

# Assessing the Function of Light and Color in Architectural View

Gholam Hossein Naseri, Manucher Tamizi

**Abstract**—Light is one of the most important qualitative and symbolic factors and has a special position in architecture and urban development in regard to practical function. The main function of light, either natural or artificial, is lighting up the environment and the constructional forms which is called lighting. However, light is used to redefine the urban spaces by architectural genius with regard to three aesthetic, conceptual and symbolic factors. In architecture and urban development, light has a function beyond lighting up the environment, and the designers consider it as one of the basic components. The present research aims at studying the function of light and color in architectural view and their effects in buildings.

**Keywords**—Architectural View , Color ,Light

## I. INTRODUCTION

**L**IGHT is the first requirement for every visual perception. We can see neither the environment nor the forms and colors in absolute darkness. However, light is not only a physical necessity but its psychological value is one of the important factors in all aspects of human life. In addition to its applied usage, light has a symbolic value, too. Light is a part of the life nature and in many cultures, light or the sun, as the source of light, has been considered and valued as a divine element. Light has also been of special importance in the ancient Egypt. According to geographical location of Egypt, the light intensity and consequently the resolution of light and shade tones are high. The plain and geometric forms with sharp angles used in the Egyptian architecture have had a special effect under the intense light. Le Corbusier's remark about light and shade becomes more valuable here; he says: "architecture is the artful, precise, and attractive play of a group of things constructed under light. Our eyes are created in order for us to see forms under light: these are the lights and shades that bare the forms before our eyes. Cube, cone, sphere, cylinder, and pyramid are the first forms presented to us by light. Their images are clear, tangible, and plain" [1],[2]. But, in Egyptian architecture, the play of light and shade is not limited to the large primary forms. Surface of these masses is covered with embossments designed delicately and curved on stones and hence chiaroscuro phenomenon is repeated in a smaller scale here. To Egyptians, the infinite god is invisible and not accessible for mankind, therefore, it must be in darkness. The way to such a god that must end to darkness from light became a little clearer by such optic phenomena. If we consider color recognition as a "secondary part" of the sense of sight, it shows the lack of awareness of color

recognition. Intensity of light and color recognition are the most essential factors in humankind's visual perception. On this basis we can conclude that in a style with a complicated order, color has more significance in comparison with form rather than in a simple order. The other fact to be concluded from the abovementioned explanations is that in a message, the components relating to color are mostly a part of aesthetic information, while the components of form are mostly related to semantic (hermeneutic) aspect.

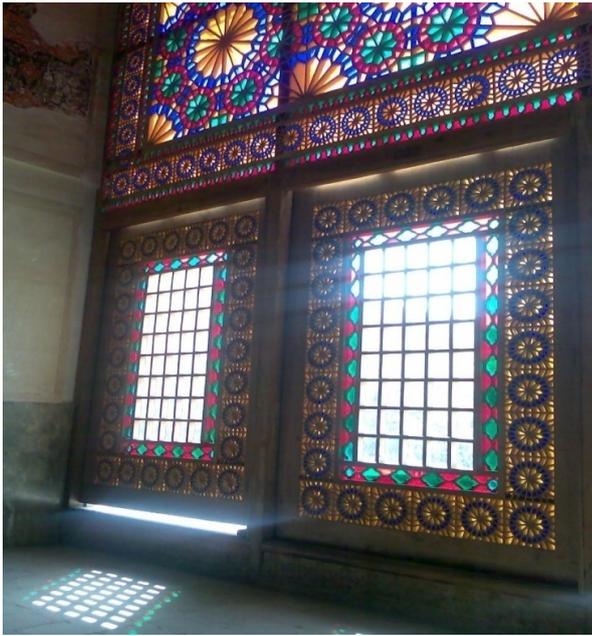
## II. CHIAROSCURO IN ARCHITECTURE

Lighting, whether natural or artificial, and producing chiaroscuro (halftone) in an architectural space are one of the techniques of giving purpose to a construction design. But there are more important responsibilities related to light in a building that the architect is responsible for. These responsibilities mainly include making the light architecturally purposeful. From among them the followings could be mentioned:

1. differentiation of spaces according to their identity by lighting
2. mental and psychological direction of the audience based on consecution of diversity in lighting

These two responsibilities are based upon the fact that humankind has a tendency towards paying attention to and moving towards light by nature. The most frequently used spaces of a building are those in which light is effectively present, and spaces are mainly defined according to the light existing in them.

