Defining the Principles of Organic Shaping while Classifying Organic Architecture

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Abstract. The creation of organic forms brings architectural objects closer to the organization and needs of a human being. With all the variety of design approaches, it is possible to identify the basic principles of organic shaping, helping to avoid superficial "mimetic" solutions. Classification of approaches of organic shaping in the architecture of the 19th–21st centuries provides a complete analysis of the material necessary to derive such principles, as well as the conceptual one-sidedness, in which one possible solution is prioritized. Developed by the author tables help to master a wide range of areas and approaches of organic architecture.

Keywords: organic shaping, organic architecture, co-proportion with a human being, ecological architecture, classification of organic architecture

1. Introduction

The loss of the integrity of architectural objects and complexes, increase of visual and physical "pollution" of space, the impossibility of creating urban ensembles for economic reasons – all of these processes raise the question of the creation of architectural objects and systems that are commensurate with the mental and psychological organization of a human being, bringing a sense of harmony, nurturing and enhancing it [see: 26]. As a paradigm shift for urban development (from industrial guidelines to neo-industrial) these trends have an opportunity for implementation.

At the same time, environmental trends in culture are gaining strength, a healthy lifestyle is becoming popular when a number of companies, places, cities need to communicate their "advancement" in this area. The easiest way to do this is by means of organic architecture, receiving, if not widespread, but confident spread in the world.

The concept of "organic architectural shape" comes from the idea of the necessary integrity, internal structure and deep connectivity of parts of the object of any scale, designed by an architect. We are not limited to an interpretation of the organic approach declared by L. G. Sullivan and F. L. Wright, finding sources in the architecture of much earlier periods [6].

The methodology of the paper is based on the analysis of both the objects of architecture and the creative attitudes of their authors. The research is hampered by the lack of recognizable features of the external form, which could be clearly attributed to the object to the organic architecture: buildings can have very different looks but can be made using organic shaping. A small number of objects corresponding to the parameters of organic architecture in modern Russian cities complicates professional reflection.
The first attempt to review all organic architectural approaches belongs, most likely, to B. Zevi (1918–2000), after moving to the United States under the influence of the ideas of F. L. Wright and L. Sullivan [34].

In the Russian-language theoretical literature of the beginning of the 21st century, we can find a small number of references to organic architecture, mainly in relation to the objects and programs of F. L. Wright, who owns the introduction of the term "organic architecture" [30], as well as other proponents of the organic approach in modern architecture – A. Gaudi [29], E. Saarinen [16], R. Steiner [24] M. Budzynsky [3]. The principles of organic architecture are stated in [28], but they are not confirmed by the analysis of objects. The most informative works are by [19], [30].

The following works published abroad should be acknowledged: W. Auer, L. Bachman, G. de Bruyn, M. Zbasnik-Senegro, L. Kroll, H. V. Kruft, R. Motro, A. Njoo and others, whose individual approaches disclose their ideas, creative principles, including about regional versions [21]. We have not found a systematic presentation of the development or classification of organic architecture in these sources. Sometimes useful information is contained in interviews with architects [15]. An extensive database of photos of organic architectural solutions is collected in [14]. The most structured information on the topic is in the Volkania website.

In this paper the following sources were also used:

- references on the history of aesthetics, enabling the development of key concepts of the study [5; 9; 10; 32];
- the authoritative writings of theorists and practitioners of architecture, allowing to understand its essence, features independent of style or technologies [7], [8], [23], [25].
- the critics of modernist architecture, R. Venturi and his co-authors [31], R. Koolhaas [17] et al., which has parameters being far from the organic architecture. The latter makes it possible to draw a fundamental distinction that helps in defining the organic architecture of the 20th–21st centuries: organic architecture is a reaction to all versions of modernist architecture and is opposite to it, first of all, as a creative program and a way of project thinking. At the same time, the study of the evolution of architectural thought shows the deep connection of organic architecture with the ancient tradition.

Conceptual and methodological framework influenced by the ideas of Ch. Alexander [1] and N. A. Salingaros [26]. It lies in the fact that organic shaping makes architectural objects closer to the physical, mental and psychological structure of a person, and therefore satisfy his needs and contribute to his comfort.

