Sustainable preservation of historical urban areas through the improvement of colour image

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Abstract

In this paper we discuss the procedure, performance and importance of chromatic analysis for preservation of historical architectural centre. We present the results of analysis of urban area and development of chromatic strategy for the Brazilian historical city of Piratini. Portuguese immigrants founded this city in the 18th century and it holds the most complete and homogeneous architectural setting in Rio Grande do Sul state. The purpose of the developed chromatic strategy is a creation of characteristic colour image (colour identity) of the historical centre adjusted to modern chromatic space of the city to assure a sustainability of historical architectural setting. Different palettes were prepared for the group of buildings with different levels of preservation. The elaborated proposals were approved by the state government and practice works are currently being executed.

1 Introduction

In this work, we present the results of analysis of urban area and development of the chromatic strategy for the Brazilian historical city of Piratini. The present study focuses on the city downtown area where most of the buildings were built in the colonial period in the beginning of the 19th century. The city, located in the southern region of the state, has an historical setting considered one of the most complete and homogeneous in Rio Grande do Sul state.

The façades of the oldest houses are mainly characterised by the following factors: the presence of roof-pitch, simple geometry of the façade, the opening proportions approaching the form of the flat rectangle or the square, the predominance of the full spaces over the empty ones and a considerable robustness. The
decoration is only used for prominent elements over the windows and doors with straight lintels or low arches. Some wealthier houses have doors and windows with stained glass. City buildings are generally joined together and aligned along the street axis without frontal retreat. Therefore, the colour of these façades is an important element of the composition of the urban image.

An analysis of the area showed that nowadays the choice of colour is basically done in a random way. Generally, there were some separate proposals for some valued buildings to be preserved by the state, but they were based only on the survey of isolated examples and cannot serve for development of polychromy proposal that covers the considerable area in the urbanistic scale. A global view over the palette and chromatic structure of the setting was needed, considering the relationship between isolated buildings and their surroundings in the terms of colour.

The problem of improvement of the colourscape of the downtown area, valuing its historical characteristics, was considered. We searched for these characteristics in the chromatic language of the buildings and their links with the urban development. The colours should restore the historical polychromy of the setting and create a process of interaction/interrelation with its inhabitants permitting the continuous renovation of the area and, this way, assuring its sustainability.

In this work, the evolution of the urban chromatic preferences is analysed and old and contemporary tendencies of colour usage are revealed. The objective of chromatic strategy developed on the base of this study is the creation of chromatic characteristic image (chromatic identity) of the historical architectural setting, adjusted to the modern contemporary space of the city [1, 2].

During the first part of the study, prospects of the significant historical buildings were done, historical registers, descriptions, colour illustrations and photographs were collected and morphological surveys were performed as well as studies of the colour use in the surrounding areas. These works were carried out by the team of the Architecture Department at Pelotas State University and the State Government. In the analysis and contextualization phase, the urban structure of the historical centre, the location and the perceptive prominence of the significant buildings in the urban area were evaluated as well as their associated use and insertion in the immediate context [3].

2 Study of historical colours

2.1 Methodology

During the study, examinations of 42 important historical buildings were performed. The morphological language, historical and architectural value, year of construction and conditions of the façade conservation (quality of the plaster and condition of the painting) were taken into consideration.

The study had two objectives: searching the original colour of the concrete
buildings (as an isolated example) and identifying the general palette and the chromatic typologies of the façades to determine “the colour taste” at the time of the creation of Piratini city. Analysis of the prospects was used to solve both tasks and other sources of information (documents, descriptions and photographs) were also considered to reach the second objective.

During the work we met different difficulties. First, climate and time conditions contributed to fast transformation of paint (specially the whitewash) that appears as variations of a number of lighter or darker tones. Second, inhabitants used to repaint the façades with new colours taking out the previous layers. Third, there are no sufficiently rich and reliable graphic-image materials, which, by itself, could permit the restoration of colour urban image. However there is one favourable point: while the other cities have a scarceness of architectural examples that still conserve their original plasters and paint layers, Piratini downtown represents almost intact historical architectural setting and this is a perfect example for analysis and evaluation of the prospects.

