

Investigating Aesthetics According to Gestalt's Theories and Principles of Architectural Design

D. Moussazadeh, A. Aytug

Abstract—In this study, aesthetics, which is architecture-dependent, covers the interpretable, debatable, and mathematical features. The purpose of this study is to provide a different perspective on the values of formal aesthetics and to analyze architectural forms to examine the factors that are related to the form of architectural works. In this study, the formal factors of aesthetics have been objectively studied and analyzed.

Keywords—Architecture design, Gestalt, architectural principle, museum.

I. INTRODUCTION

AFTER Bauhaus, Gestalt's perception theory, in the formation of the principles of modern architectural design, has had the most effective role today. Given the importance of this theory, the principles of Gestalt and their effect on design have been studied.

Traditional scholars of aesthetics have a long set of rules and principles to meet architectural needs [1]. Architectural design presents the architectural elements in a verified aesthetic system and in the framework of visual rules as a whole. In searching the aesthetics of architecture and in keeping with the interests of different individuals, all the architectural features of the form are used in the design process. In order to achieve the whole from the purpose, they have emerged from the principles and design elements called "Design Principles" and constitute an important part of architectural aesthetic [2].

Finally, given the importance of the Gestalt's theory and the outstanding role of the principles of architectural design in the beauty of a building; in this article, Gestalt's theory and architectural design principles are presented and each of their reflections has been displayed by considering some examples of available museum buildings.

II. INVESTIGATING AESTHETICS ACCORDING TO GESTALT'S THEORY

In parallel with the Bauhaus's movement, a new psychological theory named as Gestalt began between 1920s and 1930s. The term Gestalt in German means form and shape. In Germany, Gestalt's perception theory, presented by Wertheimer, Kohler and Kafka introduced a new definition of perception with its various principles [3]. According to this

D. Moussazadeh was with the Department of Architecture and Technology, Yildiz Technical University, Istanbul, Turkey (phone: +98-9143071927; e-mail: delaram.moussazadeh@gmail.com).

Prof. A. Aytug is now with the Department of Architecture, Yildiz Technical University, Istanbul, Turkey (e-mail: aytug@yildiz.edu.tr).

theory, perception is much more than what the eyes see. Gestalt's theory, as a comprehensive cognitive experience, does not mean separating or dividing the process of visual perception into small components, but rather understanding the form and shape that these elements have created [4], [5].

A. Similarity

In principle, the elements that are similar in terms of form, color, texture, value, direction, etc., are grouped in one class and are perceived as a whole [6].

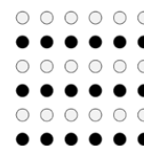


Fig. 1 The principle of similarity



Fig. 2 Sea city museum, WilkinsonEyre, England

B. Proximity

According to this principle, the close elements in a visual order tend to form a visual group [3]. In addition, the closely related components that are in our vision, if they form a group, they attract more attention to themselves. Therefore, they are understood in a more different way [7].

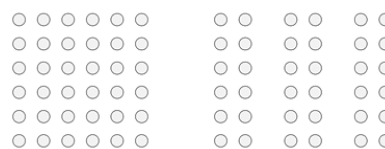


Fig. 3 The principle of proximity

C. Common Fate

This principle is based on motion. Similar forms moving in the same direction tend to form a group and are perceived as a whole [8].

D. Closure

According to this theory, there is no need for seeing all the

components to understand the whole; sometimes, the components direct us to complete the incomplete parts [9]. Closure principle enables humans to comprehend the objects of the universe that are violated or incomplete in the visual world and make them perceive these as a whole [9]. Thus, all other elements are not individually distinguished and change into an integrity, and the structure will eventually be completed [5].



Fig. 4 Museum Aan De Stroom, Neutelings Riedijk architects, Belgica



Fig. 5 The principle of common fate



Fig. 6 Eli and Edythe Broad art museum, Zaha Hadid, USA

E. Continuity

If the elements stay uninterrupted and in connection with each other and continue on the back of each other, their perception become more clear and distinct [7]. The form created by a good unity creates a more regular and effective form [10].

