

# The Color in Architecture: natural color vs. artificial color

Patrícia Diogo

*Abstract— The environment is a sea of energy that floods us through the various sensorial channels: the look, the smell, the hearing, the walking, the manipulation of the objects.... the scale and complexity of the environment make it difficult to perceive it passively, so we have to actively explore and select the large amount of sensory input from the environment because its perception helps us to manage communication and social interaction with other people and to identify important characteristics of our daily environment enjoying a set of aesthetic expressions.*

*Index Terms—Architecture, Artificial Color, Color, Materials, Natural Color.*

## I. INTRODUCTION

The theme of color in Architecture is widely debated in the academic and scientific community and although it seems to be already saturated, it is our belief that the way as the society evolves its studies needs to be revised and deepened given the changes to its premises and beliefs. In addition to the aspects of tradition, clear distinctions are observable in the environment constructed through the way in which its populations use the color (transmitted by both the pigment and the materials) thus creating a mark on their identity. Chromatic preferences are part of vernacular local languages, just as spoken languages do, with color appearing as the visual language of populations.

## II. THE COLOR

For a large part of the world population, the Color is an intense expression of its culture as we can observe in Fig. 1.



**Fig. 1 – Neighborhood “La Boca”, Buenos Aires**

In the more traditional cultures, which have consolidated over the centuries, the chromatic preferences ends up serving as a reference in the collective and vernacular sense of the practical and symbolic use of color, since it emanates from the characteristics of the material itself and not from an associated pigment as we read [1]?

In contemporary times the use of color, even if informed by these vernacular preferences, is also influenced by

decisions in a wide range of actions. Not only by the choice of a coating pigment, but also by the array of materials that have since appeared, as well as by the placement of a "skin" on the facades and mutant color materials.

### III. THE DIFFERENT MATERIALS IN ARCHITECTURE

A simple look at an architectural or urban landscape immediately reveals how color - which translates into coatings, finishes and different types of architectural surfaces, using various materials and its many manufacturing techniques - decisively affects our visual interpretation of these architectures by touching in a decisive way [2]. The Materials that, by modifying their exposure to light, varies their color, recreating different environments around the building are the "big revolution" in image and color in them. In this subject we can consider glass, polypropylene and other types of fibers, mirrors and other reflective materials.



Fig. 2 – Example of lights in different materials

Alongside these evolutions of matter and the use of it, in the great cosmopolitan cities there is a great diversity in the human races that results from the migratory movements as we observed in Fig. 2. These cultural differences brings with them their languages and, when they appropriate an urban area, they introduce their chromatic preferences - contributing to diversity in the urban and cultural/ethnic mesh.



Fig. 3 - Mexican neighborhood in Manhattan



Fig. 4 – Oaxaca City in Mexico

We can also verify a chromatic difference in the cities according to the various cultural marks that are appropriated to it and with the passage of time starts rooting, becoming late part of the history of the own place.

In Manhattan, especially in Lower East Side as we can see in Fig. 3 and Fig. 4, the most colorful and luminous streets points us to the identification of the cultures of Mexico and Central America. However, it is understood that the intensity and chromatic saturation of these cultures can negate the visual reading that is done in the surroundings when removed from the context. The decisive factors in this opposite effect are essentially the geographical context and the light, because when taken from the context in which it originated, the chromatic harmony of contrasts can create dissonances.





Fig. 5 – Favela of Sta. Marta in Rio de Janeiro, Brazil.

Thus, between the neutrality of an urban environment, overly saturated colors can cause visual discomfort, a feeling that we can name as visual noise as we can see in the example given in the Fig. 5 at Rio de Janeiro, project of Holland architects Haas and Hans.

#### IV. THE LIGHT IN ARCHITECTURE

The Light is a decisive factor in chromatic cultural preference. Depending on the geographical location, the sun has different degrees of incidence. For example in Fig. 6, in Ecuador, the sun's rays strike vertically and the earth's surface reflects sunlight at its maximum intensity. In these regions the psychological response of populations to this stimulus is the preference for highly saturated colors.



Fig. 6 – Quito, metropolitan in Ecuador

In Fig. 7 the angle of incidence of the sun's rays is oblique. By observing light and shadows in cities like Stockholm, the surfaces of the facades reflect a yellowish light, and by the other hand shades of blue and violet are visible in the shadows.



**Fig.7 – Gamla Stan, Stockholm in Scandinavia**

In opposite of Fig. 7, in Japan, as we observe in Fig. 8, the insular context and predominantly hazy atmospheric conditions create a lower ambient in light levels. The chromatic preferences expressed in their chromatic systems and in the built environment are generally subtle and without intensity. Traditionally, the Japanese relegated luminous colors to artifacts and ceremonial events like illustrated in Fig. 9. In this way they made a clear distinction in the use of vivid colors for the recognition of ceremonial events in their localities - especially in the props, clothing and ritual objects - that can be witnessed even today.