The comparative-historical approach ensures the balanced vision of the subject of the research on the basis of the idea of invariant characteristics of objects of organic architecture. The morphological analysis allows us to assess the sequence of implementation of organicism as a design and methodological prescription by the architect.

The study of the works of architects who share an organic approach or are inclined to it, allows us to revise the traditional classification of architects in different directions. Generalizing the characteristics of organic architecture by different researchers [2; 11; 13; 18] shows, the organic form and its design do not require following the rigid style features, and therefore may be generated by authors who share approaches to different styles [4; 12; 20; 27]. In other words, the organic form in architecture is not so much the result of following a rigid set of rules, as the implementation of conceptual and philosophical, scientific and theoretical set-ups. The movement in this direction is of meta-project nature, i.e. it is of primary importance in relation to the definition of formal stylistic features of an architectural object [22; 28; 33].

Hence, the strive for organic shaping can be found (to various degrees) in the works of architects belonging to different approaches. We think that the main requirement, which must be observed, is awareness, a professional reflection of this desire. This is not always the case. Designers may have spontaneous aspirations for organicism being influenced by the best examples or authoritative opinions, as well as by the aesthetic and compositional grounds.
Results. The comparative historical morphological analysis allows classifying representatives of organic architecture by historical periods and regions, highlighting the invariant principles of the approach and specific historical features.

So, for the antique architecture and the subsequent classical traditions: morphological and visual primacy of the whole to its parts, which is determined by the comprehension of the whole by an architect; the individuality of the object when it is executed on the basis of the theory of proportions and the standard algorithms of construction; the isomorphism of an architectural object to the organization of the natural world.

The Western European Medieval organic form is a structural clarity and subordination of dimensions; integrity, clarity, proportionality (F. Aquinas); the presence of a symbolic aspect of the form, which is created by an architect just as the world was created by God.

In the organic architecture of L. G. Sullivan and F. L. Wright, the primary focus is on the visual and spatial relationship of the object with the environment with insufficient elaboration of internal structural relations.

R. Steiner and his followers (until present) are characterized by a reference to the first phenomenon; shaping the building according to its natural environment; the use of the principle of self-similarity; refusal to imitate the external shape of natural objects.

A. Gaudi and his followers are known for working with structures similar to the structures of the living followed by the decoration with local natural materials; transformation of natural forms into abstract, geometric curvilinear shapes, introduced into architectural solution and providing its connection with other forms of a particular culture; individualization of both the whole and its elements of different size; the principle of "sacred ugliness" of the form [29].

The architecture of S. Kalatrava is based on the understanding that organic architecture does not have stable formal features. It is focused on the person not only as a carrier of needs but also – in the unity of his physical and mental features – as the starting point of any architecture. In this regard, it is not a method of design, but rather a certain way of creativity [Ivy]. It is characterized by real, not imitative, the expressive pronunciation of forms, just like nature, it does not stand still. Dynamics is about the organization, not chaos. It is not accidental that the researcher P. van der Ree characterizes deconstructivism and organicism as two types of architects' works with dynamic forms that are opposite in terms of idea and result [30].

K. Alexander and N. Salingaros put physical and mathematical correspondence of architectural forms to the laws of nature at the forefront. Along with the traditional indicators, they operate with the vocabulary of the information approach, which allows evaluating, for example, modernist forms, as a variant of the degradation of architecture, due to the loss of its necessary multilevelness and connectivity.

In general, the organic architecture of the second half of the 20th century becomes more diverse; it overcomes the only interpretation as an imitation of natural forms which is replaced by an understanding of organic architecture in the unity of structural, aesthetic, social and environmental aspects, taking into account the external relations of the designed object. At the beginning of the 21st century, there is an active development of regional versions of organic architecture; regional trends develop alongside international; the desire of architects to create complexes - microcosms, arranged according to the laws of the organization of the living, is increasing; attention to the users of architecture is increasing. At the same time, due to the general growth of environmental trends, organic architecture becomes image-building, especially for public buildings and structures; the form at this stage involves the inclusion of technical components, including those contributing to the "sustainability" of the building.