Based on the results of the examinations, chromatic tables were elaborated with referential codes and individual palettes for each historical building. For analysis of the general palette of the colonial period, 32 buildings with the formal language used in this period were selected. The main formal elements were grouped according to their position on the surface of the façade: masonry wall, base, horizontal elements, vertical elements (pilasters and corners), door and window frames.

The original colours, defined in the palettes of each element, formed a database for global analysis. For study of chromatic typologies via computer, the different tones were classified by similarities in 16 groups of the basic colours: brown, red, pink, salmon, orange, yellow, ochre, beige, green, moss green, blue, aquamarine, grey, purple, white, black. All these tones were observed with eight levels of lightness and saturation. The chromatic predominance of the tones, found in each element of the façade, their lightness and most frequent combinations were calculated.

2.2 Results of the prospection analysis

The prospects were usually performed in two points of the masonry walls to better check the sequence of the layers. Based on these prospects, some hypotheses of the probable sequence of layers of original colours were made. The first two or three layers closest to the plaster, which could correspond to the oldest colouring of the house, were selected for the analysis. These layers were analysed both separately and jointly. Table 1 shows the results obtained in terms of percentage of colours found for each element of the façade.

In the first layer of the masonry wall, was found the main predominance of white, which presents more than half of the total percentage (53%). Yellowish tones (ochre, yellow and salmon that appears as a pinkish yellow) account for almost one fourth of all the examples (24.7%). The grey colour has a considerable
Table 1: Summary of the frequency of colours in the elements of the façade.

<table>
<thead>
<tr>
<th>Elements of the façade</th>
<th>Chromatic code *</th>
<th>Number of examples in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>r</td>
</tr>
<tr>
<td>1 Masonry 1 (R)</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Masonry 2</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>Masonry 3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Masonry, general</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>2 Base</td>
<td>36</td>
<td>0</td>
</tr>
<tr>
<td>3 Horizontal details 1 (R)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Horizontal details 2</td>
<td>0</td>
<td>69</td>
</tr>
<tr>
<td>Horizontal, general</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Vertical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical details 1 (R)</td>
<td>48</td>
<td>0</td>
</tr>
<tr>
<td>Vertical details 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vertical, general</td>
<td>2.4</td>
<td>4.8</td>
</tr>
<tr>
<td>4 Frame (door/window)</td>
<td>11</td>
<td>71</td>
</tr>
<tr>
<td>Frame (door/window) 2</td>
<td>11</td>
<td>56</td>
</tr>
<tr>
<td>Frame, general</td>
<td>11</td>
<td>65</td>
</tr>
<tr>
<td>7 Window</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>8 Door</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

* b - brown; r - red; p - pink; o - orange; sm - salmon/ceramic; y - yellow; oc - ochre; bg - beige; gn - green; mg - moss green; bu - blue; gr - grey; pu - purple; am - aquamarine; wh - white; bl - black. R - first layer after the plaster.

The chromatic sequence among separate tones is the following: white, with a considerable predominance, then grey, yellow and ochre with the same percentage and, finally, salmon. In the second layer of the masonry, there is a predominance of the yellowish colours (52%). White has a very reduced percentage (26%) compared to the previous layer. In the third layer of the masonry, the presence of blue increases significantly (20%) and the yellowish colours (without the ochre) are more frequent among the groups (40%). This layer seems more colourful because the range and the quantity of chromatic colours are increased. In the joint analysis of these three layers, the dominant colours were divided in two big groups: yellowish tones (38%) and whites (36%) with similar values. The grey and blue tones (6.8% each) are the next two groups with standing out values. The colours have various types of lightness with the predominance of light, medium and intense colours.

The palette of the base was divided in two groups: white (39.3%) and dark pink colours (salmon and pink) that, together with brown and orange, present almost one third of the total (28.7%). The dark blue colours and greys also have prominence (21.2%).

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The cornice was considered as element of horizontal marking of the façade, which is characteristic for the colonial period. Its palette of all the layers, analysed in group, was divided in three parts: white (32%) with a small advantage, yellowish colours (26%) and pink colours (22%). Other tones with prominent percentage are grey and blue. It is interesting to note that white predominates specially in the first layer after the plaster and the values of the pink and yellowish colours increase in the most recent layer (the second after the plaster).

