



ARCHITECTURAL TILES IN XÀTIVA: COLOR AND MORPHOLOGY

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ABSTRACT

The Convent of Santa Clara in Xàtiva, Valencia, is an iconic monument that, among the wealth of art preserved in it, contains numerous valuable ceramic pieces included in the list of assets of the Ministry of Culture. The most notable among them are the tiles of the Room of the abbess, because of their quality and the wide area that they occupy. Here you can find ceramic pieces from the seventeenth, eighteenth and nineteenth which together form an interesting overall design. We use a specific data collection method that allows us to create a card catalog of tiles in the field of study). The paper focuses on analysing the chromatic and morphological characteristics -obtained with a spectrophotometer which indicates the descriptive color and its difference in CIEL * a * b * -, in order to establish a series of findings demonstrating the genuine compositions of the tiles and the originality of the present arrangement. Also, we create a specific color chart referenced to the A. Munsell color chart for further documentation and with a view to a possible restoration of the tiles.

The tiles are a symbolic subject material because of their brightness and color, therefore, they are a fundamental component of historical heritage and it is necessary to know the types and characteristics of these pieces so that the architectural restoration can be integrated and consistent.

KEYWORDS: Architecture, design, Tiles, chromaticity, morphology

1. INTRODUCTION

The ceramic production of architectural coating, which is very traditional in the Region of Valencia, enjoyed an era of splendor during the Baroque period. The architectural elements were invaded by a layer of ceramic colors, achieved with the use of only five oxides, used in an unusual way. One of the examples of the versatility of ceramics in architecture is found in the Convent of Santa Clara de Xàtiva, (Valencia) declared Asset with Cultural Interest (BIC) in the category of monument in 2003 by Royal Decree 136/2003, 18 July, where Gonzalez Baldoví, director of the Museum of l'Almodí of Xàtiva between 1992 and 2011, makes an architectural description of the building. The origins of the convent of Santa Clara are well documented: there is a large archive divided into three parts: Archive of the Kingdom of Valencia, Archive of the Cathedral of Xàtiva and the monastery's own file, kept by Professor Galiana Chacón and consulted by Sarthou Carreres[1] that reflects the different events that the building has witnessed.

This work deals with analyzing the morphological, chromatic and descriptive characteristics of these ceramic pieces, hence the study is presented in the form of cards in order to have available a catalog that documents this part of the artistic heritage of the monument and can be helpful for any future architectural intervention.

2. ARCHITECTURAL DESCRIPTION OF THE CONVENT

The monastery, "the most sumptuous of its kind" as Madoz says [2] was founded in 1325, and originally stood at the edge of town. It formed a quadrangle of approximately 70x70m which was organized around a cloister of three galleries. The lower level was constructed by ribbed



vaults supported on cantilevers, with polychrome ribs in blue cobalt, and the upper galleries, which were closed and had balconies, were built in the late seventeenth century in Baroque style. On the south side stands the Church which has direct exterior access.

On the East side are located the refectory, the kitchen, the chapter house, the cemetery under the armarium and the bedrooms (on the refectory).

This part, which dates from the fourteenth century, was set up as a single space, like a medieval great hall whose dimensions are approximately 12 meters wide, 15 meters high and 40 long, and is organized by transverse stone arches with beveled edges, supporting a gable roof. The buttresses are internal. According to José Emilio Llácer, architect of the Rehabilitation Project of the convent, in the sixteenth century the height of this wing was raised, leaving marks on the structure of the previous level. In the eighteenth century the slab was constructed through the split, creating the refectory and kitchen on the ground floor and bedrooms on the top. Over the kitchen was built then a second floor which led to a room called room of the abbess, paved with beautiful tiles brought from other parts of the convent[3]) and which are the subject of this study. The north part contained the cell abbey, the chapter house, the new infirmary, the archive room and various service areas.

The west wing was destroyed during the Spanish Civil War, and now we find recent interventions with differences in construction that are evident in the assembly plant, where you can clearly distinguish the walls from the structure of concrete.

