



SIZE: SCALE AND PROPORTION

\_2020\_1\_

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# C O N T E N T S

SIZE: SCALE AND PROPORTION - FOREWORD

Mariela Cvetić

1-20 BIG SCALE OR SMALL SCALE:

A TYPOLOGY OF ARCHITECTURAL EXHIBITIONS

HELD IN YUGOSLAVIA (SFRY) AND THEIR PRESENT SIGNIFICANCE

Mladen Pešić

21-35 SIZE IN THE PROCESS OF DESIGN AND REALISATION IN EMERGING  
ARCHITECTURE - THE DIGITAL CHAIN APPROACH

Sladana Marković

36-52 GEOMETRICAL BREAKTHROUGH IN CONTEMPORARY  
ARCHITECTURAL DESIGN: META-MATERIALITY AND FRAGMENTATION

Mila Mojsilović, Jelena Mitrović, Vladimir Milenković

53-65 SCALE BEYOND ILLUSION - AESTHETIC WAYPOINTS

Lars Strachler-Pohl

Guest Editor: Mariela Cvetić

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SIZE: SCALE AND PROPORTION



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Scale and proportion in art and architecture are both concerned with size: while scale refers to the size of an object in relationship to another object (relationship of parts of an image to the image as a whole, or to something in the world outside of the image), proportion refers to the relative size of parts of a whole (proportion refers to the relationship of parts of a body or form to one another and of the parts to the whole). Throughout the history of art, many artworks represent what was considered as an ideal based on the ancient classical Greek model and therefore serve as an illustration of both scale and proportion in art.

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Here, the focus is on the distinction and relation between size and scale, size and proportion, as well as on the problem of ‘life-size’, ‘actual size’, ‘familiar size’, and the role of the body in perception of scale and proportion and in relation to art and architecture. Scale is quantified ratio and therefore based upon measurement, the division of the whole. The difference between degree and kind, quantity and quality, is applicable to the difference between scale and size respectively. The Latin *proportio* was used to translate the Greek word *analogia*. Proportional, according to Euclid, are magnitudes with the same ratio, and ‘the body of the world was created, and it was harmonised by proportion’ (Plato).

Therefore, the notion of the scale in the works of Claude Levi-Strauss (problem of miniaturisation), Henri Bergson’s book *Matter and Memory* (differences of ‘quantity’ and differences of ‘quality’), and Gilles Deleuze’s essay ‘Bergson’s Conception of Difference’ are crucial for this investigation. With regard to proportion, from Vitruvius’ *Ten Books of Architecture*, there is a significant amount of literature on this topic and a lot of compendiums that contain these texts (e.g., Hermann Graf ‘*Bibliographie zum problem der Proportionen*’). The research of Fritz Saxl (‘*Microcosm and macrocosm*’), Aby Warburg, Rudolf Wittkower (‘*Architectural Principles in the Age of Humanism*’), and Erwin Panofsky within a growing number of European philosophical and anthropological discourses of the interwar period question the centrality of the human subject from a global perspective.

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Anthropocentric reference in Gordon Matta-Clark’s work *Conical Intersect* (Paris, 1975), as well as himself both as an architect and artist, can be taken as a pivotal figure for understanding the relation between size and proportion: he inserted classical quotation of ‘*Vitruvian figure*’ (familiar from a number of Renaissance architectural treatises) into contemporary urban scene and his ‘*Vitruvian man*’ appears as the ‘*immobilised victim*’. Instead of the ancient Greek saying, ‘*Man is the measure,*’ Gordon Matta-Clark asserted, ‘*You are the measure.*’ His re-enactments of the ‘*Vitruvian man*’ within the urban reconstructions of New York and Paris exerted a powerful influence on fellow artists and architects.

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The following paper investigates these issues from a different perspective and through different methodologies in interdisciplinary field of art and architecture. All these texts provide tools to help see what scale and proportion can teach us about the essential design of the present (and past) and how we can use this knowledge to create a blueprint for the future.

# BIG SCALE OR SMALL SCALE: A TYPOLOGY OF ARCHITECTURAL EXHIBITIONS HELD IN YUGOSLAVIA (SFRY) AND THEIR PRESENT SIGNIFICANCE

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## A B S T R A C T

With the notion that exhibitions, independently of their format or content, can always be considered as both discursive and visual platforms for the study of specific time periods, this research will provide an insight into a possible typology of architecture exhibitions that were organised socialist Yugoslavia between 1945 and 1991. The exhibitions in question were considered as collective activities, and they provide an insight into a wider context of social, economic, political and cultural events in Yugoslavia after World War Two as well as the status that architecture as practice held within them. Having in mind that we speak about various exhibitions with a large number of parameters according to which they were similar or different, this paper will point out the process of forming an exhibition typology in order to enable the classification for their systematic study. A specific study will be used to create the typology that will be applied in the process of researching the architectural exhibitions, their role and importance at the specific range in the specific time period.

## KEY WORDS

EXHIBITION  
ARCHITECTURE  
TYPOLOGY  
YUGOSLAVIA  
PROCESS  
MODEL

## INTRODUCTION

The research points to the role and importance of the architectural exhibitions within the architectural discourse in the period after World War Two in Yugoslavia. Due to the potential of exhibitions to mobilise a wide circle of participants in the course of their preparations as well as later, during their aftermath, exhibitions are considered as a component of architectural discourse through which it communicates not only with the members of the profession but wide audiences as well. Bearing in mind the growing number of researches related to architectural exhibitions, as a special form of manifestations on a global scale from one,<sup>1</sup> and researches relating to the history of socialist Yugoslavia, with a particular emphasis on the architecture and urbanism that emerged in that area and context.<sup>2</sup> On the other side, the exhibitions were considered as collective activities whose study allows an insight into the wider context of social, economic, political, and cultural events within Yugoslavia after World War Two and the status that architecture had within them. As the time period considered here covers almost 50 years (1945-1992),<sup>3</sup> when a lot of events of this type were organised, the typology of architectural exhibitions should be defined in order to enable their classification and determination of time periods.

The history of exhibitions and similar events is generally directly connected to the historical development of the Yugoslav society in a wider context. The complexity of this issue is directly connected to the role of the architectural exhibitions primarily as an intermediary, places which should explain the past or foresee the future. Each try to make an accurate typological classification of exhibitions is connected to the classification of social events, technological progress, and historical development of Yugoslavia.<sup>4</sup> The time period of the research was defined as the period of existence of Yugoslavia as a state-legal form, from the end of World War Two until the beginning of the 1990s, covering the period from 1945 to 1992. Defined in this way, the research framework enables further research and analysis of the phenomenon of exhibitionary practices in the domain of architecture as well as the modalities of post-war architecture in Yugoslavia.

Although we speak of the exhibitions that had different formal characteristics and exhibition material, what they all had in common was that within them there was communication, i.e., transfer of information between the exhibits and the audience, and that they were always created within certain system of values and ideas. As the architectural exhibitions of the above mentioned period developed into a special type of events often connected to the broader social, cultural, economic, and political context of post-war Yugoslavia, this research

will not be organised as an independent research of the history of exhibitions, but as an interdisciplinary study of architectural exhibitions, although from the present-day perspective, these events are very often considered as isolated.

## CONCEPTUAL DEFINITIONS IN THE PROCESS OF EXHIBITION TYPOLOGY DETERMINATION

Architectural exhibitions at the end of the nineteenth and the beginning of the twentieth centuries were places for the promotion of ideas oriented to spatial changes that should have resulted in a change of the society. In that period of time, exhibitions were often established as a part of ideological state apparatus with clear political implications, with the aim of not only to educate the public, but take part in identity formation as well, on local, national and international levels. The complex mechanisms of exhibition, selection and presentation in combination with a discursive field of architecture of the specific periods created a unique mechanism<sup>5</sup> The variety and dynamics of these events enable the insight into distribution and diversity of ideas in the architecture of a certain period. Simultaneous re-reading and explaining the exhibitions offer an opportunity to research the way the exhibitions contributed to confirmation or denial of the ideas promoted at these events as media of communication between the profession and the public. The insight into the exhibition material and its positioning within a specific historical moment open the possibility for showing the impact of architecture on society - and vice versa - through reactions about an exhibition, practical results, and its heritage.

Architectural exhibitions offer a unique insight into the development of the profession. The characteristics of all these exhibitions is the fact that they aimed to promote the ideas and messages related to both practice as well as the theory of architecture and urbanism, regardless of their time and spatial limitations. From the technocratic exhibitions in the 1950s, where one-way communication educated the audience how and what to do, through to the 1970s exhibitions as opportunities to include the audience in the decision-making process, and develop a universal visual language of presentation in architecture.

On the other side the perception of socialist Yugoslavia from post-socialist discourse, as a land between the East and West, which, depending on local political movements and global turmoil gravitated to one block or another, has received new interpretations in recent years. Accordingly from a present perspective, within the framework of the historiographical interpretation, the question of Yugoslavia in the second half of the twentieth century is interpreted between two dominant narratives: one, global, about the land between (the East and West), and another, local, which relates to various interpretations of historical and cultural circumstances within the post-Yugoslav space. Within the

latter this period is reconsidered in two ways: as a period of social security and economic well-being, and as contradictory narrative that speaks of this period as the age of dictatorship, political unrest, and economic inefficiency. Having in mind the focus of this paper and the context within which architectural exhibitions were developed, the stratification of research relating to the history of Yugoslavia is simultaneously transmitted to research dealing with the status and role of architecture within the mentioned space. Additional challenges in interpreting the position and role of architecture within the Yugoslav society create the inability of a comprehensive analysis and interpretation of historical events, since the state interpreted in the narrative 'between the East and the West' was further divided into smaller spaces and that individual national histories were created, architecture histories that often interpret the common past in different ways.