A study of the layers of the vertical details (pilasters and corners) showed that the pink colours (31%) and the white colour (28.6%) are more frequent. The yellowish tones, together with light beige and light moss green, also have a prominence of 21.5%. Among the isolated tones, the predominant is light salmon. There is the same tendency found in the cornices: white is more predominant in the first layer after the plaster and the pink colours are predominant in the most recent layer.

The predominance of saturated and dark colours, close to the reddish brown tone, was observed in the windows and doors. In the doors the saturated green colour is used with the same frequency as the browns. The light grey and blue colours appear with predominant values in the windows.

2.3 Results of the photographic analysis

The photographs were one of available documents in the archives which can offer us the observations of the local polychromy, despite being black and white. Use of photographic files allows us to elucidate if the houses were painted white or if there were different colours. Also they help to determine the distribution of the colours in the façades, relation of light/dark between wall and details and the paint condition as well.

The analysis of the photographs showed that, in most cases, the walls were painted in white or light colours, contrasting with the formal elements (cornices, cymatiums, friezes, corners and frames) painted in darker colours. Despite this, some buildings are seen totally white with no prominent elements and with ceramic roofs whose colours look like the soil. In other cases, darker tones of walls are found with light corners and pilasters. The bases are almost always darker than the rest of the façade. It can be observed that there were, frequently, coloured windows and there were white ones as well, in contrast with the doors which were always painted in darker colours (Fig. 1).

2.4 General conclusions about historical colours

Analysis of prospects reveals that along the years the predominant tones of walls of the studied historical buildings were different kinds of white, which varied a little in hue due to the kind of whitewash used. Thus, we can conclude that in the 19th century, according to the Iberian tradition, the façades of the Piratini city, in most cases, were painted white. The photographs confirmed this tradition was kept almost until the second half of the 20th century. Very light ochre and salmon
tones are observed in façades probably due to the presence of clay based pigments and mixtures of brick powder in the lime paint. There were façades painted only with one colour and others with the colours marking the vertical and horizontal elements – corners and cymatiums. The base was always emphasised with another colour. In the openings, there was the predominance of the coloured paint in oil of reddish brown that protected the woods ("strengthened red" as Saint-Hilaire called it), blue and green tones that the nobles preferred. The colours were primarily simple, just enriched by the contrast with the whites on the walls. Sometimes two colours were combined to paint the frames and corners, breaking the monotony, which could appear if each hue was used separately. The sash windows were sometimes painted white.

As a result of this study, the tables, graphs and palettes were elaborated and hypotheses of chromatic typologies of the façade coloration in the colonial period of the Piratini city were created.

3 Study of contemporary colours

The identification through the colour is a noteworthy feature of the contemporary city coloration [4, 5]. There is a spontaneous process of creation of polychromy and treatment of façades of the houses by inhabitants and these colour preferences should be respected. Therefore, the contemporary colours of the historical houses of the surroundings were also evaluated [6].
3.1 Study results

In the masonry colouring, it was detected about one third of the façades had white bases and two thirds had coloured bases. The two groups of yellowish (yellow, ochre and beige) and pinkish (salmon and pink) colours can be considered as basic dominants besides white because they are presented in 21.2% and 33.3% of all cases, respectively. Light tones are predominant in both groups. Besides that, we also found examples of paints in green, orange and blue. It is either rare or uncommon to use very dark or very light colours for the masonry of the façades.

The colours of the base have practically the same range of tones: white 34.4%, yellowish tones 15.6% and pinks 15.6%. However, a new group of hues (blue and grey) appears with 15.6% of frequency. They have a low level of lightness and are darker and more grey-like.

The survey showed a predominance of light colours in the vertical details – white 50%, pink tones 18.2%. The cornices are more coloured in yellowish (15.2%), pink (18.1%) and blue (9.1%) tones. The white has a reduced percentage (42.4%) in comparison with the previous item. In the frames of the doors and windows, despite the predominance of light colours (for instance, white has 39.4%), there is also notable percentage of dark tones: brown, blue and grey with 21.2% for each one.