3. CERAMICS CONTAINED IN THE CONVENT

The tile pieces in this convent are of high quality, and some of them are included in the list of assets of the Conselleria of Culture of the Generalitat Valenciana. Among them, the tiling of the floor of the room of the abbess is an outstanding example where we find 2200 ceramic pieces of the seventeenth, eighteenth and nineteenth centuries from other locations in the convent which were reused for paving this stay, and together they form an interesting overall design:

- The northern part of the room has about 1080 neoclassical units belonging to the nineteenth century, many of them from The Royal Tile Factory of Valencia. There are a series of hydraulic parts nearly as recent as the twentieth century next to the Renaissance staircase landing, and certain units of the eighteenth century with remains of scenes and non-religious motifs, and also copies from the *series*.

- The pieces dating to the late seventeenth and eighteenth century (120 units) are concentrated in the central area. There are many "Molinell" design tiles of approximate dimensions 11.5cm x11.5cm, quarter and completed ones, and units of the type of "pometa". There are also fragments of pieces of "mitadad". The objects of the seventeenth century stand out, and undoubtedly belong, due to their surface characteristics, to a baseboard.

- The southern area can be divided into two sections: the first contains about 300 standard tiles of the eighteenth century, framed by a border of about 180 modernists pieces of the nineteenth-century in a blue colour (This is the area of detailed study) and finally, there are about 520 pieces located at the end of the room, where we find a mixture of tiles from the eighteenth and nineteenth centuries.

The size of the pieces is generally 22 x22 cm, dimensions imposed in the Valencia factories, especially in the eighteenth century[4] except, as indicated, those belonging to the seventeenth century, together only representing a minimal area.

The colors of the glazes of these pieces were obtained by applying five oxides: copper oxide for green. cobalt oxide for blue, manganese oxide for purple and violet, antimony oxide for

yellow-orange colours and iron oxide for ocher colours, generally applied on a white tin base. New shades were created by mixing oxides and with which they applied extra touches to the ornamental patterns. Different effects were achieved depending on the varnish used in mixtures[5].

4. METODOLOGY OF THE WORK

As we said, this work deals with analyzing the morphological, chromatic and descriptive characteristics of these ceramic pieces, hence the study is presented in the form of cards in order to have available a catalog that documents this part of the artistic heritage of the monument and can be helpful for any future architectural intervention.

This work focuses on a specific sector of the southern part of the room for the following reasons:

- The ceramic composition is recognizable and closed and it is basically paved with standard pieces with similar stylistic features and color.
- these pieces are chronologically-bounded and they all belong to the eighteenth century, when the standard tile reaches a moment of splendor [6]

We use a specific data collection method that allows us to create a card catalog of ceramic pieces obtained in the following way:

- Dimension / demarcation of the area to be analyzed within the stay, based on the criterion of compositional unity and common characteristics in terms of size and chronology.

For the classification of the ceramic units, the rectangular sector -composed entirely of 30x10 tile- was divided in fifteen columns of 2x10 elements. There are, therefore, fifteen columns, in total, numbered from 1 to 15, from west to east. In each one we have considered the various units that can be found, named alphabetically from "a" to "Z", a classification of the type "1a", "1b", "2a", "2b" "2c", "3a", etc. ... the pieces that are repeated throughout the composition are not covered, so that the catalog contains only the different units. (Fig. 1)

