PHENOMENOLOGY OF PERCEPTION AND MEMORIZING CONTEMPORARY ARCHITECTURAL FORMS

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Abstract. Perception of an architectural form is not a unilateral act which has been often and unduly identified with mechanicistic captures of a camera. In understanding architectural composition and the way it influences our perception and memory, the knowledge regarding the field of psychology of perception and the analysis of principles of its use in architecture proved to be highly important. Instinctive understanding of perceptual processes and of laws according which our visual apparatus and memory are influenced by the architectural form and space is something that cannot be avoided. These are the operating principles of the so called "ordinary" observer; and this is an important insight for architecture as a visual discipline, which has been often neglected. As a significant addition to intuition and experience, the creative work of architects is supported by the insights on perceptual and cognitive processes which have been revealed by the psychology of perception.

Key words: composition (architectural), form (architectural), gestalt (psychology), perception, structure.

1. INTRODUCTION

In human perception, structural environment consists primarily of objects and the space formed by their interaction; though the fact that architectural objects are resulting from the need for space, more internal than external, has been often neglected. In addition to its basic function as the generator of construction of architectural objects, through an external "envelope", this internal space by itself forms the external space or contributes to its formation. The internal space does not contribute (through an architectural object) to formation of the external space only if the structure is formed under the ground. In that case the "existing envelope" has been used by which the existing condition remain constant. The two basic questions which need to be answered at the outset are the following:

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What are the reasons of perception of an architectural form?
What are the principles of the process of perception and memorization of an architectural form?

As to the recent works, the following question needs to be answered as well: which are the predominant principles of composing (as the results of perception) in the contemporary architectural form?

Since they are seldom discussed, these questions could not be answered by relying on knowledge obtained in engineering schools. The topic of perception and memorization is addressed by another discipline – the psychology of perception. The basic psychological theory aimed to define the laws is the Gestalt theory.

Within the framework of psychology itself, the process of perception and memorization of an architectural space is not defined separately as a specific problem, but there is an extensive general knowledge base which is important for this process. In this work, instead of being considered and supported by evidences, principles of perception and memorizing as defined by psychology are used as starting points with the aim to clarify the perceived characteristics of an architectural form.

2. THE MAIN PRINCIPLES OF PERCEPTION OF AN ARCHITECTURAL FORM

Before defining the predominant properties of contemporary architecture by which the peoples' perception is attracted (which is required for memorizing), in addition to the generally known properties, also the properties will be shown by which architecture operates, and for which there is a consensus both in psychology of perception and architecture.

The term architectural form applies to the whole and unique physical structure which man has created by engineering. It is the result of a need for certain and specific function (work, housing, sport, entertainment...)[1]. This utilitarian and social characteristic is what differentiates architecture from a sculpture as a purely aesthetic form, designed and implemented by man into a certain space. The basic purpose of construction of an architectural object is to have a useful space; from this act follows the aesthetic component. In the perceptual process, however, the most important thing is the appearance of the architectural form.

It is important to keep in mind that architectural objects are never isolated. The actual space, whether it is a natural or a structural environment, always represents some context. Objects are becoming targets of human perception mainly in two ways: one way is the moment when the object, by its characteristics, imposes itself as the object of perception; the other way is when the object is focused willingly and purposefully for certain reasons. According to psychology of perception, to see something means to determine its place in the given entity.[2]

To perceive firstly the substantial entity, followed by the perception of its parts, is the basic rule of Gestalt, which makes the essence of perceptual processes. According to psychology of perception, to exclude an object from the context belongs into the domain of selective attention. For selection, it is important to identify the basic characteristics which are important for the perceived architectural object.

Any architectural object has an extensive number of properties, such as the size, number of storey, proportions, colour, materials which have been used, characteristics of style,
and the like. However, the essential physical characteristics of an architectural object are expressed by its structure. Certainly, there are also more complex messages emitted by the architecture to our perception.

During the process of design, there are two persisting problems which are unavoidable. One of them is the problem of gravitation, which needs constant attention and which has to be addressed adequately. The second problem is the structure under design which needs to be useful, i.e. it has to satisfy certain utilitarian purpose for what it has been designed. Considering gravitation, architecture is manifested through the manner after which it overcomes gravitation, which is clearly reflected through the architectural expression. This is not an issue of mathematical nature. Instead, it applies to the way in which people perceive the streaming of perceptual forces, which the so called visual static consists of.