### **1.1. The Definition Of The Exhibition Phenomenon**

Formal characteristics of the exhibitions and their creation and interpretation do not in themselves define their meaning, but they are constructed in a dynamic network of spatial, social, intellectual and professional practices that produce different types of social knowledge. During the discussion of exhibition practices, the exhibitions are not analysed as isolated events of the presentation of architectural works in certain periods of socialist Yugoslavia, but as a framework for production, reception and evaluation of architecture, through analysis of the whole process of organisation of exhibitions, including selection criteria, thematic framework, and place of exhibiting. By examining previous researches into architectural exhibits and their role in the history of architecture, it can be realised that exhibitions were often a place of presentation as well as the creation of new ideas within the architectural theory and practice. It shows that architectural exhibitions are not only a framework in which the best examples from the practice are presented, or new positions are promoted in the domain of theory, but that the exhibitions can be viewed autonomously as a separate medium with its own history and its mechanism of action.

### **1.2. Exhibition Type Or Model?**

The typology concept will be used in this research more as a principle of theoretical and methodological approach, and less as a concept which denotes a scientific discipline or method. If we consider it as a form of research, typology is used as an integral part of various scientific disciplines, as a method of explaining events, processes and phenomena, observed as a part of methods and techniques that enable problem solving in the identification process, system analysis, synthesis, or within other research procedures.<sup>6</sup> In this case, with respect to the fact that it is an attempt to include knowledge

on architectural exhibitions in a system and their classification into certain categories, this research adopts the conceptual determination of the typology concept as a criterion in relation to the nature of the exhibition phenomenon, related to the context within which the phenomenon is) interpreted as well as in relation to the objectives of the research itself. The aim of this research is to classify architectural exhibitions into certain groups, as phenomena with a large number of conceptual and formal determiners, for the needs of future research. Considering the role and significance that architectural exhibitions nowadays receive, and those they had in the past, it is necessary to approach the study of this phenomenon in a systematic and analytic manner. The aim of this paper is to present the theoretical framework for such an analytical approach as well as to position architectural exhibitions in the broader interdisciplinary context. Since we speak about a large number of exhibitions which differ among themselves as much as they are similar in certain aspects, their classification represents the foundation for their further research. As classification in its primary meaning represents determination of a place of a concept within a system, that is, separation or connection of elements in certain order or structure, so first of all, we will consider the relations among the concepts of *exhibition*, *type* and *model*.

When it comes to the history of architectural exhibitions and their development, in certain researches types of exhibitions or models were written about, and in some of them classes or families. However, there are rare examples with a consistent typology of architectural exhibitions which would be significant for further considerations of this subject.<sup>7</sup> In case that such a specific division exists, there is no detailed analysis of parameters which caused the division. If we rely on the researches of the history of architectural exhibitions so far, and the concepts used in their classification, we can notice that the concept of exhibition is often used with the terms, such as types or models, in order to denote a larger group of these events. For the needs of this research, in this part of the paper we will consider the issue of whether we can speak of types or models of exhibitions, and which one would be more appropriate to use.

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Although the term model is often used as a synonym for the term type, and it is the closest in meaning, it is most often associated to the function of a role model or an example, that is, a model according to which something should be done or made.<sup>8</sup> If we consider it in this way, the term model represents 'a key, regulation or specific manner in which something is produced or interpreted.'<sup>9</sup> The difference between the two concepts is reflected in the fact that term type is broader and more comprehensive than model. The difference between model and type can also be denoted as the difference between the definitions of type as an idea about an object used as a rule for certain model, not as an image of the



thing to be imitated and copied.<sup>10</sup> Since models can be interpreted with the ideas of complex things, it can be said that there is always a model of a phenomenon, concept or problem that needs to be used as it is, while in the case of type, it is about the object according to which anyone can produce works or objects that will not have any similarities. Nevertheless, type is a representative of a group with certain characteristics, that is, a group of attributes determining affiliation. In this case, type is a typical representative of the group consisting of members who possess a set of features that simultaneously interact, while dividing them from other groups at the same time.<sup>11</sup>

If we use the above defined concepts in the process of determining the exhibition division, for example, in the course of certain historical and interpretative research of architectural exhibitions, we can reach the conclusion that both type and model could be used with the exhibition concept, but with a difference in meaning.

If we speak of exhibition model (exhibition models), then we can consider it as a specific historical format of exhibitions used as an example for the organisation of exhibitions, and often with the long historical continuity based on which certain exhibition becomes legitimate. Exhibition model in itself also implies specific institutional framework as well as discursive mechanisms of exhibition organisation and architectural exhibitions. In fact, this is about pre-designed categories, that is, exhibitions designed with the idea of them being held on a regular basis, according to a rhythm (annual, biennial, triennial, etc.), with clearly defined criteria for participant choice. These are predetermined and deliberate divisions, implying clear boundaries and specific time continuity.

When we speak about exhibition type, although we have already mentioned that type and model could overlap in certain features, it is used in the context of architectural exhibitions to denote those exhibitions with a specific set of characteristics. These characteristics represent the essence of that type, that is, the structure only reduced to the most important characteristics of that group of exhibitions. In this case, the parameters for exhibition typology are not predetermined by the exhibition format itself, but selected afterwards, after the analysis of a larger sample.

In the specific example, it means that during the research, the analysis of certain number of exhibitions is conducted first, and typology parameters are chosen afterwards. In this case, common parameters would be looked for in the process of analysis, followed by exhibition type/types formation. In conclusion, in the course of architectural exhibition consideration and determination of

their typology we can speak of both model and type, with the difference of exhibition models being pre-determined, while types are created. Actually, in the classification process of certain exhibition models it is determined whether a particular architectural exhibition meets the criteria to be classified within a particular model or not. When considering types of exhibitions, they occur subsequently, and they are related to the context of the research, that is, they arose from particular values created by those who create the typology. Since the aim of this research is to offer a general division of architectural exhibitions, the research will discuss exhibition types, not exhibition models.

## TYOLOGIES IN THE CONTEXT OF ARCHITECTURAL EXHIBITION CLASSIFICATION

When choosing the criteria for architectural exhibition typology, it is necessary to have a broader insight into the history of exhibitions as a phenomenon with a special review of the architectural exhibition history. Although we can say that, as a format, architectural exhibitions derived from art exhibition format, they developed into an independent group in the course of time, with a lot of specific characteristics. So far, exhibition researches have been very different, and numerous sub-genres developed from the basic stream of research, describing various disciplines. Most of the research related to ‘exhibitions’ refers to the study of the history of museums and other cultural institutions, relying on the concept of ‘exhibition complex’, introduced by Tony Benet in 1988 for the first time; then, the research dedicated to industrial exhibitions considered as the places of presentation of regional and national progress,<sup>12</sup> followed by the appearance of international exhibitions in the middle of the nineteenth century,<sup>13</sup> or exhibitions as parts of art museums.<sup>14</sup>

### **2.1. The Relation Of Museums, Exhibitions And Museum Exhibition Typologies As A Role Model For Architectural Exhibition Typology**

From the previous research, we can say that, in most cases, the study of exhibitions is related to the history of museums and museum institutions, as well as that exhibitions are inextricably linked to the history of museums. The relation between museums and exhibitions can be determined in two ways, depending on whether the museum is considered as a place where the exhibition is held and its spatial framework, or as a basic form of communication function of a museum.

In the former case, the concept of museum is related to the building, space, place where exhibition is held, while in the latter the museum is considered as an institution that collects, keeps, researches, communicates, and exhibits the material records from the period which establishes the contact with the audience and educates them through exhibitions. In this context, an exhibition

is usually defined as a group of objects organised according to certain criteria which are used so that the audience (public) can learn something from them through the messages these objects convey. Therefore, the museum exhibits, that is, exhibitions can be considered important in the identification of particular space and time.

When we consider the relations between exhibitions and museums, we have to start from the fact that parallel with the origin of exhibitions and their development, there is a creation of the institution of museum as a place with many characteristics in common with these events.<sup>15</sup> Through exhibitions, museums showed the collections of items that classified, described and constantly reconstructed the world, materialising the ideas about the world, the way it is organised and who controls it.<sup>16</sup> As materialisations of certain concepts, i. e., ideas, exhibitions were, according to Prince materialised 'lands of dreams' where the objects had the key role.<sup>17</sup> As the result of selection process and the information manipulation carried by the exhibits showed in exhibitions, by the curators, the exhibition items were, consciously or unconsciously, re-coded in relation to their original meaning. As the result of selection process and the information manipulation carried by the exhibits showed in exhibitions, by the curators, the exhibition items were, consciously or unconsciously, re-coded in relation to their original meaning. The original message of the object remained, but the objects were additionally redefined in relation to the context of the exhibitions intended for the audience.

In the book 'The museum experience', John Falk and Lynn Dierking suggest communication analysis within a museum, that is, museum experience and therefore exhibitions, from the audience perspective.<sup>18</sup> In fact, they build their analytic model on the interaction of three contexts which, according to them, influence the way the exhibition is presented: individual context, social context, and physical context. Within the individual context, the authors imply the knowledge and experience of audience, their interests, motives and ideas. In this domain, every visitor and the exhibition itself is under the influence of a broader social context which implies the influence of external factor manifested through cultural, political, and economic systems represented at the time of the exhibition. When they speak of the physical context, Falk and Dierking consider the role of the architectural framework of exhibition, the place of exhibition, that is, exhibition space. The analysis that follows is for the purpose of representing exhibition as the place where the ideas and intentions of the organiser are presented, that is, determining their ontological character and structure through the suggestion of their typology.

Ivo Maroević writes about exhibitions as creators of a closed information and communication system. The dominant perception that exhibitions are always a part of the activities that take place within the institution of museum and within

the physical framework of these buildings connects exhibitions with the history of museums. According to Duncan and Wallach, museums, as well as churches and temples of the past, had an ideology role to transform ideologies from abstract to real category through the selection of the exhibits in the pre-created context.<sup>19</sup> The visitors were in this way forced, to a certain extent, to accept interpretation and displays offered within the museum as media determining the meaning of the exhibited object.

Three concepts are repeated in these definitions: exhibit (material), space (place) and audience (visitors). Therefore, the primary division of exhibitions can be made on the basis of these concepts, that is, according to what the exhibitions shows, where it is shown and who it is for. This is the primary division, so to speak experiential and the simplest one. Of course, the number and type of divisions or exhibition typologies largely depends on the person dividing them, what the context is, and for what purpose. When considering museum exhibitions, Ivo Maroević makes a difference among permanent displays, temporary exhibitions and thematic exhibitions.<sup>20</sup> In this case, he makes a combination of several parameters, time limit and exhibition structure, so this type of division can be applied to most exhibitions within museum practice.