On the other hand, existence of light is meaningful only if it is near darkness. Therefore, the quality of light and chiaroscuro in every place of an architectural work may have a special meaning, implication, and finally a special effect, and it is the architecture that applies this effect with regard to the goals it follows in intellectual creativity. As a result, a considerable volume of light and darkness (regulation of light in a building) would be available for the architect as a designing tool in order to make the building space favorable, interesting, and harmonic. This playing with light and shade (chiaroscuro) finds meaning with the air flow in the space, and these two are in fact correlative with each other.



(a)



(b)

Fig. 1 playing with chiaroscuro together with air flow in the space, as a designing tool available for the architect

a. Karim khan zand castle, shiraz , Iran

b. Ghavam house , shiraz , Iran

### III. COLOR AND LIGHT IN ISLAMIC ARCHITECTURE

In Islamic architecture, the heavy formless material loses its weight into a stalactite and reticulate forms by engraving decorative designs and carving, and become similar to metaphysical objects, and, in this manner, light is shed on thousands of directions and turns plaster and stone into precious jewels. The arcades of the yard of "Alhamra" and some mosques in the west (Morocco, Algeria, etc) gives you a sense of tranquility and serenity, and they seem to be woven of brilliant radiations of light, and it is in fact the light that has been transformed into crystal. Mankind thinks that the internal material of the interconnected rooms is not stone at all, but it is the divine light, and it is the creative wisdom that mysteriously dwells everywhere.

Function of light in Islamic architecture is to highlight other elements of architecture as well as giving authenticity to the schemas. Jones remarks that virtual plates of light can be created in designing reticulated surfaces through proper control of light. Light can give a special dynamism to architectural form and design and lends it a special effect in every hour of a day and hence through proper combination of lights and shades and creating an ideal contrast between the plates as well as defining a set of tissues for stone sculptures and brick surfaces some external changes can be made.

### IV. COLORS IN MOSQUES

One of the characteristics of Islamic arts in constructing mosques and decorating arches, altars, walls and porches, is how to combine the geometric and curved lines with tones, lights and colors in an appropriate angles and surfaces. The utilized delicate working in this artistic combination and taste not only gives the spiritual aspect and non-material attractions to the architectural works but also opens a world of beauties and the supernatural feelings in front of human beings. This makes an architectural artistic work to have not only one but also the deep aspects.

The internal designs of mosques arched passageways affected by light reflection manifests a sacred space. The columns delicacy and the ceilings brightness with green and blue tiling gaze the eyes as if everything changes into the light and light in itself changes into crystal. When we enter to the mosques, their spaces are designed so that we feel the divine presence tangibly as if the light of fact is radiated on everything.

According to this property, we can mention Sheikh Lotfollah mosque. Most of the architectural pundits also admit that proportions of lights and colors in this mosque enchant the human. Sheikh Lotfollah mosque is the first building constructed around a square which was the creative centre of a new urban complex in Shah Abbas period. The innovative entrance passageway of this construction causes the mosque to be facing Mecca and makes its external facade to be alongside that square. Sunlight enters the covered part of a mosque from the two-half windows in the stem of the arch. Inside the short arch of this mosque has been decorated with diamond-shaped

designs, the size of which decreases gradually up to the arch centre [3],[4].



Fig. 2 observing the proportions of color and light in Sheikh Lotfollah mosque [4]

#### V.CONCLUSION

One of the color psychology considerations which is important in the artistic use of colors, is to study the reciprocal effect of the colors. The effect of each color will change in the neighborhood of the other color and each color manifests its darkness or brightness as compared with the other color. Studying the reciprocal effect of color psychology has a condign importance in color artistic use and the appropriate application of each color can have the special usage in the internal design. The manifestation of each color near the other one shows its real effect and the darkness or brightness of each color appears with regard to other one.

Undoubtedly, light is the first direct comprehensible factor of the world. From the beginning of human birth, the opposition of brightness and darkness has been the basis of human knowledge formation about the environment and appearance of all kinds of believes and philosophical

assumptions. Light has not only an important function in valuation of the architectural elements, but also considers one of the important and determining factors of space. Light and architecture are integral topics. In times past, the architects have found the importance of light in architecture and innovates the intelligent methods in order to use light in the constructions. In Iranian architectures, light has not been used in the same manner and applying these natural elements has been so various. Besides its operational function, light has also the symbolic, artistic, and high functions. One of the elements of designing architecture is the existence of hierarchy in constructions. Usually, the spaces of an architectural construction have not the same value and they also have lots of variety.

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