Note that for the perception of an architectural object, treatment of asymmetry of the vertical direction with regard to the horizontal axis of symmetry is highly important. Spatial asymmetry (anisotropy) is reflected both through kinesthetic sense of effort and weight, which is arising in the body, and through the sense of eyesight, since it is known that problems in perception are created by objects affected by gravitation which are not supported. The dynamics of the vertical linear direction is increased by the awareness of vertical direction, through which the gravitation operates.

There is a parallel which can be drawn between the sense of gravitation in buildings and the sense opposing forces in a growing tree. In the tree, as opposed to a building, there are actually operating forces of growth which are opposite to that of gravitation and people perceive it since they know from experience that the process is actually present. Though the gravitation is affected similarly by the tree, this fact has been neutralized by the human awareness on presence of opposing forces.

Indeed, the architectural expression of the Business Innovation Center in Nijmegen (Fig. 1) is reflected by the dynamic of weight-pressure towards the ground. The effect of gravitation has been emphasized by its deflection in the lower storey. The way in which
the contact between the object and the ground has been achieved results in specific perception which depends on the ratio established based on the principle of visual static.

The architectural form offers its "purity" and pleasant experience only by the gravitation being clearly mastered. However, this is not merely a sensual, primal experience, but an experience of "higher order", which makes the spiritual component of the architectural form.

With every novel construction technology, also a new spirit of time has been manifested which is recognized and interpreted through a corresponding style. Style is not merely a "way of playing" in the form. Instead, if correctly analyzed, it is the manifestation of resolving certain technical tasks which are the function of experience of the form.

Based on the fact that architecture has been referred to as art depending primarily on its purpose, and that it would be eliminated by the lack of this purpose, the architectural form which fails to fulfill its purpose is unconvincing.[3]

For the architectural form to be experienced completely, a successiveness of motion is needed which is thereby inseparable from the time factor.[4] For the architectural piece to be fully understood, it is necessary to combine the sequences "collected" by moving through the object and around it, so the time is often defined as the "fourth" dimension. Perception always has to be supplemented by memorizing.[5] However, the wholeness of the architectural form which is obtained in this way is not considered "sensory unrealistic ", because it is not recognized by senses.[3]

The aesthetic component of the architectural form is considered to be the second plan which occurs as the result of a pleasant feeling in the process of observation.

In some works, the basic component and the reason of perception lie in the overemphasized manifestation of the structure. Such a form is called "engineering architecture", with Otto Frei, Buckminster Fuller, Pier Luigi Nervi, Torroja, Fresine and the contemporary but already legendary Santiago Calatrava being the famous artists in that domain (Fig. 2). New technologies and constructive possibilities of a certain epoch are clearly manifested by this architecture, but such pieces of art can "exist" independently and outside the parent context. Although there are different ideas, it is necessary to note that the construction primarily needs to "serve" the building, but not to demonstrate its "muscles".[6]

Fig. 2 "Engineering architecture" of Santiago Calatrava; a refined form, but without respecting the context. A strong manifestation of the structure in every case.

However, the quality of the architectural piece is influenced by the clear structural characteristics which are one of the important factors of perception, but to rely solely on them creates a predefined impression. The possibility of transforming the architectural
form into a brand is enabled by the expressiveness of the character of the sign itself. Highly successful examples of this are the Museum of Contemporary Art in Belgrade and the chapel in Ronchamp, created by Le Corbusier (Fig. 3).

Fig. 3 Antic & Raspopovic: Museum of Contemporary Art in Belgrade and Le Corbusier's chapel in Ronchamp. The structure and the expression of the architectural object are translated into a brand.

The same group of successful examples includes also the legendary architectural pieces where the structure and the expression are translated into brands; these are Jorn Utzon's Sidney Opera House and Frank Lloyd Wright's Guggenheim Museum in New York City (Fig. 4).

Fig. 4 Sidney Opera House and the Guggenheim Museum in New York City. The objects' clear structure is translated into a brand.

The fact acknowledged by the psychology of perception is that the visual experience is dynamic. [7] The dynamic features of an architectural form are one of its three main features. Note, however, that not every structure built for utilitarian purposes may carry the epithet of architectural piece.

Every architectural composition has certain more or less dynamic features which are perceived as decrease or increase of tension. This dual dynamic is reflected in tendency towards motion-action and contrary, towards settling down. This dimension cannot be measured mathematically nor experimentally; it exists only on the level of conscious illusion. According to psychological theory, the "illusion of motion" is not the same as the perception of motion as the result of dynamic features of the spatial composition.