Peter van Mensch uses his previous theoretical considerations on this topic as well as his personal experience and contemporary exhibition practice to divide exhibitions according to *structure*, *style* and *technique*.<sup>21</sup> The division according to structure relates to the organisation of exhibition material (exhibits), and here, Mensch relies on Margaret Hall's typology which recognises two basic approaches (strategies) – taxonomic and thematic.<sup>22</sup> According to the taxonomic approach, the exhibition material is sorted on the basis of classification, that is, instrumental rationality.<sup>23</sup> The taxonomic approach implies that exhibits are sorted based on their similarities, or, as George Ellis Burcaw says, genetic similarities among the exhibits.<sup>24</sup> Margaret Hall opposes this with thematic approach, which implies that the exhibition is structured according to certain topic, and according to Hall, also implies the purpose of telling a story (narrative, 'narratology'). Michael Shanks and Christopher Y. Tilley describe this type as 'narrative display' in which the audience is guided through the exhibition, and they are expected to expand their knowledge on the topic parallel with the spatial disposition of exhibits.<sup>25</sup> This type of exhibitions implies a linear narrative connected to the narrative usually found in books or films. While in the first type each exhibit is positioned separately within the exhibition context, in the second type the exhibits are mutually connected and they create a chain or network where each of them has an individual specific role in the narrative structure of the exhibition.

There is a similar division with a different name suggested by Verhaar and Meeter who recognise an exhibition based on the object and the exhibition based on certain concept (idea).<sup>26</sup> Although similar to the strategy suggested by Margaret Hall, this strategy is not exclusively based on the exhibition material typology, but it also relies on a broader context of the exhibition considering the fact that it is not entirely created on the basis of exhibition classification, but also implies the general atmosphere at the exhibition and its spatial framework.<sup>27</sup> The taxonomy approach suggested by Margaret Hall is also supported by Michael Shanks and Christopher Y. Tilley who call it objective as opposed to the biased (antirational) approach, which implies that the exhibits are classified only according to their aesthetic qualities. The authors say that this approach is, in fact, rarely applied independently, so it is often noticed as a smaller part of the display system based on the objective parameters, and a result of individual decisions rather than formal principles and strategies. Although this is an exception rather than the rule, the aesthetic approach, that is, exhibition classification on the basis of formal and aesthetic characteristics is just one of the approaches that Shanks and Tilley call subjective.<sup>28</sup>

In addition to the structure, Peter van Mensch writes that exhibitions also differ in style, where style implies the atmosphere, i.e., the effect that the exhibition possesses as a unity.<sup>29</sup> The style relates to exhibition design used in order to clarify and further emphasise the message, i.e. the concept of the exhibition or, in other words, dramaturgy of space (*Dramaturgie der Räume*).<sup>30</sup> In this context, Mensch emphasises that each exhibition, by its very nature, is educational in its character and it has the task of providing the audience with some knowledge that it had previously not had. The method may vary, but the essence of the exhibition is to produce knowledge about a particular topic within a particular targeted atmosphere.

The final category of dividing exhibitions according to techniques refers to the communication technique, or rather the level of interaction between the exhibits and audience, and in this respect, Margaret Hall distinguishes active and passive exhibitions.<sup>31</sup> The former group implies the static attitude of the audience to the exhibits, while in the latter the audience is expected to interact with the exhibit in order to find out the message of the exhibition. If we look at this from the contemporary context, we can draw the conclusion that most of the exhibitions from the past belong to the former group, while contemporary museum and exhibition practices increasingly rely on the latter group of so-called interactive exhibitions.

This division of museum exhibitions can be directly applied to the typology of architectural exhibitions. The previous analysis shows a large number of parameters that can be used in combination with one another appear in the course of exhibition classification. The type and number of parameters in most cases depend on the specific conditions in which the division is made as well as its aim. If we consider the fact that the aim of each typology is to identify and simplify certain phenomena, we can say that each typology as well as the criteria used in it is as good or appropriate as its results are applicable. Although the exact criteria measurability cannot be established in case of exhibitions, their nature points to the subjective choice of the author who creates the typology, with a clear and consistent application of the division from the beginning to the end.

## **2.2. The Choice Of The Criteria For Architectural Exhibition Typology**

In the previous part of this paper, we discussed the complexity of the exhibition concept, its development as an independent event as well as factors that influenced the creation of efficient and effective exhibition organisation, selection, and promotion concept. Also, we initiated the concept of historical, thematic interpretation and classification of exhibitions. As the time passed, architectural exhibitions started to imply a wide spectre of various activities, with the task of presenting the aims and authors' positions for both architects and curators who organised the exhibitions. Bearing in mind the objective of researching or classifying exhibitions within the given range, in this case the architectural exhibitions organised from 1945 to 1992 in the Yugoslavia, and the previous theoretical and practical knowledge related to the general distribution of exhibitions, their typology will be suggested in the following part of this paper.

If we speak of exhibition classification, Miodrag Šuvaković gives a definition of exhibition as a form of work of art presentation in gallery or museum premises, while according to the concept, this definition differs: individual expositions (one work or a larger opus), group expositions (the work of a group of authors who are not necessarily linked personally or through topics and/or concepts), original exhibitions (display on current art issues), and exhibitions as works of art.<sup>32</sup>

Exhibitions will be classified on the basis of the criteria arising from the exhibit (material) selection process that displays the content, based on the structure and audience exhibitions are intended for. Through the history of the development of these events, various types of architectural exhibitions appeared and developed, and they differed primarily in exhibits, i.e., the objects of the exhibition as well as the manner of exhibit presentation. There are two basic possibilities within

the former criterion – project presentation (through drawings, models, etc) or presentation of the previously made objects (photographies, videos, etc). This first and basic division causes possible further divisions that depend on the needs. In addition to this division, another division is determined; the exhibitions that present the projects in figurative meaning display the architecture of the future, while the exhibitions with the existing objects present the past or present, which is very important if we consider the ideological role of certain exhibitions.

There are two basic possibilities in relation to the audience – national and international exhibitions. This criterion is very important, especially if we consider the role of the architectural exhibitions in the creation of foreign policy identity, or national identity in general. A number of research shows that architecture has been used for these purposes many times, and therefore, the exhibitions are a component of this discursive apparatus.

If we consider the structure as a criterion, there are three possibilities – individual, group and retrospective (original) exhibitions. This criterion refers to the manner of exhibition organisation, i.e., its cause. The organisation mechanism is very important considering that it determines the form and character of exhibitions.

On the basis of the three criteria mentioned above, as well as the possibilities inferred, several exhibition models can be made. In a simplified scheme, it looks as follows:

- Model 1. International original/author exhibition (projects)
- Model 2. International original/author exhibition (built objects)
- Model 3. International collective exhibitions (projects)
- Model 4. International collective exhibitions (built objects)
- Model 5. International solo exhibition (projects)
- Model 6. International solo exhibition (built objects)
- Model 7. National original/author exhibition (projects)
- Model 8. National original/author exhibition (built objects)
- Model 9. National collective exhibitions (projects)
- Model 10. National collective exhibition (built objects)
- Model 11. National solo exhibition (projects)
- Model 12. National solo exhibition (built objects)

By establishing this typology architectural exhibitions will be seen as a cause, but also as a result of certain changes and developments in a wider social, cultural, political and economic context. Defined in this way, the framework of the proposed typology allows for additional research and analysis of topics of exhibition practice in the domain of architecture as well as the modalities of

the post-war architecture in Yugoslavia. By observing the exhibitions of architecture created in socialist Yugoslavia at all stages of its existence, as a larger interdependent system, phenomena, and changes in the theory and practice of architecture can be followed, which can show us the status of architecture in the Yugoslav society and what role it played in the Yugoslav cultural space.

#### FINAL OBSERVATIONS - CONCLUSION: ARCHITECTURAL EXHIBITION TYPOLOGY IN YUGOSLAVIA FROM 1945 TO 1992

In theory, the created models are all possible, but they are not distributed evenly. Based on the insight into the archive materials on the architectural exhibitions of this period, it is evident that models 1, 3, 4, 8, 11 and 12 are most often represented. The typology is created on the basis of the processed examples, with the clear idea that there are a number of limitations which will be reassessed in further work in order to create the optimum typology. Nevertheless, the application of this typology will facilitate the study of architectural exhibitions as places of public presentation which had the role in shaping the knowledge on architecture and the manner it was used or should have been used in the Yugoslav society.

We will only point out some of the representatives that could be classified as model one, and they were very interesting because of their characteristics at the time when they were held as well as today. In this group, due to their continuity and the importance they have had for the further evolution of this genre, we can highlight the world's exhibitions (International Exhibitions or 'EXPO') as places where exhibits from all segments of a society are exhibited, and the Venice Biennale, as the typical place of displaying art and visual arts (from the 1980s and architecture). Despite these great differences in organisation manner and dynamics, scope and length, these exhibitions have a very important common characteristics which refer to the manner of performance, artist and country participant selection, consisting of the national and non-national exhibition selection process combination.<sup>33</sup> The premises of the national exhibition pavilions are used for these exhibitions, which represents an important tool in the function of exhibition events of this format.<sup>34</sup>

By examining the models from 7 to 12 (national exhibitions), we can track the changes in exhibition formats, from state projects in the 1950s and 1960s through to 1970s, when they are part of smaller private initiatives as well as their role or topic content from the exhibition as a manifest to the exhibition as a place of criticism and archives.<sup>35</sup> Also, through the places where these exhibitions were held, we can follow the way in which architecture was presented and which



had its status within the Yugoslav society, i.e., a change from architecture as a technical discipline in the first post-war years when exhibited at trade fairs and exhibitions, to architecture as art when exhibitions are organised within a museum (contemporary or applied art), and independent galleries.