The study indicated that the colouring of the windows and doors have similar predominance: white (35.5% and 30.3%), brown (29% and 30.3%), blue (16.1% and 18.2%) and green (9.7% and 12.1%).

3.2 General conclusions about contemporary colours

The study of the palette of contemporary colours revealed that the analysed buildings have a range of colours that differs a little from the original tones, varying only in the bigger gradation of nuances and their intensity.

The existence of a few examples with the same colour for the walls and details confirmed the idea that nowadays there is the tendency of differentiating the elements of the façade. The presence of the buildings of different morphological typologies, especially of the modern and eclectic periods, in the studied setting increased the amount of houses with coloured walls and light details.

As a result, some tables, graphs and typical palettes of the contemporary colouring of the façades of the historical centre were elaborated. The revelation of these palettes and predominant contemporary combinations helped to clarify the present chromatic preferences and permitted to enlarge the range of colours that could be used in the proposals.

4 Strategy Elaboration

In the strategy elaboration, the phenomenon of the colour was used as a tool of planning and environment improvement. In the morphological analysis of vari-
ous architectural typologies, the buildings were divided in three groups according to formal language of the certain architectural period: colonial, eclectic and modern (contemporary). The last group was reserved for common buildings without historical value.

This way it was possible to establish appropriate general palettes for each architectural type and to make specific proposals for the buildings with different levels of preservation (different historical value) presented in these great groups.

Detailed and precise proposals were elaborated for the most important buildings in accordance with performed prospects and position of the building inside the urban structure. General fluent palettes for walls and details of surrounding buildings were prepared to adjust their colouring to the morphological type of the predominant buildings in the setting (Fig. 2). It allowed to residents to choose colours and combinations within the established limits and this way surrounding coloration could be changed in the course of time assuring dynamics of the area.

![Figure 2: Chromatic typologies and palettes of façades in the colonial and eclectic periods of Piratini city.](image)

The colours of the detailed proposals emphasised the important historical buildings and the key points of the urban tissue. The tones of the fluent palettes filled in the gaps of the urban space, creating a surrounding environment, without abrupt change of the appearance of the continuous blocks of streets. For buildings of the colonial period that are the most present in the city, the following tones were used in the elaborated palettes: for walls – light colours and whites; for details – ochre, grey and salmon; for frames of doors and windows – dark colours such as reddish brown, green and blue. The range of hues was
increased in terms of nuances, but it was kept within the basic tones. According to these palettes, new chromatic typologies were elaborated showing a possibility of colour combinations.

For a few buildings of the eclectic period, palettes established the following colours: for walls — some smooth colours such as pink, yellow, aquamarine, with no great emphasis in order to be not competitive with older buildings; for details — light colours and whites; for the frames — browns, beiges and greens.

The contemporary architecture was characterised as an accompanying architecture and it should follow one of these palettes with smooth colours without chromatically damaging the surrounding historical environment. The elaborated proposals were approved by the State Government and practical works are being executed.

5 Research conclusions

Revitalisation or renovation of a space is making it more pleasant and more interesting to its dwellers, because preserving an urban environment is one of the forms of preserving the cultural memory of a certain people. In the case of Piratini we have an experience of working with colour as the principal element responsible for the task of identifying, restoring and preserving the historical environment. The investigation and determination of the general existing chromatism made the historical characteristics of the city become more relevant and qualified.

The renovation was based on the preliminary analysis of all the characteristics of the local polychromy, considering the inevitable chromatic changes of the buildings. The study proved that it is possible to solve the contradiction between historical colouring values and present tendencies through the use of alternative strategies, which can anticipate the continuous renovation of the area and development of the historical polychromy inside the contemporary space [4, 7].

The main result of this work is improvement of the historical centre of the Piratini city by means of elaboration of directions for the regulation of polychromy (palette and structure) and elaboration of the colour solutions for the façades and streets according to the complete chromatic proposal for the historical centre. The memory and the urban identity become directly connected to the historical context assuring the sustainability of the setting.

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References

406 The Sustainable City II