In his discussions, stating that the colorful style is based on the impression of motion, Velvflin has thought on baroque primarily as of architecture of dynamic processes.[8] Here, pictures of objects of distinct dynamic features and clear tendency towards the illusion of "frozen" motion have been shown.
However, what is explicitly emphasized in the above mentioned examples is the dynamic which exists in all architectural objects. This can be seen in the Parkhaus Engelenschanze in Stuttgart, where excellent dynamic features were achieved by the highly emphasized gates for the moving cars, while the hypermarket in Houston, constructed in the manner to give the impression of a building that will collapse at any moment, is one of the first deconstructivistic objects (Fig. 5).

At the end of defining the properties which are important for the process of perception and memorization, the meaning of every architectural form has been also considered as important. The stronghold in the area of psychology for this segment of consideration is in associative thinking, which is based on the observer's previous experiences. Through the example of perceptual illusion, known as the "duck-rabbit" illusion, it is clear that these perceptual codes are one of the important factors (in addition to the structure and dynamic) based on which architecture is perceived and memorized. When looking at the duck or rabbit, i.e. the two headed monster, there are three possible variations of illusion. The same applies to the building of Kisho Kurokawa, which may be interpreted in several ways, some of which are only some of the attributes, e.g. a stack of Lego bricks, a pile of washing machines, bird cages. (Fig. 6)

The conclusion is that the language for deciphering the codes of architectural pieces depends on previous information obtained by the people, and their general and personal
culture. Certainly, the ambiguity of codes is something which has been verified by the above examples.

Fig. 7 The well-known "duck-rabbit" illusion; Kisho Kurokawa: washing machine, bird cages, Lego bricks … or?

Fig. 8 shows metaphoric in the chapel in Ronchamp, drawn by Hillel Shocken, which is highly persuasive when compared with the structure's physical appearance.

Fig. 8 Metaphoric by Hillel Shocken; Le Corbusier: Ronchamp. The acoustic analysis of the wall has been done by Rifat Alihodzic

It seems like the meaning of the architectural form is relying on the complex interaction of hiding and showing.[9] Human experience simply enables to compare and find only known images "from the treasure of memory". This has been shown by the complex interpretation of the Guggenheim Museum in Bilbao. When speaking of metaphors, also the Sidney Opera House has to be considered. Figure 9 shows only two of the multitude of associations resulting from its form. "Shark tail" is one of them as well as the mating turtles. The way in which contemporary architecture operates has been understood by the "Permasteelisa group" (the right hand side of the same figure) on the basis of extremely simplified structure of this object, by which the company has translated it into its own brand. This is a complex projection and an inspired compliment for the Sidney Opera House.
Fig. 9 Metaphoric of the Sidney Opera House (www.hipernova.cl.com) and a caricature made by the students of architecture in Sidney (made in the time of opening of the object by the queen in 1974.

The "material" of an architectural object which has been memorized is the best verification of characteristics of the perceived object. In psychology, "crystallization charm" is a proven process during which the shapes have been simplified, but always within the framework of the specific structure. Accordingly, architectural pieces without explicit individual characteristics are "condemned" to be forgotten more easily and quickly since they lack adequate elements which are convenient for the process of memorization. As it has been shown by the previous discussion, these elements are reduced to structure, dynamic and the meaning of the architectural object. It is not necessary for every object to contain each of these elements as the reason of perception and memorization. The quality of an architectural piece, however, is indicated by the presence of all of these elements.

The following is the important question from the architecture: which of the structures being observed will be chosen as the object of attention and for what reasons?

The answer based on Treisman's theory seems convincing. It consists of two stages of vision which verify the previous statement: the "early vision", characterized by the perception of basic features, and the "focused vision" with the task to form the perceived object's whole image with its all features.

According to this theory, important thing is the stage of "early vision" containing the reasons for choosing the object of perception. This is also the requirement for the object to be memorized. The experiments of Treisman et al. are in favour of compatibility with the idea on spatial "excess". (Fig. 10)

It is easy to see that in such defined situation the Tower of Pisa is separated from its environment by "excess". The "excess" has been made by the Tower by deviation of its vertical axis from vertical direction. It is significantly different regarding the other objects in the perceptual field. On the right hand side figure, where a district of Florence is shown, there are no objects which express the elements of "early vision"; to find less drastic individual differences between the objects "focused vision" is required.