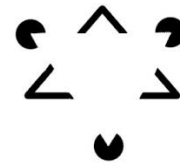


Fig. 7 The principle of closure



Fig. 8 Museum of ocean and surf, Steven Holl, France



Fig. 9 The principle of continuity



Fig. 10 Museo Soumaya, FR-EE Fernando Romero Enterprise, Mexico

F. Enclosure

In the five shapes seen in Fig. 11, only the last one is a rectangular. Four other shapes, no matter how much they are like to the rectangle, undoubtedly, they could not be able to take the full rectangle shape. Because of this, the effect is not definite [10]. In other words, if the boundaries of the shapes and forms that we observe are endless and fully covered by the form that they represent, the perception is a clear and distinct perception.

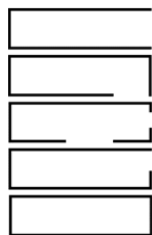


Fig. 11 The principle of enclosure



Fig. 12 Moderna Musset Malmo, Tham and Videgard Arkitekter, Sweden

G. Transparency

The principle of transparency makes a unity in visual comprehension. In an intuitive environment, one can use the principle of transparency to put the different systems together [8]. When one looks at the objects, their depths, which are their third dimension, are not visible. If these are geometric objects, invisible levels can be predicted. However, if the objects are not geometric or maybe they are geometric but they are different in the third dimension in terms of color, texture, and the value of the probability difference, these dimensions are noteworthy. Because the invisible levels are unidentified in the mind, they will prevent a clear understanding of the objects [4], [9].

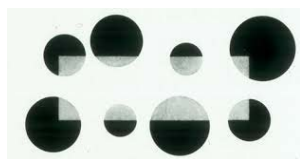


Fig. 13 The principle of transparency

H. Figure and the Ground

In all visual perceptions, there is a relationship between figure and ground, and each shape is perceived on a ground [11]. In the relationship of figure and ground, the figure makes people to be concentrated, while the ground is a part behind the figure and it does not attract. Daniel expresses this relationship as follows: "In the relationship between the figure and ground, in which the superiority of the figure is determined, and the ground lies in the background and gives a sense of depth" [1].

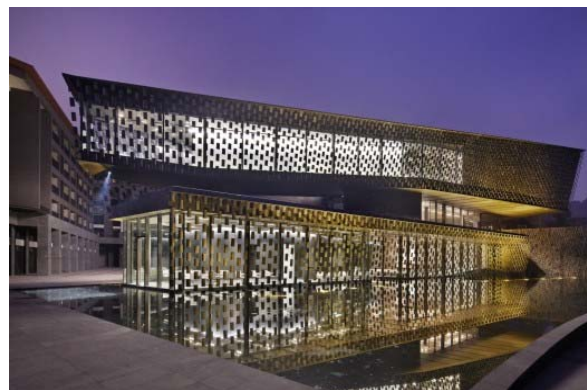


Fig. 14 Xinjin Zhi museum, Kengo Kuma and associates, China

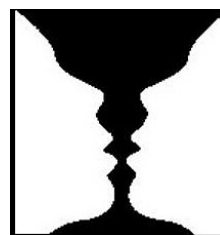


Fig. 15 The principle of figure and ground



Fig. 16 Solomon R. Guggenheim museum, Frank Lloyd Wright, USA

There are two different modes for detecting shape and ground [1]:

- 1) In the case of two different colors, the color used in a small amount is related to the shape and the other one will be for the ground.
- 2) If a visual field is divided into two parts in such a way that one is placed on the top and the other on the bottom, the upper part would be the ground and the lower part would be the shape.

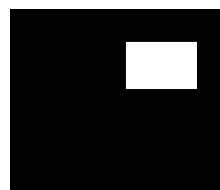


Fig. 17 The principle of figure and ground 1



Fig. 18 Vitra design museum, Gehry Partners, Germany



Fig. 19 The principle of figure and ground 2



Fig. 20 New Acropolis museum, Bernard Tschumi architectures, Greece

1. Depth

Depth should not be used only in the meaning of the third dimension of the body or the thickness of the object. Whether these objects are two-dimensional or three-dimensional, if the object's placement makes us feel that they are located at different intervals from us, these forms and objects can express the depth in such a presentation [10]. Objects that are at our landscape, according to the characteristics of the constituent elements of them, create a sense of proximity or distance in us. Depth can be determined by various methods such as coverage, transparency, the degree of measurement, standard degree of measurement, degree of value, texture, color, luminosity and linear outlook.