In future research, with the help of the established typology, exhibitions and their new role will be considered in several directions: their role in the construction of the foreign policy identity of Yugoslavia, then the exhibition as an archive and as a place for 'setting up time and spatial diagnostics', and the role of exhibitions in creating the theories and practices of architecture from national and international to local and regional deliberations in a specific period. The research will try to position the architectural exhibitions in a broader social and professional context as well as additionally clarify the mechanisms of their organisation and presentation in the period from 1945 to 1992. The exhibitions will be considered as the laboratories of 'the social utopia' in which an imaginary picture is made and then interpreted within the exhibition itself through the selection criteria of the exhibited works of architecture. With the thesis of Boris Groys to best describe all cultural strategies by starting from what they are trying to exclude, this paper will explain the role of the architectural exhibition within the broader context of culture in post-war Yugoslavia by comparing what was shown at exhibitions and what had actually happened.

## NOTES

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For more information see: Aaron Betsky, "Exhibiting Architecture: The Praxis Questionnaire for Architectural Curators", *Praxis: Journal of Writing + Building, untitled*, No. 7 (2005): 106–119; Kristen Feireiss, *It's Not About Art: The Art of Architecture Exhibitions* (Rotterdam: Nai Publishers, 2001); Mary Anne Staniszewski, *The Power of Display: A History of Exhibition Installations at the Museum of Modern Art* (Cambridge, Massachusetts: MIT Press, 1988); Exhibitions Showing and Producing Architecture, OASE 88 (2012); Thordius Arrhenius, Mari Lending, Wallis Miller and Jeremie Michael McGowan, eds. *Exhibiting Architecture: Place and Displacement* (Zurich: Lars Muller Publishers, 2014); Eeva Liisa Pelkonen, Carson Chan and David Andrew Tasman, eds. *Exhibiting Architecture: A Paradox?* (New Haven: Yale School of Architecture, Yale University, 2015); Aaron Levy and William Menking, eds. *Architecture on Display: On the History of the Venice Biennale of Architecture* (London: Architectural Association, 2010); Beatriz Colomina, *Manifesto Architecture: The Ghost of Mies* (Sternberg Press, 2014).

2

For more information see: Љиљана Благојевић, *Нови Београд: Оспорени модернизам* (Београд: Завод за издавања уџбеника, 2007); Wolfgang Thaler, Maroje Mrduljas, Vladimir Kulic, *Modernism In-between The Mediatory Architectures of Socialist Yugoslavia* (Berlin: Jovis Verlag GmbH, 2012); Maroje Mrduljaš, Vladimir Kulić, eds., *Unfinished Modernizations Between Utopia and Pragmatism* (Zagreb: Croatian Architects Association, 2012).

Time period for research is determined according to the period when Yugoslavia existed as a country after the Second World War, through three models of its social and political organization (Federal People's Republic of Yugoslavia – FPRY (1945 – 1963) and Socialist Federal Republic of Yugoslavia - SFRY (1963 - 1992).

3

In this research, their periodization will be connected to the periods in social and economic developments in SFRY according to the model of Dušan Bilandžić, who divides this period into: the 1950s – state management of the economy and introduction of self-management concept; the 1960s – the economic reform according to the market-oriented model; the 1970s – the concept of associated labour and the 1980s – economic crisis and the programme of social and economic stabilization. (Dušan Bilandžić, *The History of SFRY, the main processes from 1918 to 1985. the third edition, revised and updated*, Skolska Knjiga, Zagreb 1985).

4

For more information about the relation between exhibitions and architecture see: Mladen Pešić, 'Exhibitionary complex: Architecture as an exhibit,' *Serbian Architectural Journal* 5 (2013): 292.

5

Vladan Đokić, *Urbana tipologija: Gradski trg u Srbiji* (Beograd: Univerzitet u Beogradu Arhitektonski fakultet, 2009), 11.

6

There are examples of research dealing with exhibition typology at the general level, that is, they are a part of broader research on the history of museums and museum practices. Within that research, the division of exhibitions is considered within the institutional framework of museums and other similar institutions.

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Đokić, *Urbana tipologija: Gradski trg u Srbiji*, 15.

- 8 Ibid.
- 9 Ibid.
- 10 Ibid
- 11 For more information see: B.E. Conekin, 'The autobiography of a nation': The 1951 Festival of Britain (Manchester: Manchester University Press, 2003).
- 12 M. Amati and Freestone, R. „The exhibitionary complex and early twentieth century town planning“, Urban Transformation: Controversies, Contrasts and Challenges: Proceedings of the 14th International Planning History Society Conference, Vol. 1, Turkey, Istanbul, July 2010, pp. 459-470.
- 13 Ibid
- 14 This is, primarily, about necessity of public exhibition, i. e., the existence of audience the museums and exhibitions are intended for as creators of broader, contextualized images of culture. Ljiljanja Gavrilovic, *Museums and the limits of power*, p 30.
- 15 Gavrilovic, *Museums and the limits of power*, p 28.
- 16 D. Prince, 'The museum as dreamland', *The International Journal of Museum Management and Curatorship* 4 (1985): 243-250.
- 17 J.H. Falk and L.D.Dierking, *The Museum Experience* (Washington:1992).
- 18 C. Duncan and A.Wallach, 'The Museum of Modern Art as late capitalist ritual: an iconographic analysis,' *Marxist Perspective* 1 (4) (1978): 28-51
- 19 Ivo Maroević, *Baštinom u svijet* (Petrinja: Matica hrvatska, 2004). See: Ivo Maroević, 'Muzejska izložba – muzejski izazov,' *Informatica Museologica* 34, 3/4, (2003), and Ivo Maroević, *Uvod u muzeologiju* (Zagreb: Zavod za informacijske studije Odsjeka za informacijske znanosti, Filozofski fakultet, 1993).
- 20 Peter van Mensch, 'Characteristics of exhibitions,' *Museum Aktuell* 2003 (92): 3980-3985.
- 21 Margaret Hall, *On Display: A Design Grammar for Museum Exhibitions* (London: Lund Humphries,1987), 25.
- 22 Ibid.
- 23 George Ellis Burcaw, *Introduction to Museum Work* (Nashville: American Association for State and Local History, 1975), 121.
- 24 Michael Shanks and Christopher Y. Tilley, *Re-constructing Archaeology: Theory and Practice* (Cambridge: Cambridge University Press, 1987).
- 25 Jan Verhaar and Han Meeter, *Project Model Exhibitions* (Leiden: Reinwardt Academie, 1989).
- 26 In the former type, the exhibit is central, while the latter implies that the story or the narrative is primary within the exhibition where exhibits have the secondary role, rather as illustrative elements and then as exhibits themselves. Although in terms of language these are very similar categories, Peter van Mensch remarks that there are different premises as the basis for the classification of these types. Peter van Mensch, 'Characteristics of exhibitions,' 3.

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- 27 Peter van Mensch, 'Characteristics of exhibitions,' 4.
- 28 Ibid.
- 29 Martin Roth, 'Scenographie. Zur Entstehung von neuen Bildwelten im Themenpark der Expo 2000,' *Museumskunde* 66 (1) (2001): 25-32.
- 30 Peter van Mensch, 'Characteristics of exhibitions,' 5.
- 31 Miško Šuvaković, *Pojmovnik savremene umjetnosti* (Zagreb: Horetzki, 2005), p. 287.
- 32 Јасмица Чубрило, "Како међународне изложбе мисле," *Зборник Матице српске за ликовне уметности* 37: 301.
- 33 The following are among these exhibitions: the exhibition at Brussels EXPO in 1958; the exhibition at Montreal EXPO in 1967; the exhibition at Vancouver EXPO in 1986; the exhibition at Melbourne EXPO in 1988; Venice Biennale in 1991.
- 34 The following are among these exhibitions: the exhibition at Brussels EXPO in 1958; the exhibition at Montreal EXPO in 1967; the exhibition at Vancouver EXPO in 1986; the exhibition at Melbourne EXPO in 1988; Venice Biennale in 1991
- 35 The following are among these exhibitions: 'A Dwelling for Our Conditions' (1956); 'Family and Household' (1957, 1958, 1960); 'Serbian Architecture 1900/1970' (1972); 'Alternative Architecture' (1975); 'Primary Architecture' (1979); 'Romantic Architecture' (1980); 'Architecture as a language of Art' (1981); 'A Group Portrait of Belgrade Architects' (1982); 'The Centre of the Third Millennium Culture' (1985); 'Urban House' (1981).

## BIBLIOGRAPHY

- Allwood, John. *The Great Exhibitions: 150 years*. London: ECL Exhibition Consultants Ltd, 2001.
- Altiser, Luj. *Ideologija i državni ideološki aparati*. Loznica: Karpos, 2009.
- Amati, Marco and Robert Freestone. 'The exhibitionary complex and early twentieth century town planning,' *Urban Transformation: Controversies, Contrasts and Challenges: Proceedings of the 14th International Planning History Society Conference*, Vol. 1, Turkey, Istanbul, July 2010, pp. 459-470.
- Bazin, G. *The museum age*. New York: 1967.
- Greenhalg, Paul. 'Education, Entertainment and Politics: Lessons from the Great International Exhibitions.' In *The New Museology*, ed. Peter Vergo, str. 74 -98. London: Reaktion Books Ltd, 1989.
- Greenhalg, Paul. *The Modern Ideal: The Rise and Collapse of Idealism in the Visual Arts from the Enlightenment to Postmodernism*. London: V & A Publications, 2005.
- Beatriz Colomina, *Privacy and Publicity: Modern Architecture as Mass Media*. Cambridge, Mass.: MIT Press, 1994.
- Belcher, M. *Exhibitions in Museums*. Leicester: 1991.
- Benett, Tony. 'The Exhibitionary Complex,' *New Formations* 4 (1988): 73-102.
- Benjamin, Valter. *O fotografiji i umetnosti*. Prevod Jovica Aćin. Beograd: Kulturni centar Beograd, 2006.
- Black, Mischa. *Exhibition Design*. London: The Architectural Press, 1951.
- Boylan, P. ed. *Museums 2000*. London: 1992.
- Burcaw, G.E. *Introduction to Museum Work*. Nashville: 1975.
- Cameron, D. 'Problems in the language of museum interpretation', in: *The Museum in the Service of Man: Today and Tomorrow. The papers of the Ninth General Conference of ICOM (Paris) (1971)*: 89-99.
- Cameron, D. 'Viewpoint: the museum as a communication system and implications for museum education', *Curator* 11 (1) (1968): 33-40.
- Cannon-Brookes, P. 'Orthodoxy and the interface between the museum object and its user', *Museum Management and Curatorship* 9 (3) (1990): 235-239.
- Crimp, Douglas. *On the Museum's Ruins*. London: The MIT Press, 1993.
- Čarapić, Ana, Sanja Simonović, i Božidar Manić, 'Arhitektura - granice, manifesti, utopijske vizije - osvrt na jedanaesto Venecijansko bijenale,' *Arhitektura i urbanizam* 24-25(2009): 7-14.
- Davis, K.L. & J.G.Gibb 'Unpuzzling the past: critical thinking in history museums', *Museum Studies Journal* 3 (2) (1988): 41-45.
- Denegri, Jaša. *Šezdesete: teme srpske umetnosti (1960- 1970)*. Novi Sad: Svetovi, 1995.
- Denegri, Jerko. *Exat 51- nove tendencije*. Zagreb: Horetzky, 2000.
- Domijan, Žarko. 'Arhitektura XX stoljeća u Hrvatskoj,' u *Arhitektura XX vijeka*, ur. Nataša Tanasijević-Popović (Beograd: Prosveta, 1986), str. 44.
- Duncan, Carol. *Civilizing Rituals: Inside Public Art Museum*. London: Routledge, 1995.