The position relative to the sun of any locality has an influence on the human reaction to light, in relation to the geographical context of that locality.



**Fig.8 – Sendai in Japan**



**Fig. 9 – Hiroshima memorial in Japan**

In Persian architecture the blue-ceramic vaults make reference to the sky, and the use of gold raises the levels of reflection of its luminosity. But, as the significant of color vary in the different geographical location, in many Arab cities we can observe that the blue symbolizes orientation to Mecca. The example of that is Chefchaouen, the Blue Medina in Fig. 10 where we observe that different hues of blue mark paths, accesses, and doors.

The vernacular use of colors defines local identities, prevailing beyond their places of origin. Everything we construct has the specificity of context, and by perceiving the effects of lights, the colors in new architectural interventions may also reflect this diversity of vernacular chromatic use.





**Fig. 10 – Imam Mosque in Iran**

The analysis of color in the urban and rural mesh is essential for the understanding of an identity, where the factor of geographical location becomes the starting point in this process.

#### V. CONCEPT OF COLOR IN GEOGRAPHY

According to the approach to the concept of "Geography of Color" by Jean-Philippe Lenclos, a fragment of construction reveals much information about the characteristics of the place. In a first phase of analysis we must identify the various materials that makes up the chromatic existence, in terms of floors, walls, roofs, doors and fittings among other outstanding elements of each building.

Knowing also that the color has variations throughout the day and according to sky conditions, we must also consider the most visible differences of these nuances recognizing the level of reflection and light absorption of the existing materials. At the same time it still other elements such as shutters, curtains, awnings or advertising elements of a less permanent character, can bring additional chromatic elements to the facade - by their influence in the luminosity or effect of shadow, hence they are important to consider as well.



**Fig. 11 – Neighborhood in Norway**

In the second stage, the identification of color in the NCS system, as already mentioned, there are materials that have different color nuances (physical properties or reaction to the weather), which makes them difficult to identify



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with only one NCS system color. We can assume its inherent color - like the one we draw from a distance observation or else by simulating a juxtaposition of the main apparent colors of that material (brick, coarse grain stones, woods, metals, etc.). In Fig. 11 “the extreme climate means that vegetation is very sparse and the appearance of the landscape changes from snow in the winter to earth and black gravel in the summer. Together with the dramatically seasonal changes in daylight hours, this made the project extremely demanding.

NCS colors of almost equal whiteness, blackness and chromaticness and of medium lightness were found to give sufficient contrast to the environment throughout the seasons and have resulted in a color plan that includes both housing and public buildings.” [3].

The final phase involves gathering the identified color palette, reflecting the synthesis of the chromatic language of the fragment under study. You can make a single palette that reveals colors per building, according to its structure and coating (existing percentage), or presenting a palette of chromatic relations that additionally reveals the variations of color of the external elements to the own structure of the building.

## VI. CONCLUSION

An attitude of distrust or disinterest in relation to ink is an attitude that results in the non-acceptance of color rather than the emanation of materials, and is linked to the concept of building integration in the landscape as the result of ignorance of the use of colors on the so-called noble materials and the ignorance of the history itself, and points to the monochromatic monotony of the façades of our cities. The poetic dimension of color can be seen as a non-functional and also less accessible mark of the buildings. Although, it is a vital dimension: it is the “primary material indispensable to life” [4]. Le Corbusier also said that color is the blood of the body that circulates with a good heartbeat; it is the very sign of life. This study encourage us to the next study: the psychology of color in the 21<sup>st</sup> century.

## REFERENCES

- [1] P. Tom, M. Byron, “Colour for Architecture Today”, Taylor and Francis, Dez. 2008.
- [2] A. José, R. Veiga, “Revestimentos de paredes em edificios antigos” Cadernos Edifícios nº2, p.1, Oct 2002.
- [3] [http://www.ncscolor.co.uk/case\\_studies/architecture.html](http://www.ncscolor.co.uk/case_studies/architecture.html).
- [4] M. Christiane, K. Jean, “Couleurs et Architecture, Les Couleurs de L’Habitat en Moselle”, Editions Pierron, pp. 52-53, 1989.

## AUTHOR BIOGRAPHY



**Diogo, Patrícia** was born in Oporto, Portugal in 10 June of 1980. In 2009 she defended her Doctoral Thesis in Escuela Técnica Superior de Arquitectura in the University of Valladolid called “Núcleos Rurais: uma manifestação de autenticidade” recognized in Portugal by Oporto University . She is PhD and Auxiliary Professor of University Lusíada North, Pole of Oporto and *Campus* of V.N. de Famalicão.