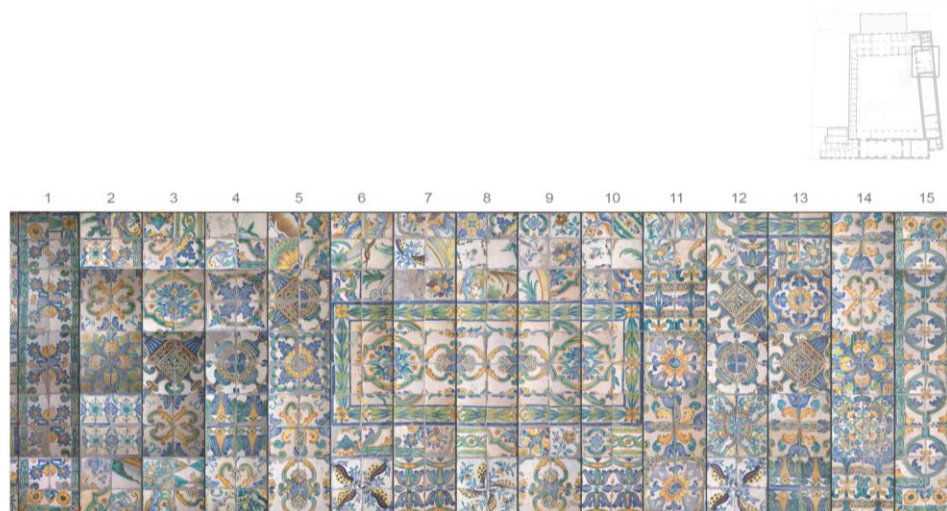


Fig. 1 - Pavement area to study. Photomontage by Irene de la Torre Fornés.

- Pictures of each ceramic piece of the sector taken by using a reflex camera. Due to the negligible distortion of the image in each photograph, taken one to one, it was not considered necessary to use photogrammetric rectification software.

- Free-hand drawing, in-situ, of each of the different ceramic pieces, indicating their position within the set, so as to bring them the points where the measures have been taken by the contact colorimeter.



-Taking the color values obtained with the use of a color measuring instrument, the spectrophotometer CM-2600D Contact / 2500D Spectrophotometer (spectral type) calibrated in accordance with ISO 9001 requirements which are then managed by a specific software

The existing color range has been divided into six general groups: purple, blue, green, ocher (or orange), yellow, and white. Thereafter the data obtained by the spectrophotometer are subjected to statistical analysis to determine the mean value of each color group, standard deviation and the dispersion of the samples. The predominant families shall be established in Munsell notation, that defines the colors in terms of Munsell Hue (H), Munsell Value (V) and Munsell Chroma (C) and are written as HV / C.

This aim of this procedure is to establish a global color chart representative of this era. Each card organizes the data of different existing tiles as follows: (FIG. 2)

-General layout of the composition. Identifies the sector where the tile in question is located, and indicates the units of this same tile existing in the whole plant.

-Color analysis. It consists of:

- Photography of the tile to study.
- Measurement data obtained by the spectrophotometer Contact: it shows the $L^* a^* b^*$ of each measurement and its equivalence in the Munsell system.

-Morphological analysis-descriptive. Comprises:

- Photography explaining the morphology of tile, that is, its organization in the overall composition.

• Descriptive data of the tile:

-denomination, indicating if it is a quarter piece, complete, and so on.

-chronology.

-origin. In general, it indicates that the tiles come from ceramic plants in Valencia.

-measures: they show the dimensions of the pieces. In general they are pieces of 22x22cm, with small variations of 0.5 cm. Perimeter tiles are cut.

-decoration: describes the motifs that form the design of the tile.

-Color: existing tonalities are noted. the background of all the tiles is assumed to be tin white.

-observations: When possible, the tiles are compared with those designated by Innocent Guillen Vicente Perez in his book *Cerámica Arquitectónica Valenciana. Los azulejos de serie* (Ss.XVI-XVIII) which is abbreviated in the schedule as CAV. We have also taken as examples of similar pieces existing in other locations some of those compiled by Maria Eugenia Vizcaino Martí in his book: *Azulejería Barroca en Valencia* (ABV) and to those in the catalog by Josep Lluís Cebrian I Molina in his book *Pintura ceràmica a Xàtiva*, (PCX) and Vincent Guerola i Blay in *La Pintura Ceràmica a Carcaixent* (PCC).

5. MORPHOLOGICAL CONCLUSIONS

The most striking examples of these new combinations of tiles that have been the trigger for the search of their corresponding original panels are those on the units 3c, 3d and 4b of the card catalog.