- 
- Falk, John .H. & Lynn D. Dierking. *The Museum Experience*. Washington: DC Howells House, 1992.
- Findlen, P. 'The Museum: Its Classical Etymology And Renaissance Genealogy,' *Journal of the History of Collections* 1 (1) (1989): 59-78.
- Гавриловић, Љиљана. *Култура у излогу: ка новој музеологији*. Београд: Етнографски институт САНУ, 2007.
- Galjer, Jasna. *EXPO 67 i jugoslavenski paviljon Vjenceslava Richtera*. Zagreb: Horetzky, 2009.
- Гавриловић, Љиљана. *О политикама, идентитетима и друге музејске приче*. Београд: Етнографски институт САНУ, 2009.
- Гројс, Борис. *Уметност утопије. (2003)* Београд: Логос, 2011.
- Groys, Boris. 'The Museum in the Age of Mass Media,' *Manifesta Journal: Journal of Contemporary Curatorship* 1 (2003): p. 32-41.
- Gutschow, Kai K., 'From Object to Installation in Bruno Taut's Exhibit Pavilions,' *Journal of Architectural Education* (2006): 63-70.
- Hall, Margaret. *On Display: A Design Grammar for Museum Exhibitions* (London: Lund Humphries, 1987).
- Hall, Stuart, ed. *Representation: Cultural Representations And Signifying Practices*. London: Sage Publications, 1997.
- Hensel, Michael., Christopher Hight, and Achim Menges. *Space Reader: Heterogeneous Space in Architecture*. West Sussex: John Wiley & Sons Ltd, 2009.
- Hičkok-Džonson. *Internacionalni stil. (1932)* Prevod Ivana Trbojević. Beograd: Građevinska knjiga, 1989.
- Hobsbawm, Eric. *Age of Extremes: The short Twentieth Century*. London: Abacus, 1995.
- Hooper-Greenhill, Eilean. *Museums and the Shaping of Knowledge*. London: Routledge, 1992.
- Hyes, Michael K. ed. *Architecture Theory since 1968*. New York: MIT Press, 1998.
- Ignjatović, Aleksandar. *Jugoslovenstvo u arhitekturi*. Beograd: Građevinska knjiga, 2007.
- Karp, Ivan, ed. *Museum Frictions: Public culture/ Global Transformations*. London: Duke University Press, 2006.
- Kubet, Vladimir, Olga Carić i Dušan Ristić. 'Izložbe Verkbunda - čitanja rukopisa modernizma danas,' *Arhitektura i urbanizam* 28 (2010): 21-28.
- Leatherbarrow, David. 'The Craft of Criticism,' *Journal of Architectural Education* (2009): 20-21.
- Leone, M. 'Method as message,' *Museum News* 62 (1) (1983): 34-41.
- Levy, Aaron and William Menking. ed. *Architecture on Display: On the History of the Venice Biennale of Architecture*. London: AA Publications, 2011.

- Lorimer, Rolend. *Masovne komunikacije: komparativni uvod*. Beograd: Clio, 1998.
- Maroević, Ivo. 'Izložba kao oblik muzejske komunikacije,' *Osječki zbornik* 21 (1994): str. 289-298.
- Milenković, Aleksandar. *Arhitektura: Salonska vizura*. Beograd: Savez arhitekata Srbije, 2001.
- Miles, R.S. et al. *The Design Of Educational Exhibits* (London: 1982).
- Miller, Wallis. 'Mies and Exhibitions,' in *Mies in Berlin*, ed. Terence Riley, and Barry Bergdol, pp. 338-349. New York: The Museum of Modern Art, New York, 2001.
- O'Doherty, Brian. *Inside The White Cube: The Ideology O Gallery Space*. Santa Monica: The Lapis Press, 1976.
- Peart, B. 'Impact Of Exhibit Type On Knowledge Gain, Attitudes, And Behavior,' *Curator* 27 (3) (1984): 220-237.
- Pešić, Mladen. 'Exhibitionary Complex: Architecture as an Exhibit,' *Serbian Architectural Journal* 5 (2013): 282-305.
- Petranović, Branko. *Istorija Jugoslavije 1918 – 1978*. Beograd: Nolit, 1980.
- Prince, D. 'The museum as dreamland,' *The International Journal of Museum Management and Curatorship* 4 (1985): 243-250.
- Rabinowitz, R. 'Exhibit as canvas,' *Museum News* 70 (2) (1991): 34-38.
- Schueler, F.W. 'Storylines And Exhibits, Authenticity In Exhibits,' *Muse* 1 (2) (1983): 34-37.
- Shanks, M. & C.Tilley. *Re-Constructing Archaeology*. Cambridge: 1987.
- Sherman, Daniel J., and Irit Rogoff, ed. *Museum culture: Histories, Discourses, Spectacles*. Menneapolis: University of Minnesota Press, 1994.
- Stojanović, Jelena. 'Модернизам и музеј: Дијалектика перформативности,' *Зборник Народног музеја - Историја уметности* 18:2 (2007): 471-483.
- Swiecimski, J. 'Museum exhibitions as an object of theoretical investigation,' *Museum News* 10 (1987): 211-217.
- Štraus, Ivan. *Arhitektura Jugoslavije 1945-1990*. Sarajevo: Svjetlost, 1991.
- Šuvaković, Miško i Aleš Erjavec. *Figure u pokretu - savremena zapadna estetika, filozofija i teorija umetnosti*. Beograd: Atoča, 2009.
- Шуваковић, Мишко. *Постмодерна: (73. појма)*. Београд, Народна књига/Алфа, Библиотека Појмовник, 1995.
- Wesemal, Pieter van. *Architecture of Instruction and Delight. A socio- historical analysis of World Exhibitions as a didactic phenomenon (1798- 1851- 1970)*. Rotterdam: 010 Publishers, 2001

# SIZE IN THE PROCESS OF DESIGN AND REALISATION IN EMERGING ARCHITECTURE - THE *DIGITAL CHAIN* APPROACH

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## A B S T R A C T

Emerging architecture, based on computational methodologies directly connected to design and realization, places new approaches in front of us and requires an examination of existing terms. One of them is the principle of the *Digital Chain*, established by CAAD Chair at ETHZ as an uninterrupted digital process with every step as a programmed entity connected by CAAD/CAM technology to universal interfaces.

This paper investigates size in the design and realisation in emerging architecture following the principle of *Digital Chain* as a digital approach based on coding, manipulatively iterative, through scale and proportion, by variables. Code is connection from design to realization with complexity in its content of parameters (input) and in variations of received product (output) at one side. However, it is simple manipulation of the parameters (i.e. architectural expressions – size, scale and proportion) used and a complex combination of unique scale with different variables and direct correlations to the proportion as utilization of architectural products, such as drawings, models, prototypes or realizations.

This paper considers emergence of size as a mixture of scale unification and proportion output (dimensionality) as components of code decided on the architect as fluid energy of the *Digital Chain* approach.



## CODE IN THE *DIGITAL CHAIN* APPROACH IN ARCHITECTURE

Digital Chain is an uninterrupted digital process consisting of design (idea, coding, geometry finding) through construction (structure, junction, prototyping) to production (fabrication), with every step as programmed entity connected by CAAD/CAM technology universal interfaces.<sup>1</sup> The term Digital Chain is established by CAAD Chair at ETHZ. Digital Chain is not a continuous one without the role and position of architect as fluid energy and expert that investigates how digital technology is changing, i.e., the entire process of chain, simultaneously adapting to it as well as decision-making about design solution through parameters.

Digital design represents the transformation of traditional design activities by introducing a whole range of constructive engineering technologies, new materials, production and constructive processes that the computer discovers, allows, conditions and supports.

The main characteristic of Digital Chain is a code as a process adjustment from design to realisation. An architect dictates the relationship between parameters and architecture in code – scales, proportion and size. Generally, scale and proportion in art are both concerned with size, as the relationship between one object to another and object as product to the human body (Fig. 1).

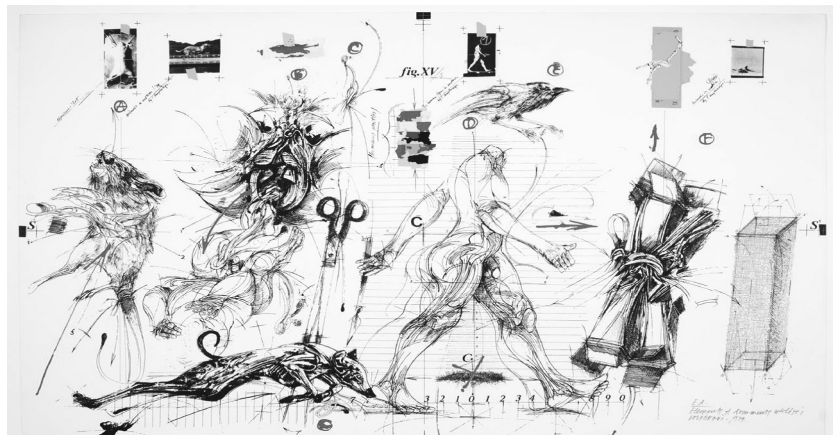


Fig. 1. Vladimir Velichković, Elements et documents utilisés 1979. (*The Tate Gallery 1980-82: Illustrated Catalogue of Acquisitions* (London: The Tate Gallery, 1984), cover)

The scale in code is united, meaning it is all-in-one in every sense. Proportion as relative size between parts of the whole refers to elements in an object as product. Size refers not only to design, but also to dimensionality – architectural product.

