterbalance. The latter resides in the ambiguity of forms and colors: black and white, full and empty, presence and absence. Indeed, the reading of some figures varies, depending on the eye, which eliminates either the clear or dark shapes. This alternate reading gives rhythm to the composition and fascinates the viewer [33].

Table 1. Visual and spatial effects of the polychrome patterns based on color contrast as perceived from a distance and close up.

View from a distance		
		
<i>Hue contrast</i>	<i>Clear/obscure contrast</i>	<i>Temperature contrast</i>
<p>The colored spots, placed side-by-side, provide a multicolored and pointillist effect.</p> <p>The optical mixture reinforces the repeated colors and their afterimages, in order to synthesize an overall picture of warm hues.</p> <p>The contrast of hues achieves a colorful patio paving that creates movement and animation.</p>	<p>Color combinations between light tones (ocher-yellow, green and white), and dark (black) create a weaving effect.</p> <p>The color combination of the checkerboard paving emphasizes the perspective. It is highlighted by the monochromatic environment (white color). The colored floor decorates the sparsely furnished space.</p>	<p>Foreshortening effects and attractiveness. The optical mixture draws its liveliness from the temperature change in the green (cool color) and the ocher yellow (warm color).</p> <ul style="list-style-type: none"> - Illusion of relief of the ocher yellow and depth of the green. - Appeal and attraction of the object highlighted by the brightness of the ocher yellow, a shimmering color.

Close-up view - colors offer better perception of details		
		
<i>Quality contrast</i>	<i>Temperature contrast</i>	<i>Clear/obscure contrast</i>
<p>The black on white makes the shape smaller, while the tone-on-tone of the color with its background makes it appear infinite.</p> <p>The black as a dull color accentuates the brightness of the ocher-yellow and provides it with a brilliant golden effect.</p> <p>The yellow color illuminates the chromatic ensemble. It replaces the gold, the gild and the spark.</p>	<p>The black graphic leaf design is accentuated because clear colors appear brighter on a dark background and darker on a lighter one. The light tones; white and ocher-yellow, in proximity to the black leaves (thus creating a dark background), appear larger and radiate outwards.</p>	<p>The calligraphy appears to emerge from its white background.</p> <p>Visual balance: the white background weakens the clear colors and makes them appear dull; while the black color highlights the colours and makes them appear brighter. This contrast creates a play of light and shadow and a play of relief.</p> <p>Light colors tend to withdraw, while the dark colors move to the foreground.</p>

5. Conclusion

The mosaics of faience played an important role in the decorations of the medieval Islamic architecture of Tlemcen. Its proven resistance to the elements made it a preeminent coating for exteriors. Permanent colors are fixed to the portals, minarets, and courtyards of the mosques and major public buildings. *Sidi Boumediene Mosque* is a representative heritage of that period and its color ceramics have been the focus of this paper.

Colors are used in isolated fragments or small groups and encrusted in a brick apparatus, as an exterior finish. The tones are bright spots in the matt or dark surfaces that surround them. They are assembled in strips of a single tone highlighting architectural lines and facilitating formal reading. They are also combined into complete panels composed of interlacing geometric and floral designs mostly on a white background. Color gradients, that suggest the volumes, have been replaced by a play of contrasting oppositions, reflecting a more graphic understanding of the form.

The visual impact of these decorated spaces is intimately related to the outstanding adorning which covers them. Indeed, the polychrome ceramics transform the look of the architectural space. It has a decisive influence on the appearance of a building and the atmosphere that emerges, giving it an identity and a sense to its geometric composition.

The ceramics adorn the flat surfaces, with colors in chiaroscuro, producing contrasts in hue, quality and temperature. The latter provide the impression of relief, form and background effect, together with an impression of light and darkness, of optical mixture and flickering effects. Although small in number, the four tints provide a surprising palette of high-quality decorations that are rich and varied.

The image of this architecture, its aesthetics and polychromy is a visual memory that enhances the built heritage. Documenting it enables the conservation of the chromatic authenticity of this architectural heritage. It also provides the necessary data for prospective conservation, as well as forming a basis for its integration as a potential expression of contemporary cultural identity.

Notes

¹ Specifically in relation to his last chapter.

² *Leo Africanus* was born in Granada around 1486-1488 and died in Tunis around 1535. He was a diplomat and explorer of North Africa, during the fifteenth and sixteenth centuries.

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Biographical notes

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Summary

The study and research described in this paper aims to reveal the unexplored aesthetic role of colors used for the ceramics in a mosque from the Marinid dynasty in Tlemcen, Algeria. The methodological approach consists firstly, of a formal analysis of the mosque's artwork by describing its elements and composition and related principles. Secondly, the patterns and geometries are analyzed in-depth using artistic color concepts and laws of color contrast. The analysis demonstrates that the contrasts between bright, pure and dynamic colors provide luminosity, dynamism, rhythm, brightness and an optical mix. The color contrasts are also found to provide visual illusions of mass, volume or movement, as well as depth and relief that ultimately result in influencing the overall ambience of the mosque. The study thus enables the chromatic authenticity of this architectural heritage to be preserved by providing the necessary data for potential conservation, as well as providing a basis for innovative principles in expressing contemporary architecture.

Riassunto

La ricerca è rivolta alla conoscenza dei colori impiegati nelle ceramiche presenti nella moschea della dinastia Marinid a Tlemcen, in Algeria. L'approccio metodologico consiste, innanzitutto, nella trattazione degli aspetti artistici della moschea, descrivendo i principi ai quali essi si riferiscono. In secondo luogo, i modelli e le geometrie dei colori vengono presi in esame dal punto di vista estetico e nel contrasto dei colori. L'analisi dimostra che i contrasti tra colori luminosi, colori puri e dinamici forniscono luminosità, dinamismo, ritmo. Tali contrasti danno luogo anche a illusioni visive di massa, volume e movimento, nonché profondità: in ultima analisi essi influiscono particolarmente sull'ambiente della Moschea. D'altra parte, questa ricerca consente di preservare l'autenticità cromatica di questo patrimonio architettonico fornendo i dati necessari per la conservazione, nonché alcuni principi innovativi sull'architettura contemporanea.