Based on experiments of Treisman et al., the argument for defining the answer to the above question, i.e. which of the structures being observed will be chosen as the object of attention and for what reasons, has been obtained. For example, these are the identified specific properties by which the Tower of Pisa has been selected to be the object of "early vision".
In the discussion of perceiving an architectural form, the structure, the dynamic features and the meaning were emphasized as the most important characteristics for perceiving and memorizing an architectural object, with the object's structural properties being the most important.

Which of the three characteristics existing in the process of "early vision" needs to be given priority?

Based on Treisman's research, it may be concluded that the "excess" is the most important factor of perception. This may be translated into the statement that the object's dynamic features, or the perception of motion of the composition, are the most important factors by which the perception is stimulated in its early stage (Fig. 11).

The previous discussion has been based on the extreme spatial correlation of objects of which a specific entity consists. When objects are of unified dynamic properties, the space may be dominated or self-imposed by an object for other reasons as well. These
properties are primarily the quantity, a predominant colour, specific details and materials, belonging to certain type with explicit characteristics, or a unique and original approach, as well as the incompleteness of the object under construction.

The perception itself is not a sufficient and complete process, since the human brain is engaged with cognitive data processing. This processing is not merely a reproduction of the perceived space and form, and is not the same in all subjects.[10] The final perception of any object depends on characteristics of other "input data".

3. ANALYSIS OF THE PREDOMINANT CAUSES OF PERCEPTION AND MEMORIZATION OF CONTEMPORARY ARCHITECTURAL FORM

In cognitive processes there are three predominant pieces of information among the most frequent and intense stimuli from the environment: speed, strength and accuracy.[11] This data is easy to verify by numerous examples of the historical development of both machine and architectural forms (Fig. 12).

![Fig. 12 The strength, speed and accuracy are reflected by all levels of development, both in machine and architectural objects](image)

Both quantitatively and qualitatively, transformation of the architectural form had become a product depending on the growth of strength, speed and accuracy which is obtainable in the technological process. Speed, as an important determinant of the material and spiritual environment has become an important element of the modern shaped expression, not only in locomotive, automobile, airplane, but also in the architectural object itself, where the trend is ranging from the once hard-to-obtain amorphness to aerodynamics.
In contemporary architecture there is an obvious trend of neglecting the context of building. Examples for this include some buildings of the contemporary architectural production, the quality of which has been praised by all the critics. One of the examples is the freshly opened MAXXI National Museum in Rome, by Zaha Hadid. In fact, any piece of her creative work may be included into the analysis with stated ideas on causes of attraction of the human attention, and thereby memorization.

Fig. 13 MAXXI Museum in Rome, by Zaha Hadid. Absence of context and the spatial "excess"

In order to draw more solid conclusion and give a clear answer, several other buildings of praised authors, which have been designed in the last two decades, may be considered. For example, almost all pieces of Frank Gehry are bearing the identical composition matrix, which is based on the absence of respect toward the ambient and reliance on the effect of spatial "excess".

Fig. 14 the identical composition matrix used by Frank Gehry: spatial "excess".

By his deconstructivistic approach in every situation, Daniel Libeskind maintains the same approach to the environment, creating structures which induce "early vision". The human visual apparatus is intrigued by the objects' complexity, which is characterized by psychology as "focused attention".
In addition to the previous examples, also the Danish architect, Rem Koolhaas should be mentioned, with his characteristic buildings but essentially the same approach maintained by the previous authors. Koolhaas says that he is well aware that architecture which is now being created is an insult to the ambient where it has been implemented, but it has resulted from the investor's requirement for the effect, which is nothing but a spatial "excess".

Here, the architect Norman Foster should be mentioned. He also contributed to shifting the architecture towards the direction which is considered as predominant in contemporary architecture. Remarkable examples have been created in London and Moscow: a city hall and the "crystal island" project (Fig. 20).
The works of the five leading contemporary architects by which actual directions of the architecture have been somewhat defined, may be considered as referential for this research. According to the project of the leading architect of the "Morphosis" group Thom Maine, arrogance towards the environment is not abating but is becoming widespread. His design of office building will be constructed in La Defense, the well known new part of Paris. But, not so long ago, the late French president Francois Mitterrand gave Paris a hollowed building in La Defense, called the New Arc de Triomphe. Designed with the ambition to play the same role in its ambient as the role the Arc de Triomphe plays on the Etoile, it is situated in the axis of Champs-Elysees (Fig. 18). It is not difficult to imagine what will be the "effect" of this form in the environmental space after the realization of Thom Maine's office tower.