In the architectural process of design and realisation of the *Digital Chain* principle, the code is the main driver. All the above-mentioned characteristics together with others needed for the idea are parameters. The main components of the architectural product are created by the demands of context, function, form and the user input. Testing the design code through changes of parameters in iterations as well as checks in prototype on the next level make experiments with any request possible. Experiment as the base of *Digital Chain* is also shown on variables of scale and proportion. The size is a result, product or output, which is changeable and depends on inputs. This means that every needed relationship between the objects is the base or a part of the code. All relationships inside the code and the whole *Digital Chain* process are theoretical and physical, but also social. All kind of connections between parameters of scale, proportion and size are inputs of the code, but also affect size as product of *Digital Chain*

The complexity, as the reason for use, is not always related to the complexity of form, but also to the complexity of complete concept, appearance or construction of the building as well as to the complexity of relationship, which are the process base.

The architectural process is not interactive only in technological sense, but also in social, meaning that the process is not explained only through the idea, internal and external influences, modeling and carrying out the prototype to the final product – building, but also through many external and internal influences, which are inseparable parts of this process.<sup>2</sup>

*Digital Chain* is a complex continuous tool for troubleshooting (Fig. 2).

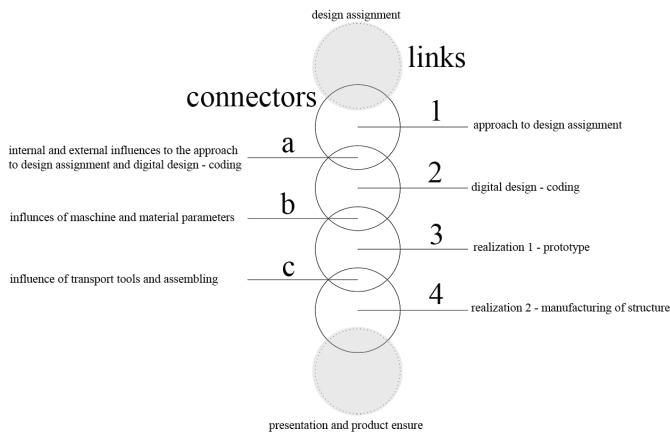


Fig. 2. *Digital Chain* – scheme with links and connectors

## UNIFICATION OF SCALE AS PRODUCT OF CODE IN THE *DIGITAL CHAIN* APPROACH IN ARCHITECTURE

The computer is no longer a passive digital drawing board, but an active design work tool controlled by the code. The code is a united scale or one scale for all sizes, which literally means connecting idea and production. Through unification of scale it is easily possible to change the scale and to produce drawing, prototype or realisation.

According to Lawson, the use of computer is a wise decision, modeler, draftsman and revokes the skill of drawing in architecture as a drawing board,<sup>3</sup> as well as the ratio of all scales and dimensions.<sup>4</sup> It designs theoretically expected, but practically the unexpected and creative. The mental activity of architects before sketching, then drawing on the computer, today is computer knowledge. However, representation of skills of computer programmes knowledge and their use in design - drawing with point, not just for effect, is an important part of this knowledge.

Here the nodes are the decisions and the arcs represent the directed relationships of a superior decision influencing or providing the context for a subsidiary decision. The concept of graphbased dependency is quite understandable on a small scale. But for the designer (without any supporting software) it is difficult to apply on a scale that is appropriate to real-world problem solving. On the other hand, graph dependency is easily implemented as a programme and can be applied to complex real-world tasks.<sup>5</sup>

However, the programming requires very explicit rules from designers, which is the creative, research and impact approach of a large amount of information and scale. Programming design solves the problem, which is the basis of conventional design. The process depends primarily on the way of thinking, which means that the tool is less important, while the logic of problem solving and architect's intention are more important. The point is in abstract design, finding rules for generating space and form, and in the surprise that the programme has to offer. This research experience is the strongest aspect of digital coding.

The base of represented design is the drawing, which is connected to the realisation and operates in parallel/in correlation with the word. However, once it would be no drawings in the design, the point would be only in the making - realisation. The drawing is also an instrument, a tester a system of symbols, a

transformation between problems and solutions.<sup>6</sup> The drawing is a presentation of imagination and idea, analysis of and confirms this idea. As Carlo Scarpa says he wants to see and that is just why he draws.

Machines and material give a special treatment of scale. Machines dictate the parts of architectural object related to dimensions, which CNC machines could produce. But, they are then elements of some other concept parts. Zooming in scale with material parameters gives detailed proportions and a bigger size. It also allows the use of materials or different treatment of these materials for different parts or use. These two characteristics give digital offer from prototype through to real realisations in metric and detailed sense.

#### The Evolution Of The Model

Tools - software and hardware - are more powerful, sophisticated and intuitive. Complex digital designs created using software can now be physically realised through advanced fabrication technology, streamlining the design and evaluation process. More people are able to access these tools and participate in a process of design which was previously limited to early-adopters. The 'evolution of the model' is not just in the model itself, but also in how it is used and by whom.<sup>7</sup>

As computer systems and communications capacities help facilitate a large-scale production based on digital information, knowledge and culture, there are also important sociological factors. Together these are the most important drivers of the content in which users have a direct immediate impact to the project, and well-designed computer code allows efficient design judgment on quality.<sup>8</sup> Fabrication of the art allows the controlled use of materials for large-scale sculptures, which would otherwise be more difficult to perform. An example is the use of lace in the way the artist Cal Lane has done.

Understanding of the material on the basis of materials science and traditions of the material leads to improvement of traditional materials with new technologies. At this particularly based additive manufacturing, i.e., fabrication and improving of the space design in architectural scales. Contemporary technologies represent both human challenges and approaches in terms of protection and improvement of living conditions and environment of man.<sup>9</sup> Fabrication of brick<sup>10</sup> as well the wood theme as a friend<sup>11</sup> are always current topics, supported by continuous innovation.

In order to improve digital design culture and work effectively with the potential of performance materials, we need to find new models and methods by which we can support feedback between scales. In architecture, production on different scales has always meant engaging with different types of problems, such as planning, urban design, details or specifications. But the logic of the drawing, the system of design geometry remains the same.

Working with performance materials and connecting it with material analysis, simulation, and production of details, we need to find ways in which many different types of data can be linked, regardless of whether they are geometric, numerical or statistical. As a practice, we should develop principles of modeling that enable flexible, dynamic and interactive organisation of heterogeneous data flows. The most important is that these models must be well integrated with the creative practice of architectural design. The architecture is characterised by its breadth of engagement. It is inconsistent with the single aim of design, but always driven by a network of different and often conflicting meanings of design, and architects' practices should always find the best possible solution for a given context and current moment. So our tools can not be understood as simple ways of optimisation, but should encourage creative thinking about how this new practice of material can fundamentally change the way we think about architecture, the way we live, work and interact as well the way we treat the quality of the space and the environment that we have created.

We are experiencing a fruitful generation of architecture focused on the possible expansion of the material and formal production. Digital methods are essentially moved to the discipline of architecture, and many roads now characterise this designer's arena. Architects, involved in the digital process, dedicate to the employment of technology potential for information of design process and equipment of evolution of its projects, and their experimentation is extraordinary in scale 1:1. This approach recognises what Michael Speaks called *design intelligence*:

Making becomes knowledge or intelligence creation. In this way thinking and doing, design and fabrication, and prototype and final design become blurred, interactive, and part of a non-linear means of innovation.<sup>12</sup>

As it is evident in the works of large-scale, digital environment, which allow architects to take control of the building process. It shows the relationship between the human body and architectural product in every sense (Fig. 3).



Fig . 3 . Realtionship Coded product - Human (Belgrade-Zuerich, 2005-2009)

## PROPORTION AS PRODUCT OF CODE IN THE *DIGITAL CHAIN* APPROACH IN ARCHITECTURE

*Digital Chain* as a result of digital technology in architecture, products partial or complete architectural products based on partial knowledge or without architectural knowledge. Knowledge of the architects ceases to be the main or necessary, and the product becomes self-important - sometimes as a product of the form and identity, rarely as a solution to the functional architecture. Tools become more powerful than ideas, and their mutual relationship becomes one of the key issues of contemporary architecture.

Complexity, as already said, could be made by complex space atmosphere, not only by complex geometry. The process of *Digital Chain* is improving modeling and the realisation of structures and detail, especially connected to not typical and complex forms. The real example of improving the concept, space, form and material, we can see with *Selfridges Birmingham*,<sup>13</sup> as explained by the architects who worked on the project:

The ambition of this scheme was great. Our brief was not only to design a state-of-the-art department store but also to create an architectural landmark for Birmingham, so that the building itself would become a genuine catalyst for urban regeneration. We have reinterpreted the notion of a department store, not just in its form and appearance but also in the social function such a building now plays in our society. Its relationship to the church is significant, representing the religious and commercial lives of the city that have evolved side by side over hundreds of years.<sup>14</sup>

Insurance *against arbitrariness*<sup>15</sup> is done by architects as set of decisions. Relationship between parts are not just based on harmony, but the base is production possibility of machines, and then relationship between the elements of the whole. Proportion as product of the code is complex and could be analysed through dimensionality in sense of picture and in sense of object dependent on material and machine, also very simple for manipulation.

Dimensionality is the direct relationship between scale and proportion refers to size. Coding is change of dimensions as change of plans. At the same time, it is a different product: model, prototype or realisation. Model is simple, with bigger dimensions and detail starts to be prototype and the highest level is realisation. Also sign of proportion is established as relationship design – prototype and architecture, as well as relationship 2D, 3D and machine product. As can be

seen in great-scale works, digital design makes it possible for architects to take control of the process of realisation.