2. Discussion

The classification of various organic architectural approaches is made according to the authors' understanding of the concept of "organicism". The chronological division is advisable only in the early stages of the collection of material because it allows you to identify specific historical and regional
identity through the comparative analysis. In order to generalize the material and highlight the invariant principles of organic formation, it is necessary to take steps of a higher level, namely, to isolate the General points present in the architects of different eras and regions. In its turn, the identification of the degree of consistency of organic shaping in the projects of different architects allows us to further develop recommendations for the use of an organic approach in various projects, different types of buildings, etc.

We emphasize that, following the majority of architects and theorists, we generally withdraw from consideration mimetic, imitative forms, only externally resembling natural and, in fact, are examples of styling – works with the outer shell, capable of enhancing the commercial attractiveness of the object.

Classification is made in three directions of organic shaping, further presented in tables. These are:

- a form as a rationally (consciously) organized whole conditioned by structural goals (Table 1). This aspect requires an additional explanation of the term "rational", in the 20th century traditionally identified with the industrial nature of the creation or machine organization of architectural form. In fact, rationality since ancient times implies the realization of the goal, the purpose of the object in all its diversity of semantics and functioning for the human being, consistent expression of this goal by architectural means;

- a form as a whole close to nature, including sensual-emotional and even irrational and decorative elements (Table 2), what K. Alexander calls "roughness" or "inaccuracy" of form. These qualities are associated with a deviation from regularity or perfect symmetry, can be caused by taking into account the natural or urban environment. Surprising as it may seem, they strengthen the internal connectivity, and hence the stability of architecture, bringing necessary for life asymmetry and hierarchy in its forms. This option in Western European architecture, which is under the significant influence of classical tradition, appears quite late and is reflected in the examples. In addition, it echoes the Taoist-Zen interpretation of the form, gradually penetrating into the world architecture since the end of the 19th century;

- a form as a whole, which is dominated by spontaneous, irrational, even mystical moments, especially when it comes to cult architecture (Table 3). Paradoxically, almost all representatives of the organic approach come to this interpretation (for example, here: [26]). Images of their architecture, however, do not recreate the appearance of living organisms but have their own logic and expressiveness.

**Table 1.** Rationalistic shaping in the organic architecture of different periods and regions

| Time and region | An object of organic architecture | Information about the object and comments |
|-----------------|----------------------------------|------------------------------------------|
| Antiquity, proportionality, which defines not only functional but also the semantic subordination of parts to the whole, including nature ("cosmos") | Ancient temple. Garni, Armenia. I century. Photo: A. Manukov. The architect makes the base and steps higher, enhancing the effect of the already huge height of steep mountains |
| Time and region       | An object of organic architecture                      | Information about the object and comments                  |
|-----------------------|--------------------------------------------------------|----------------------------------------------------------|
| Late Middle Ages.     | Amiens Cathedral.                                      | Amiens Cathedral. France. Detail. Architects: Robert of Luzarches, Thomas de Cormont, Renaud de Cormont. Beginning: 1220. The impossibility of reducing the whole to parts is clearly visible, and so, like the Universe created by God, the whole structure is organized. |
| Western Europe.       | Dana-Thomas House.                                     | Dana-Thomas House. Architect F. L. Wright. Springfield, the United States. 1902. Source: website architime.ru |
| The whole, not reduced to the sum of its parts, and therefore has a deep symbolic meaning within the theocentric worldview |                                                          |
| XX century. The USA.  | Mediopadana railway platform by architect S. Calatrava. Italy. 2018. Photo: MEGLIO |                                                          |
| The organicity of the human environment, the connection of all elements of the architectural form, including the material |                                                          |
| Twenty-first century. Western Europe. Design that creates and organizes the necessary space. |                                                          |
**Table 2.** Form shaping based on the understanding of form as a whole, including sensory-emotional components