Some methods are described in this way [12]:

- 1) Relative size: A small object between objects of different sizes is understood as a further path.
- 2) Linear Perspective: By spacing, the lines become closer to each other.

TABLE I
 THE PRINCIPLE OF DEPTH

Creator of the sense of depth	Creator of the sense of proximity	Creator of the sense of distance
Cover	Covering object	Covered object
Transparency	Transparent object	Sth shown at the behind
The scale of the size	Larger object	Smaller object
The degree of the value	The degree of darkness	The degree of brightness
The value of the texture	Hard texture	Soft texture
The effect of the color	Warm colors	Cold colors
Shiny- matte	Shiny surface	Matte surface
Linear perspective	An object with large dimension	An object with small dimension



Fig. 21 The principle of relative size



Fig. 22 Liangzhu culture museum, David Chipperfield architectures, China



Fig. 23 The principle of linear perspective

- 3) Height at viewing angle: Objects that are located at different heights, in other words, in higher or lower location, create a sense of distance.
- 4) Overlap: Locating an object in front of another in a way that it covers the latter, is called as overlapping [10]. If two objects overlap in the landscape, the part that is partially coated is perceived farther away than the other object, and another object that covers the other object is more closely perceived [12].



Fig. 24 Louvre Lens, SANAA, France

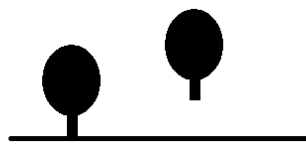


Fig. 25 The principle of height at viewing angle



Fig. 26 Vulcania center Europeen du Volcanisme, Hans Hollein, France



Fig. 27 The principle of overlap

III. INVESTIGATING THE PRINCIPLES OF ARCHITECTURAL DESIGN

Alain de Botton, in his book has studied the relationship between man and architecture, from a new perspective. In his view, architecture is a matter of awareness, and beautifully designed architectural monuments do not follow a thorough theory, but are inspired from certain principles and elements of design. According to Botton, a beautiful structure should be balanced, elegant and consistent; besides, buildings should be the product of knowing people for themselves: Botton proves that beautiful buildings cannot be reduced to rules, but they

can be broken down to certain principles [13].



Fig. 28 Fondation Louis Vuitton, Gehry Partners, France

The formal qualities of a beautiful thing are the order, the rhythm, the harmony, etc. They do not see their source as a reflection of this infinite law. The principles on which these features are based are beautiful, which is like reality. Aesthetics based on such basic principles is objective aesthetics. Therefore, beauty, which is a basic principle is independent from any worldly sense like pleasure and acceptance, and is identical with reality [14].

A. Repetition

Using an architectural element in the design more than once makes repetition. The simplest form of repetition is the linear arrangement of many elements. The elements must be arranged for repeated grouping. The elements are grouped together according to their conception and visual features, depending on their proximity and distance.

There are three types of repetition [15]:

- 1) Full Repetition: Full Repetition occurs when dimensions, shapes, colors, values and textures of objects or shapes are roughly the same and they are used at distinct intervals in the same direction.



Fig. 29 Papertainer museum, Shigeru Ban, Korea

- 2) Repetition: In this type, elements are the same in their dimensions, shape, color, value, and texture. However, their direction and distance are different.



Fig. 30 Museo ABC, Aranguren and Gallegos, Spain

- 3) Variable Repetition: Although there are slight differences between elements used in variable repetition, they are generally understood to be the same.