Today, it is also instrument for obtaining and using of code. The code without pictures and words is only text that is meaningless. By simply manipulating coding, however, we obtain different types of necessary drawings, i.e., the interpretation of idea or performance of solutions. The third dimension is obtained easily. The computer facilitates the prediction of architecture by conceptual structures - presentation simultaneously in various mental modalities, in accordance with the architectural thought, material and machine, and not against it. Digital approach to the design and realisation is a streamlined approach, where digital technology as a tool participates in the process and the creation of architecture.

As mentioned above, digital technology in architecture is basically not associated only with design, but also with the production/making. The machines are based on programmes for production, controlled since the design phase. Thinking about the structure is through digital modeling, analysis and fabrication, with constant cooperation with engineers without surprises.

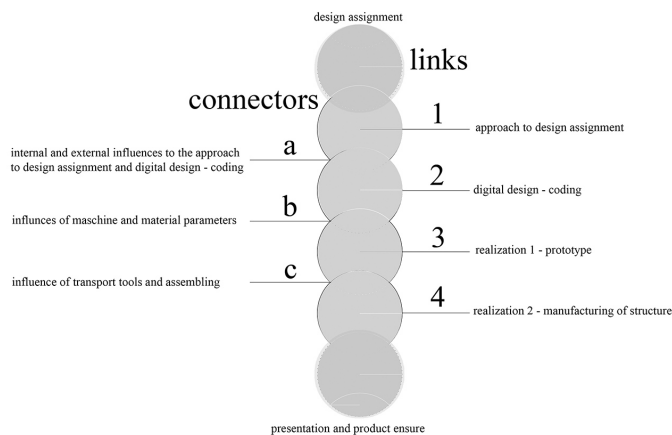


Fig. 4. Expertise and education in *Digital Chain*

The continuity of the peculiarities of architects, like every other profession, is also a constant learning. However, architects still have a fear of digital tools based on the existence of products of confusing architecture, which is the consequence of insufficient engagement of architects with precisely using these tools in the design. It is obvious that if we look at the aim of using digital tools in the educational system as a playground for small-scale facilities with open functions as pavilion or sculpture, etc., with the use of the system fabrication,



which tools are automatically associated with the design - coding, we come to the conclusion that it is the most important for architects to know the process and simply learn to organise and coordinate it.

The atmosphere of the space, *sensuality compelling logic are the result of design*<sup>16</sup> as well as the achievement of certainty every time again in the new project. All that has been said is the reason why we are doing the architecture, but with the human and technological scale as a measure. Creativity, existence of our materialised emotions more than ourselves, arising from desire for a home, is the purpose of practicing architecture by architects, and the aim which this architecture must reach. Architecture entails the deployment of pleasure, the build up of passion, the discipline that operates by intellectual as well as physical practices.<sup>17</sup>

The architect thinks that new techniques themselves solve the problems, and not perceive the necessity of adapting changes of their behaviour and role in the new system of completed - handing over the project in all proportions. For architect to be a real leader of the digital process in architecture, he/she has to monitor in great detail all information received during the process.

Projects driven by the realisation have a significant impact on the construction industry, and indirectly in the education and training of architects. Architecture is the only engineering discipline, in which the solution of the problem is located between the orientation toward the problem and orientation to solution. Expertise in this direction is progressing in all fields (Fig. 4).

A specific type of perception of architects, able to look at the idea in 2D without any means of visualisation, *Digital Chain* gives us a personal contribution in the real creation, testing and designing of digital design applications and tools of realisation (Fig. 5).

Digital architecture conditions the change in standard dimensions and measures in architecture, it is now architecture of large-scale and wide usage. Unlike conventional design and realisation, we are talking, in large part, about automated process with the necessary activities and characteristics of architects. The work resulted in topics of networking on the principles of required distinctive characteristics in two directions - in the of necessity and integrity of architects in the continuity of Digital Chain as a tool of emerging architecture.

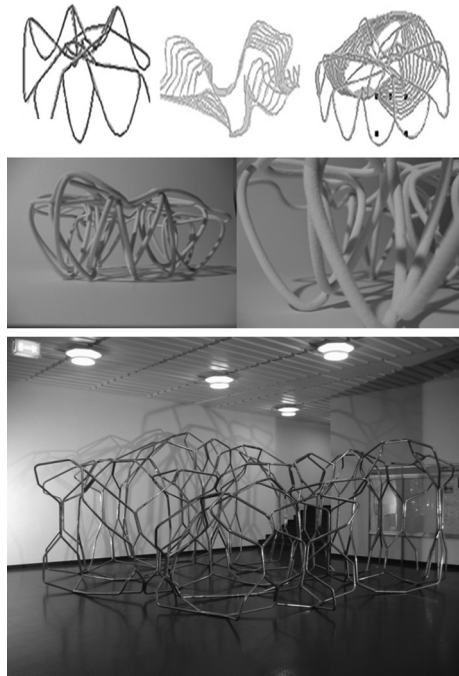


Fig. 5. *Digital Chain* – products of code: 3D model, prototype, realisation

By everyday digitalisation and technological improvement of the Digital Chain process, design and realisation in architecture is completely accomplished, so we don't need any manual process. It is leading us to follow the development of digital techniques as well as conditions for design improvement in future:

At the foundation of computational design is the relationship between tools and skills. We have to match our tools to the concepts around which designers want to build their skills. Our expectation is that geometric skills, compositional skills and algorithmic skills will be the key to future design.<sup>18</sup>

The *Digital Chain* process introduces the digital design – coding and the use of CNC machines in production of architecture in relation to the construction of complex structures and form elements, and not typical aesthetic characteristics (ornaments) with machine parameters input connected with all others coding parameters used through the whole chain. In this way, existing elements are receiving new data through the change of dimensionality and size (Fig. 6).

Digital Chain represents design process as the code, i.e., a unique formation of information from general to individual in the form of data concept analyses and synthesis:

Technology is established according to the logic of its own formalistic development, which parallels and shapes our development in history, culture and nature. It is constructed in such a way as to achieve an effect for practical purposes.<sup>19</sup>

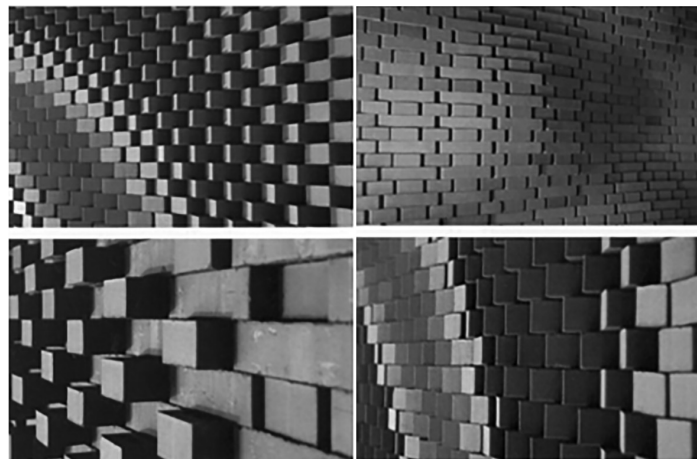


Fig. 6. Student design DFAB ETHZ

## CONCLUSION

Related to term *Digital Chain* as an uninterrupted digital process with every step as programmed entity connected by CAAD/CAM technology universal interfaces, the code is the connection from design to realisation with complexity in its content of parameters (input) and in variations of received product (output). It is simple to later manipulate used parameters (i.e. architectural expressions – size, scale proportion). Code provides possible combination for unification of scale with variables of dimensionality and other parameters. It is in direct correlation to the proportion and use of architectural products, such as drawings, models and realisations. Compared to the change of magnification in a view zooming in and out by camera, it gives the same possibility of changing scales and proportion in architectural design and realisation by the *Digital Chain* approach, and adding dimensionality at the same time with different character of output.

The code is integrated in all parameters inside itself. It gives one measurement and all relationships as relative and absolute at the same time. It can be changed as needed. Output as space is always flexible as well as today's efficiency of space needs. Some of them are the relationship of space and microspace dimensions as the size of architecture in sense of in large of parts scales.

The topic is based on overlapping stable approach in the process of design and realisation in architecture with advanced digital tools based on the required function, concept and context, not only on the architecture in which the form or structural system dictate the spatial appearance, what was originally the case with the uncontrolled introduction of digital tools in architecture. Approach in between and beginning of design digitising is just a continuation of the standard design, where drawing on computer replaced the one by hand. The next step in the development of digitisation of architecture was the use of machines in the performance of irregular shapes. Designing these kind of forms and determination of the final solution are facilitated at one point by computer, and it also determined the transfer of information. Process improvement primarily relates to the inclusion of the realisation to the phase of design, connecting the design and practice, solving the complexity and control by architects, relying in the form of amendments to the education in the direction of digital design and realisation.

The new role of the architect is setting the strategy of future architecture. The architect creates the process indirectly returning to the realisation - knowing the parameters of machines and materials needed for encoding idea, and directly in terms of product control. It suggests the greater position of architect in the development of application programmes, which are necessary for the development and realisation of idea.

Layered complexity of the emerging architecture crossed with new design activity, in relation to Ludwig Wittgenstein, as the most complex activity that people perform,<sup>20</sup> resulting in problem-solving in contemporary architecture through human activity, with the inherent characteristics of emotion and communication as control in digital architecture.

The size of digital influence in architecture is also the topic of size in art and architecture and it is open for new research opportunities. Open parameter for experimentation is the size of the architectural space comparative to the size of the idea and known topic – unknown result as psychological or social moment in emerging architecture.