| Time and region                                           | An object of organic architecture | Information about object and comments                                                                 |
|------------------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------|
| The end of the nineteenth century, Europe and Russia        | ![Image](image1.png)              | Home of Talberg. Architect E. Saarinen. Finland. 1897-98. Slight asymmetry and rhythmic disturbances enhance emotional expressiveness [Jetsonen J.,] |
| The second half of the 20th century, Europe                | ![Image](image2.png)              | The main building of the faculty of Humanities, Catholic University named after Peter Pazman. Architect I. Makovec. Hungary. 1995. |
| The 2000s, the architecture of symbiosis                  | ![Image](image3.png)              | The building of the cancer center. Swansea, UK. 2006. Architect K. Kurokawa. Source: http://www.archplatforma.ru/ |
| 2010s., China                                             | ![Image](image4.png)              | Gallery in Shanghai, China. 2009-2011. Architect: Atelier Deshaus (LiuYichun / Chen Yiming) URL: http://www.deshaus.com/en/works15.HTML |
Table 3. Interpretation of the architectural shape, dominated by spontaneity

| Time and region | An object of organic architecture | Information about object and comments |
|-----------------|-----------------------------------|---------------------------------------|
| The 1920s, Europe | Residential building. The Complex of The Goetheanum. Architect R. Steiner. Germany. 1924-28. Photo: H. Kuhle. |
| The 1980s, the USA | Lencioni Residence. Sanger, California, USA. Architect Arthur Dyson. 1986. |
| The 1990s, Europe | Residential building “in the Meadows”. Bad-Soden, Austria. 1990–93. Architect F. Hundertwasser. Source: http://housing.totalarch.com/ |
| The 2010s, China | Exhibition center of OTOG. Erdos, China. Architect K. Wong. 2019. Source https://www.arch2o.com/ |

Along with the above, it is possible to classify objects of organic architecture by the method of creating the basic elements of the shape. Summarizing and systematizing historical and modern material, we identify eight main options. We show them on a scale from the most "speculative" to more and more empirically-based, leaving the chronology behind:

- Movement from the idea of the architect of living objects, imitation of the structure and the appearance of the living, often with the loss of its structural and organisational features (R. Steiner, Z. Hadid, representatives of parametrism, etc.)
• Geometric differentiation of the integral architectural form (antiquity, versions of the classical approach, E. Saarinen et al.) in accordance with the laws of the world order, as it is speculatively and mathematically understood and expressed by the architect.
• Approximation to organic shaping through the achievement of the structural integrity of the object (F. Candela, K. C. Yoon, Avanto Architects, etc.)
• Creation of a shape as a structured proportional whole, which determines its parts, just as the forms of the living are organized (Gothic and later Gothic versions; Russian modern).
• Geometric abstraction of architectural shape from the original natural forms (A. Gaudi, Akihisa Hirato, etc.).
• Modeling of the structure of architectural objects according to the laws of the living (B. Hetger, S. Calatrava, G. Lynn, etc.)
• The materialization of regularities of the surrounding landscape in the architectural shape (F. L. Wright, F. Hundertwasser, A. Blok, T. Alberts, etc.)
• Development and calculation of the architectural shape as a part of the landscape, becoming a whole in relation to it (environmental approach in Russian architecture, B. Prince, G. Keller, Annti Lovag, Christian Müller Architects etc.).

On the basis of these and a number of other classifications, we have derived such invariant principles of creating an organic shape in architecture as the primacy of the whole in relation to its parts; the rationality of the form; the aesthetics of the whole ("proportionality", "clarity"); isomorphism in relation to a human being, proportionality at different levels; connection with the natural and/or urban environment and interaction with it; the lack of strict style features.

3. Conclusion
The work allows us to identify the principles of creating an organic shape in architecture, which can later be used in determining the design and artistic and aesthetic solutions in buildings of various types, including taking into account the regional component.

The methodology of the article, which caused the movement from the classifications of understanding the organic shape to the definition of invariant principles, showed its productivity. At the next stage of the work, the author plans to focus on the trends in the development of the organic architecture of the present time, as well as to raise the question of the possibility of incorporating structures and technologies into buildings that have an organic shape.

Of course, all options for organic solutions are favorable for people and have a great future.

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