Fig. 31 Guangdong museum, Rocco design architects, China

B. Rhythm

Since the classic Greeks, rhythm has been focused by aesthetics' philosophers. As a principle of architectural design, rhythm is the regular and consistent repetition of the line, shape, color, or texture of elements in the same extent or with a very little change [15]. Rhythm can also affect movement and direction [16]. When rhythm is used as an existing element, choice of the repeating element is of fundamental importance. In the design in which the elements are repeated without any imitation, the rhythm is destroyed, as in the complexity that occurs in the repetition of meaningless change [8]. Ultimately, the careless rhythm causes the appearance of uniformity.

The use of rhythm was regarded as a natural development of the building before being regarded as an aesthetic judgment, while later rhythm is used for aesthetic reasons. The emphasis on rhythmic elements with materials, colors and texture makes them more effective [16].



Fig. 32 Zentrum Paul Klee, Renzo Piano, Switzerland

C. Coordination

The presence of two or three-dimensional common or similar elements in design is called coordination.

Common or similar points between the elements increase compatibility. Because this principle provides the necessary background for the compatibility and connection between the elements, it facilitates the coordination of the design.

The coordination between elements can be created in terms of dimension, size, shape, color, value, texture and many other things. In addition, the coordination may be created with the direction or spacing of the elements. As a result, coordination does not mean the absolute similarity of elements; it is a connection that is easily understood. For this reason, coordination is an integration of contradiction and repetition [10].

- 1) Physical coordination: In this type of coordination, the size, shape, color, value, texture, direction, and distance of the elements used in the design, are appropriate and similar to each other [11].



Fig. 33 Dingli sculpture art museum, ATR atelier, China

- 2) Formal coordination: Although some elements or groups of elements are not really the same with one another, they may be consistent in terms of compatibility and connection. Because of these similarities, they can easily be remembered [15].



Fig. 34 National museum of Australia, McDougall, Australia

D. Contrast

The contrast is a principle that shows the whole is not created by unity and similar elements, but by contradictory elements. When we consider the concept of contrast with its broad scope, we can see that everything is in the balance of contradictions in the world.

In any valuable work in art, there is no doubt that the balance is solved in the best way by obtaining the contrast. Opposite elements, attract more and more attention. Since one of the most important features of the definition in the visual sense is the concept of contrast. The amount of this contrast depends on the effect. Some of them may be severe, and some soft [5], [13].



Fig. 35 The Dali museum, HOK, USA

E. Domination

In a design, the use of an element or a group of elements that surpasses other elements has created domination. Measurable domination is understood and used faster than other types of domination. However, dominion is not simply created by the measurement, but also it is displayed with value, texture, color and similarity. Also, elements that are repeated in a design govern the others.

F. Hierarchy

Hierarchy is a bridge that connects the first and the end steps to each other [12]. Through this regular connection, a great collection emerges. If there are differences in size between two points, the shapes must be arranged from the

largest to the smallest from one side to the other. There are three types of hierarchies: pivotal hierarchy, central hierarchy, and hierarchy of the environment [10].



Fig. 36 M. H de young museum, Herzog and de Meuron, USA



Fig. 37 Hanoi museum, GMP architekten, Vietnam

G. Harmony

Up to the present day, the concept of harmony or coordination has been used as an objective feature of aesthetics and has been used in the assessment of aesthetics. The beauty lies in the participation and harmony between the elements of the design [17]. In terms of contemporary aesthetics, each entity shows a unity [17]. Motion or tranquility, presence or absence creates a tension in the design that represents a harmony. At the same time, this tension has a force and this force is aesthetics. Also, harmony is not just elements that are arranged in the form of a simple and random manner, but are elements that form a complete harmony in the whole [14].

H. Symmetry

Another feature of aesthetics is the symmetry of the constituent elements of the whole originator [17]. Symmetry is the order of the elements of the whole, and this order is a unique order. In an architectural design, symmetry is used only in simple situations, not because of the specific structure, but most of the time for the sake of beauty.



Fig. 38 The museum of performance and design, Mark Dziewulski, USA

Art is today looking for an asymmetrical beauty. For centuries, symmetry has played a prominent role as an order and an aesthetic subject, and this new theory is formed in contrast with the nature of freedom in humans. Symmetry has created a legal obligation in which human beings lost their freedom in the fixed form and symmetry is seen as an external prison. The power of free imagination and creativity has fallen under the control of their free external forms.