Fig. 18 Novel's Arc de Triomphe as the planned benchmark on La Defense and its present destiny (right)

The architectural object has always represented an ideal means for creation urban and spatial benchmark of other environments. By analyzing the history of architecture, it is obvious that today there is an explicit tendency of several architects to assign their building exactly such a role. Without an in-depth analysis of the causes, it may be emphasized that such an attitude has been supported also by the investors; which may be well seen in the Fig. 18. The Arc in La Defense would have become a planned urban benchmark, provided if it remained of designed proportions. Every new building in its surroundings, however, has been erected with the same purpose.

By deviating from the context, new conditions are usually created for any object to become what is called benchmark, but only on local level (street, bloc). This is also the case with Frank Lloyd Wright's Guggenheim Museum, which indicates that the trend under consideration has originated in the mid 20's. By deviating from the context, this museum had become a perceptual focal point, becoming the centrifugal force of spatial events in the perceptual field, though for Robert Venturi this building is just "another anomaly on the Fifth Avenue". [1]
Comparative analysis of architectural pieces of six famous contemporary architects indicates that they certainly possess a shared predominant characteristic. From the three important components by which the architectural object's perception is affected (structure, dynamic and meaning), dynamic is the extreme property possessed by all buildings. Full affirmation and growth in strength, accuracy and speed, which is the reflection of the ongoing epoch, have been clearly manifested by the second characteristic (structurality). The extent of defying gravitation has been never greater, which is reflected by the eruption of perceptual forces, opposing gravitation. The ranges of structures have been increased, and the size of cantilever outing is not a problem anymore. This is yet another proof for the fact that the time in which it has been created is truly reflected by the architecture. The metaphor of the above presented objects varies which needs a separate analysis.

4. CLOSING REMARKS

Based on the identified principles of perceptual organization of the architectural form, a case-study analysis concluded that the structure, dynamic expression and the meaning are the most important properties. This conclusion relies on the origins of the Gestalt psychology and its rules of perceptual organization. The phenomenon of "early vision", defined by Treisman & Gelade has also proved to be an important element of intriguing human perception and leading to "focused attention" which further leads to cognitive processes and the process of memorization. To explain one of the main reasons for entering architectural object into the observer's field of vision, the term of "spatial excess" has been introduced, increasingly accounted for by modern architecture in its expression.

The increasingly frequent disrespect towards the environment and the treatment of every object as urban benchmark (which is certainly impossible) are consequences of such attitude. Concentration of visually "ambitious" forms leads to "visual buzz" in our perception. Such an attitude of contemporary architects is becoming increasingly dominant, with the tendency to become a serious creative direction.

The growth of energy as the result of technological advancement of our era is the cause of increasing speed, strength and accuracy, which has been reflected upon the structures' architectural expression. In this way once again architecture shows its constant
role of social litmus, as the consequence of all events in human lives. This is due to the fact that the strength, wealth and technological advancement of large investors, multinational companies and significant social events are manifested through this kind of architecture. All things by which the architecture is affected are leading to conclusion that architecture is less free of all arts, and that the architect is its important but not the only creator.

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FENOMEN OPAŽANJA I PAMĆENJA SAVREMEÑIH ARHITEKTONSKIH FORMI

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Opažanje arhitektonske forme nije jednostran čin, koji se često i nespravljeno identifikuje sa mehanističkim predstavama fotografskog aparata. U razumevanju arhitektonske kompozicije i njenog uticaja na naše opažanje i pamćenje, pokazalo su se veoma važnim poznavanje dostignuća u oblasti psihologije opažanja i analiza principa usmerenih na primenu u arhitekturi. Instinktivno shvatanje perceptivnih procesa i zakonitosti prema kojima deluje arhitektonska forma i prostor na naš vizuelni aparat i memoriju su nešto što se ne može izbaci. Po tim principima funkcionise tako zvani „obični“ posmatrač, a to je za arhitekturu kao vizuelnu disciplinu, što se često zapostavlja, važna spoznaja. Saznanje o perceptivnim i kognitivnim procesima kojih je došla psihologija opažanja doprinosi arhitektima u njihovom stvaralačkom radu, kao značajna dopuna intuiciji i stеченom iskustvu.

Key words: kompozicija (arhitektonska), forma (arhitektonska), geštalt (psihologija), percepcija, struktura.