Composition 1

A copy of this identical panel exists at the National Museum of Ceramics and Sumptuary Arts Gonz lez Mart  in Valencia, with the inventory number 1/305, which belonged to a mansion on Caballeros Street. As Coll Conesa[7] director of the Museum, indicates: "Its composition is diagonal, and has four large amphora vessels with flowers and leaves among which we see tulips, highly fashionable in Europe in the seventeenth century, with denticulate leaves that evoke the instruments of the Ottoman Turkish repertoires. According to Guill n P rez, the model may be the work of a silversmith due to its similarity to contemporary designs of Valencian silver (...) With respect to their chronology, Guill n P rez indicates that the presence of l ureas, polychrome bands, the type of vessels and sunflowers, are documented in Valencian tiles series between 1735 and 1745. A sunflower plant floor symbolically linked with other precedents and contemporaries whose iconography revolves around the sun king. "

This type of floor, designed as a carpet as Pérez Guillen asserts[8]" is distinguished in its composition because the tiles are usually angled at 45 degrees to conceal the defects of the visual lines caused by the inconsistent sizing of hand-crafted tiles. "(Coll Conesa, p.197). In addition, they used to be surrounded by white tiles, white being the background color of the rest of the pieces that absorbed the irregularities of the room in where they were located.



Fig. 3 - Composition 1. Photomontage made by Irene de la Torre Fornés

Composition 2

The central theme of this 8x8 tiles panel is a quartered sunflower surrounded by four lilies and bordered by a band of flowers that is not exactly circular. We note that the spaces between the diagonal vases are filled by flowers and acanthus leaves. There are two sets of this sunflower quadripartite in column 11 in the "carpet" under study, which shows that there are, at least, two panels of this composition and whose remains are also found on the stairs located at the south of the large room.



Fig. 4 - Composition 2. Photomontage made by Irene de la Torre Fornés

There is a possibility that the found pavement panels were located in the corridor of the dormitories of the monastery and axle plant located in the arches of the roof.

The rest of ceramics from this area of the stay comprises mostly simple panels. The units "6e" and "8d" of the card catalog are part of a composition in 6-flowered, and we can find them in the room combined like quartered tiles.

6. CHROMATIC CONCLUSIONS

We performed a statistical analysis of color data obtained by the spectrophotometer contact in order to establish the predominant families in Munsell notation (Table 1) of each tone (violet or purple, blue, green, or orange ocher, yellow and white) and the average values obtained, also by groups of color in the CIE Lab * (Table 2) and their corresponding standard deviations (Table 3), in order to determine the range of the color of the tiles from this period.



Table 1 - Munsell notation color data in white color.

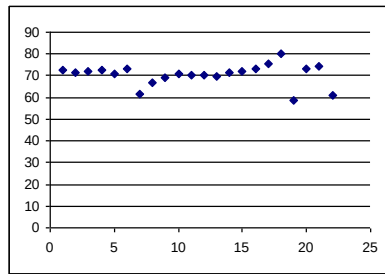
MUNSELL		H	V	C
Ceramic tile				
1 DAY	PATTERN	1,6Y	7,14	1,58
1A	1	2,1Y	7,05	1,51
	2	1,3Y	7,08	1,64
1B	8	1,9Y	7,14	1,77
2A	13	2,3Y	6,98	2,09
2B	18	9,8YR	7,19	1,66
2C	22	9,6YR	6,02	1,57
	23	9,2YR	6,54	1,56
2D	28	0,1Y	6,82	2,26
2E	34	1,9Y	6,96	1,65
2 DAY	PATTERN	0,3Y	6,92	2,23
2F	1	0,3Y	6,92	2,23
2G	7	0,2Y	6,84	2,16
2H	13	1,2Y	7,02	1,74
3A	19	1,7Y	7,08	1,87
3D	24	9,9YR	7,21	1,81
3F	28	1,1Y	7,45	1,52
3G	30	0,8Y	7,91	1,12
3I	35	0,3Y	5,72	1,79
4B	40	2,0Y	7,23	1,66
4C	42	0,3Y	7,35	2,04
4E	49	1,4Y	5,97	1,64

Table 2 - CIE Lab values in white color (color pattern in the measurements).

