

**The Visual effects of shadow and light and their role in architectural form.****Prof. Ahmed shehata abo elmagd**

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Optical design is distinct process and must be seen as a single, non-recurring condition, because it considered the human psychological and physical effects by the eye responding to light as well as the effect of the aesthetic appearance, This is illustrated by the architectural formation where the manipulation of light and shade in the production of a building filled with distinctive details, which carries many visual meanings, when returning to the majority of contemporary architectural productions, we find that they consist of a set of configurations that boils down to the material, shape and light in a way that integrates Aesthetic and functional aspect together. The research has raised a question about the methods of manipulating the shadow and light and exploiting the resulting visual effects. Light may contribute to Rendering shapes to become an essential part of the artistic formation process. The natural and artificial light is combined to give a great sense of spatial depth and achieve a new effect within the design, also the falling shadows on different surfaces and materials play a role in producing significant changes in surface characteristics.

This highlights the importance of research in keeping up with the development of technologies that help achieve this integration using advanced technologies and the premise that light is one of the most important factors influencing the design and that the development of technological materials helped to employ light as a basic element of design.

**Keywords:** (light design, architectural design, syntax space).

**problem of statement:**

The problem summarized at the lack of interest in the importance of light and shadow and their visual effects role in the architectural form

**research importance:**

study The mechanisms of using light and shade and the impact on the aesthetics of architectural form.

**Aims of research:**

aesthetic values resulting from the manipulation of light and shadow.

**Methodology: analytical study includes three parts:**

Part one: It aims to identify the effect of light in architecture by studying some historical examples

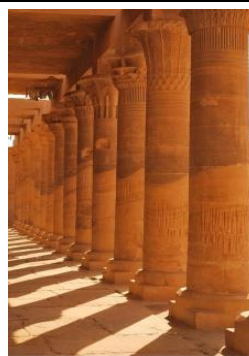
Part two: studying the relationship between man and the surrounding environment

Part three Studying the reciprocal relationship between shape, material and light by studying the effect of light on different materials.

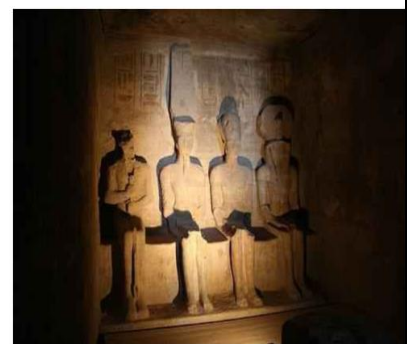
**The first axis: the effect of light in the beauty of architecture**

"Architectural work is only spaces created by the shadow and light, and light itself can make a tangible change in its physical nature in the formation of spaces." The light appeared with form and material as differentiated and intersecting elements in close association to affect mainly the quality of spaces and architectural formations. A rich element of his characteristic characteristic and artistic methods Each part is constructed and decorated and acquired its presence and beauty influenced by the light formed by it, and the realization of the difference between shade and light was not modern architecture, the architect since ancient times took care of this aesthetic singular in its various designs, and this is evident in the effects that See Today, from the various civilizations, we find the pharaonic civilization adopted in giving glory and awe to the temples on the ability to bring harmony in the formation in the shadows

The Pharaohs understood the light and the sun and helped to show the temples as a technical painting. The holy places were buried inside the Temple of Abu Simbel, which darkens most days of the year and reaches the sun only two days after the king's birthday and the day of his coronation on the throne. This is the result of studying the movement of the sun and its effect on lighting and shadows.



**Fig (1) the sun rests on the room of the most holy place in the temple of abu simbel**



**Fig (2) a row of columns was cast their shadows in front of philh temple**

**Fig (3) roman pantheon temple**  
The submerged interior spaces with the upper celestial opening, which aim at ventilation and allow the beam of light to enter the inner space, constitute a feature of the simple internal configuration, based on the power of shade and light. The covering of the void does not contain any inscriptions or decorations.



**Baroque era:**

The architects of the Baroque era were more liberal in the formulation of structural work and in the ingenious handling of the real elements of the buildings and the emptiness they identified  
Fig (4) Church of Saint-Carlo, designed by Puromini Model of the spatial syntax in the Baroque era



**Islamic architecture:**

Islamic architecture also had a share of the aesthetic formation using shadows, which was not only designed to decorate the buildings, but had a functional dimension to protect buildings from the hot climate of the Arab region. This is evident in the use of domes and domes with curved surfaces, The aesthetic element was not limited to buildings of general use, but extended to the house, where the interior courtyards and the façades of the houses were decorated with porches that still remain unique sculptural pieces in their decoration and inscriptions.



Fig(5) Mashrabiya design and the reflection light

**The second axis: levels of the relationship between man and the environment.**

Lighting plays an important role in the effects of colors in the interior space, and the colors themselves have a role in lighting the interior space because the use of light colors increases the light radiation, and the warm colors of the use of the power of light used whether natural or artificial.