In asymmetric buildings, the principle of unity is used to make them balanced.



Fig. 39 San Francisco museum of modern art, Mario Botta, USA

I. Balance

Since humans naturally have a sense of balance and order, every regular object is more accurate, natural, and beautiful for all people. In addition, people have a sense of balance not only physically, but also mentally and emotionally [2]. To create a successful design, the elements in it should be in a balanced order [4]. Contrary to this, in an asymmetrical scheme, the elements induce senses that are randomly and

transiently arranged next to each other [18]. Balance is created by the volume, direction, shape, distance, texture, color, light and shadow [8]. In order to increase the impact of a design and to emphasize on its importance in general, the complementary or opposite concepts must be integrated in a balanced way [9].

There are two types of balance in architecture [10]:

- 1) Symmetrical balance: The balance is absolute, consistent, and stable; however, it also has a duplicate effect and is often symmetric.



Fig. 40 Museu Oscar Niemeyer, Oscar Niemeyer, Brazil

- 2) Asymmetrical Balance: This order, used in contemporary art and architecture, is the balance of dynamism between visual elements that are not similar. In this way, the design elements are arranged asymmetrically, a type of balance that is difficult to provide but yields interesting results [18].

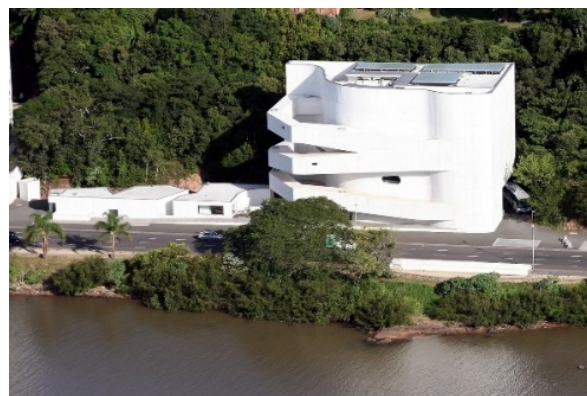


Fig. 41 Fundacao Iberê Camargo museum, Alvaro Siza, Brazil

J. Unity

It is impossible to explain the concept of unity objectively. In architecture, the concept of unity, in front of a building, without the fading of emotions and thoughts, without inducing the need to add or diminish, invites a person to unconditional appearances or gives the visitor a sense of comfort [16]. In short, unity occurs when various objects, spaces or structures are interconnected to create a balanced whole. Even conflicting sections must be in an integrated and consistent manner.

At the outset to create unity, balance is required. Unbalanced unity is impossible. Asymmetric or symmetrical balance does not affect the formation of unity. Unity is

achieved in three ways [10]:

- 1) Conformity method (Fig. 42)
- 2) Domination and variety (Fig. 43)
- 3) Contradiction Method (Fig. 44)



Fig. 42 Muse, Renzo Piano building workshop, Italy



Fig. 43 Leeum Samsung museum of art, Mario Botta, Korea



Fig. 44 Rosenthal center of contemporary art, Zaha Hadid architects, USA

IV. CONCLUSION

The main determinant of aesthetics is the formal world [19]. Therefore, when evaluating the aesthetics of architecture in a building, a formal analysis is initially carried out; this analysis includes the review, completion, the ability to explain and build on the basis of mathematics. Therefore, to determine the reason for the acceptance of a building by all individuals, far from the different place, time and culture, and for generating a general assessment, it is imperative to determine the correct factors [20].

This paper examines Gestalt's theory which believes that the perception is more than what is seen, and examines the visual perception as a shape created by various elements perceived as a whole. Ultimately, the importance of visual perception as an inseparable whole in architecture and architectural aesthetics has been studied considering the role of this theory. As a result, the role of visual understanding of the entire design, regardless of components, is very effective in understanding the beauty of the building.

Finally, the principles of architectural design, which have had an irrefutable effect on the history of aesthetics, have been studied. Therefore, formal aesthetics can be evaluated by considering concepts such as shape, size, appropriateness, rhythm, color, symmetry, harmony, conflict, and unity [19], [21].

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