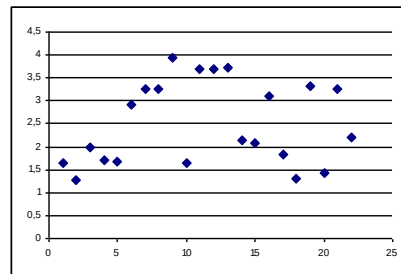
CIE Lab		L*(D65)	a*(D65)	b*(D65)
Ceramic tile				
1 DAY	PATTERN	72,54	1,66	11,04
1A	1	71,7	1,28	10,77
	2	71,96	2,00	11,26
1B	8	72,58	1,71	12,46
2A	13	71	1,69	14,80
2B	18	73,07	2,91	10,6
2C	22	61,53	3,26	9,79
	23	66,7	3,27	9,58
2D	28	69,33	3,94	14,48
2E	34	70,81	1,64	11,59
2 DAY	PATTERN	70,33	3,7	14,43
2F	1	70,33	3,68	14,42
2G	7	69,58	3,71	13,94
2H	13	71,35	2,15	11,87
3A	19	71,92	2,07	12,97
3D	24	73,29	3,09	11,7
3F	28	75,7	1,84	10,47
3G	30	80,28	1,30	7,87
3I	35	58,45	3,33	11,45
4B	40	73,45	1,43	11,83
4C	42	74,55	3,25	13,33
4E	49	60,97	2,2	11,13
AVERAGE WHITE		70,52	2,50	11,90



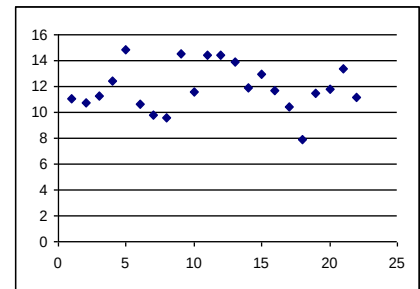
Table 3 - Graphic standard deviation of color values L , a^* , b^* of white color



deviation of L



deviation of a^*



deviation of b^*

This study was initially carried out with all the color values of each group belonging to all ceramic pieces, and then we made an average of these values based on four categories (Table 4):

- Statistical data of panel-Composition 1
- Statistical data of panel, Composition 2
- Statistical data of serial pieces: those relating to standard tiles that do not belong to the previous panels.
- Statistical data of "scene" pieces: those parts belonging supposedly to the remains of hagiographic panels or others with different theme.

Table 4 - Mean values in CIE Lab system of tones according to category.

GROUPS	violet	blue	green	orange	yellow
	$L_{a^*b^*}$	$L_{a^*b^*}$	$L_{a^*b^*}$	$L_{a^*b^*}$	$L_{a^*b^*}$
C 1	28,50_2,40_-8,76	46,90_-3,37_-9,53	51,13_-14,87_10,45	52,74_20,62_40,38	65,51_4,90_44,35
C 2	50,20_7,30_9,09	44,93_1,40_-4,50	55,73_-11,61_14,24	50,48_19,00_33,80	65,82_4,69_37,99
Serial piece	36,95_6,55_1,95	51,40_-4,78_-7,37	58,29_-14,44_8,50	47,54_18,65_31,12	69,63_0,30_35,95
scene	40,08_6,78_7,88	53,36_-3,88_-4,40	52,03_-11,98_11,03		64,80_0,44_31,34

In general, there is an average luminosity of the measured colors, which is around $L = 40$ for the violet, $L = 48.80$ and 50.48 for blue and orange and $L = 55.11$ for greens. As expected, white and yellow reach the highest values, around $L = 70$, with a great uniformity in the sample.

The values of a^* and b^* have some variety, in general the values of b^* being more dissonant, since their typical dispersion is usually double that of a^* . These values denote a general chromaticity which is not too high except in cases of oranges, white and yellow.

The result of these measurements reveal the great color range of the tiles of this period, due to the method of using different loadings pigments and mixtures of oxides, as well as an application of the same through fluent brushstrokes that originate rich and colorful compositions.

7. FINAL CONCLUSIONS

This work has helped to highlight the important role of the ceramic coating on architecture, which provides values not only of construction, insulation and waterproofing, but it may affect the composition of the building and the perception of their different spaces, through



its qualities of brightness and color. The tiles, because of their great versatility, are present in many architectural elements, and they are a symbolic material with an important identity.

Architectural ceramics is therefore a key component of Historical Heritage, which reflects a past based on tradition and culture and as such deserves to be preserved, hence it is necessary to know the types and characteristics of these pieces and the traditional techniques by which they were created so that a comprehensive and consistent architectural restoration can be undertaken.

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