Fig (6) Frank Lloyd Wright's interior spaces show the manipulation of light and color and its effect



Fig (7) Integration of Natural and Industrial Lighting at MIT Cambridge Church

Hirbert rid said that Color is an interaction that takes place between a form and the light rays falling on it, in which we see the shape and color, but the external appearance of the shape

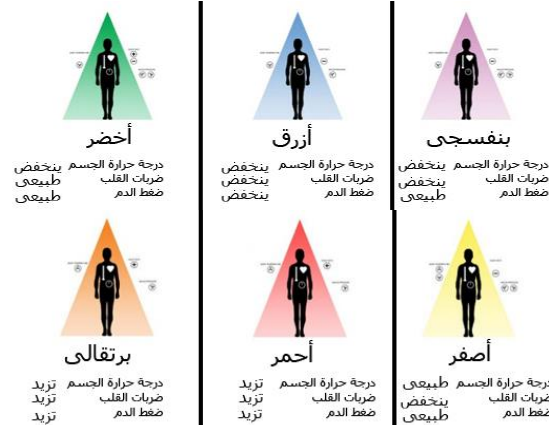


Fig (8) Variation of reactions to color on the human body



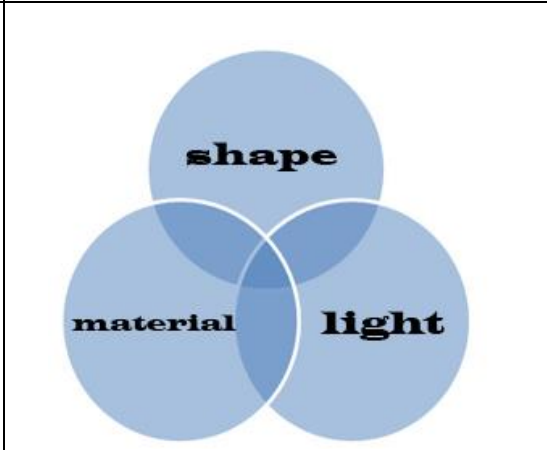
**Fig (9) Distribution the colors in horizontal and vertical directions**



**Fig (10) For example using yellow color gives more stability in the floor, but when using it in the walls it impacts more disturbance**

**The third axis: the relationship between form, material and light is a reciprocal relationship**

The identification of the available materials, their plastic possibilities, their treatment methods and the factors influencing them helps in reaching innovative formations where there is an integration between the material and the form in which it appears and the light as one of the external influences which gives an important influence as a founding element and not complementary to design. Basic in the quality of spaces and architectural formations.



**FIG (11)the relationship of the integration of form, light and material**

**texture**

The texture in architecture is divided into two types: Visual texture: for example windows and doors.

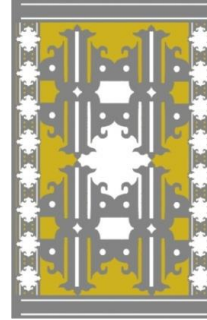
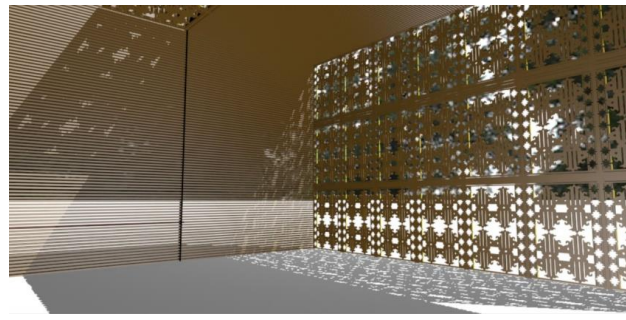


**Touch texture: like building construction,concrete or glass**

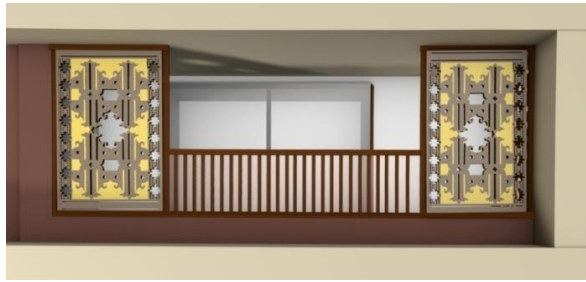
**Fig (12) difference between two types of texture**

also the surface form has an obvious effect on the shape and size of the shadow, also the optical properties of the surfaces affect the perception of its light value.

### First application : the relation between light and shadow and their different effect on different materials



**Fig (13)**The design is inspired by one of arabic calligraphy inscriptions with ornaments floral motifs, which are flexible in lines and smooth.



**Fig(14)** this design is surrounded by similar decorative motifs from the four sides  
The effect of the light permeability varies according to the material applied by the design. The more details of the surface, the lighter it receives the more variations and shadows it reflects

### Seconded application:



**Fig (15)** The character of the arabic calligraphy letters is formed through the design and the material executed by it



**Fig (16)**Arabic calligraphy is characterized by volition of various areas

An internal perspective that shows details of the design effect used to give more privacy to the interior space. The design is based on the use of arabic calligraphy motifs for its characteristic in that it offers infinite opportunities in demonstrating the design skills as it can be used as a decoration with a plastic function. When employing the concept of unloading as a means of shading, it appears in a different sense in the presence of sunlight

### Results:

- There are a number of factors that relate to lighting and directly affect the achievement of optical comfort, including: the shape of space and its size - the different characteristics of the surface of the receiver of light - the type of lighting and colors that interfere with light. - Light determines the human perception of the color within the illuminated environment, affecting his temperament and behavior.
- Illumination plays an important role in architectural formation.

**Recommendations:**

- The need to deal with light and shade as a key element in the design process and not a complementary component.
- Emphasis on understanding the difference between the concept of light and illumination.

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