## NOTES

- N. B. *The author would like to thank to Professor Ludger Hovestadt, PhD from CAAD Chair, ETH Zurich for support in this research.*
- 1 Ludger Hovestadt, *Catalog Of Special Exhibition Of Caad Chair, Eth Zuerich*, (Basel:Swissbau-Basel, 2005), 1.
- 2 Slađana Marković, *The Guide Through The Process Of Digital Chain In Architecture (Bilingual: Serbian/ English)*, (Belgrade, Endowment Andrejević, 2013), 68.
- 3 Bryan Lawson, *How Designers Think* (New York: Routledge, 2005), 61.
- 4 *Ibid*, 72.
- 5 Brady Peters and Terry Petres, *Inside Smartgeometry – Expanding The Architectural Possibilities Of Computational Design* (Chichester: Wiley, 2013), 36–49.
- 6 Bryan Lawson, *How Designers Think* (New York: Routledge, 2005), 60.
- 7 Brady Peters and Terry Petres, *Inside Smartgeometry – Expanding The Architectural Possibilities Of Computational Design* (Chichester: Wiley, 2013), 88–91.
- 8 John Palfrey & Urs Gasser, *Born Digital* (Philadelphia: Basic books, 2008).
- 9 Fabio Gramatio and Matthias Kohler and Silke Langenberg (eds.), *Fabricate* (Zuerich: ETH gta Verlag, 2014), 86–89.
- 10 *Ibid*, 105–118.
- 11 *Ibid*, 121.
- 12 Lisa Ivamoto, *Digital Fabrications- Architectural And Material Techniques* (New York: Princeton Architectural Press, 2009 ), 7.
- 13 ‘selfridges birmingham / future systems’ DANDA, February 15, 2018, [http://www.danda.be/reviews/selfridges\\_birmingham\\_future\\_systems/](http://www.danda.be/reviews/selfridges_birmingham_future_systems/).
- 14 *Ibid*.
- 15 Le Korbizje, *Ka Pravoj Arhitekturi* (Beograd: Gradjevinska knjiga,1999), 51.
- 16 Dirk Habel and Jörg Stollmann and Tobias Klauser, *Exhibition Catalog (Ed): Inventioneering Architecture Switzerland* (Zuerich: ETH gta Verlag, 2005), 48–49.
- 17 *Ibid*, 34.
- 18 Robert Aish, ‘From Intuition To Precision,’ *AA Files*, No.52 (2005), 62-63.
- 19 Verena Andermatt Conley, *Rethinking Technologies*, (Minneapolis: University of Minesota Press, 1993), 218.
- 20 Bryan Lawson and Kees Dorst, *Design Expertise*, (New York: Routledge, 2009), 24.

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**BIBLIOGRAPHY**

- Andermatt Conley, Verena. *Rethinking Technologies*. Minneapolis: University of Minnesota Press, 1993.
- Aish, Robert. 'From intuition to precision.' *AA Files*, No.52 (2005), 62-63.
- Gramazio, Fabio and Matthias Kohler and Silke Langenberg (eds). *Fabricate*. Zuerich: ETH gta Verlag, 2014.
- Habel, Dirk and Stollmann, Jörg and Klauser, Tobias. *Exhibition Catalog(ed): Inventioning Architecture Switzerland*. Zuerich: ETH gta Verlag, 2005.
- Hovestadt, L. *Catalog of Special Exhibition of CAAD Chair*, ETH Zuerich. Basel:Swissbau-Basel, 2005.
- Iwamoto, Lisa. *Digital Fabrications - Architectural and Material Techniques*. New York: Princeton Architectural Press, 2009.
- Lawson, Bryan. *How Designers Think*. New York: Routledge, 2005.
- Lawson, Bryan, and Kees Dorst. *Design Expertise*. New York: Routledge, 2009.
- Le Korbizje. *Ka pravoj arhitekturi*. Beograd: Građevinska knjiga, 1999.
- Marković, Slađana. *The Guide Through The Process Of 'Digital Chain' In Architecture* (bilingual: Serbian/ English). Belgrade: Endowment Andrejević, 2013.
- Peters, Terri and Brady Peters. *Inside Smartgeometry - Expanding The Architectural Possibilities Of Computational Design*. Chichester: Wiley, 2013.

# GEOMETRICAL BREAKTHROUGH IN CONTEMPORARY ARCHITECTURAL DESIGN: META-MATERIALITY AND FRAGMENTATION

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## A B S T R A C T

The study relates two historical categories that were not previously associated in this manner. One concerns the role of geometry in the transformation of space in the Gothic architecture, where geometric line made the position of physical forces visible for the first time. The second transformation that sees the release of anxiety in challenging the perspective was done in Mannerism by instrumentalisation of the metaphor using visual means of deformation and figuration. Today we experience both historical moments in a modified form of appearance, still trying to give a formal character to the matter of materiality. As it is not possible, this approach has resulted in fragmentation in the absence of a unitary radical critique of modernity. Fragmentation and meta-materiality of contemporary architecture today represent a possible conceptualisation of space invoking all known forms of dematerialisation and disappearance of the world, including digitisation. Referring once again to the myths of the Tower of Babel, the Fall of Icarus, and the Wizard of Oz, in this experiment myth and discourse persist together, turning into the other and finding themselves in the other. Building architectural position between the extremes of the metamaterial and the fragmentary is a matter of breaking geometry of form and the idea of it..

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## KEY WORDS

FORM  
GEOMETRY  
MATERIALITY  
META-MATERIALITY  
INCOMPLETENESS  
FRAGMENTATION

## META-MATERIALITY AND REALITY

Interest in contemporaneity emerges with the weakening of interest in the postmodern condition. If postmodernity is understood as a cultural state rather than an era, which marks the end of grand narratives following the end of modernism, or as a temporal concept of the cultural logic of late capitalist production, how can we interpret contemporaneity? It could be said that contemporaneity of architecture is defined in terms of the need for a dynamic spatial interaction that enables reactions to changes in the context. For the reaction to be possible, the question of time must be central in relation to the dynamic continuity of architecture. In it, time is the context – a condition for discursive contingency. Contingency of architecture relies on the fact that things can be different than they are.<sup>1</sup> For this reason, the question of form becomes the question of time, while the perception of time is visible in disconnected and discontinuous fragments, though of the same totality. The growing fluid sense of temporality changes the present,<sup>2</sup> and to be contemporary is to coexist with something else, in relation to which we position ourselves, either as a reflection, or a timeline, but not as a historical position.<sup>3</sup> The world of reflections and reproductions, transformations and digital information - the world we live in - has led to the loss of substance of the real in the realisation of the world by abstracting the visual from the space-time concept. Debord interprets fragmentation of the visual experience as an image, in contrast to the reality of lived experience, and the spectacle as a function of the historical development of modernity, that is, the fragmentary experience of the spectacle is defined as the perception *per se*.<sup>4</sup> Visual experience that results from being overwhelmed by images and information creates fantasies that have no basis in the real. In absolute visibility and transparency of technological appearance, objects become empty signs that describe *the emptiness and absence of the hierarchical organisation of elements*, and as such, they constitute a hyperphenomenon without a game of visible and invisible, all through a distorted view.

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 37

Only the visible gives a constructive dimension to the world. What is not me – what is beyond me – different from me – beyond the boundaries of the body – opens up the question of space or spatiality based on the positioning of the object. I am what is around me, says Wallace Stevens,<sup>5</sup> while Noël Arnaud, also a poet, argues - *I am the space where I am*.<sup>6</sup> However, the experience of architecture is also interpreted as an experience of multiple perceptions gathered asone, not only seemingly, coherent totality.<sup>7</sup> In this sense, the observed object is always just a frame of something ‘partly’ defined - external characteristics that never appear simultaneously and completely. The object



transcends them precisely by being in each of them, so that all appearances of the object are its appearances. They make it present and absent at the same time, taking into account that appearances are never the object of perception itself. It is the infinity carried within itself, given that the set of its characteristics extends beyond fragmentation of its substance, the possibilities just as much as the characteristics.<sup>8</sup> Thus, fragments of the object can be interpreted as its characteristics, those that are not fully revealed. Their potential includes traces of multiplicity - parts of a whole that is not in the domain of visible, but only in a distant perspective. Therefore, the present fragment always indicates the absence, having a kind of elusiveness.

Behind the virtual reality in all its forms of appearance, the same way as behind every image,<sup>9</sup> the real has disappeared. This is what fascinates and documents the disappearance of Blank: void, silence, contradictions, and opposites. It is clear that the digital lacks the moment in which it occurs. The digital is destined to fall into a random domain – a fragment of universal pixelation – which has nothing to do with projected distance or its negative.

New conditions of perception defined as a *postmodern hyperspace*,<sup>10</sup> as Jameson argues, interpret the aesthetic experience as a routine of consumerism organised by technology. In it, coherence of the continuity of experience emerges. Thus, visual experience understood as a purely spatial experience signifies a loss of historicity. On the other hand, Virilio addresses historical transformation of the conditions of perception and questions the overcoming of image through the concept of *vision machine*. The machine links the progress with visual experience.<sup>11</sup> For this reason, visual experience can also be interpreted as disorientation and dislocation caused by speed – new conditions of perception without a metaphor that turn into a *new spatial logic*, a spatial simulacrum, not only to Virilio. The influence of technology can be easily explained in the example of the history of telescope, whose emergence has been interpreted as a destabilisation of the appearance of what had been outside but present until then. Development of optical instruments and mechanisms for visual reproduction has led to the experience of a shifted view and expansion of the geocentric horizon of perception.<sup>12</sup> In the same way, the visibility of reality always indicates something beyond, something that can never fully manifest itself. The character of perception is based on incompleteness, the moment when we become aware that there is infinitely more than we can see. In this regard, perception turns into intention to see something.<sup>13</sup> Literal application of this principle turns the world of visible into the visibility of autonomous images: visual experience in its fragments. Virilio, Debord, and Baudrillard thus argue

that the world has lost its future permanently due to its total visibility, without mystique and seduction, because it is never blurred, never ambiguous, never distant, and precisely for this reason, because of the impossibility of grasping its capacities and dispositions, it is incredibly empty and worthless. If we go back to Berger, who argues that the way of seeing includes what is seen, the question of intention, even the question of object itself, remains outside such evaluation.

I was modern because of the method and not the form. Because form is the one that gives longevity to art, enables it to break away from modernity of its time, and launches it like a torpedo into the past and the future (Fig. 1).

- Marcel Duchamp (Interview by Achille Bonito Oliva, 1977)

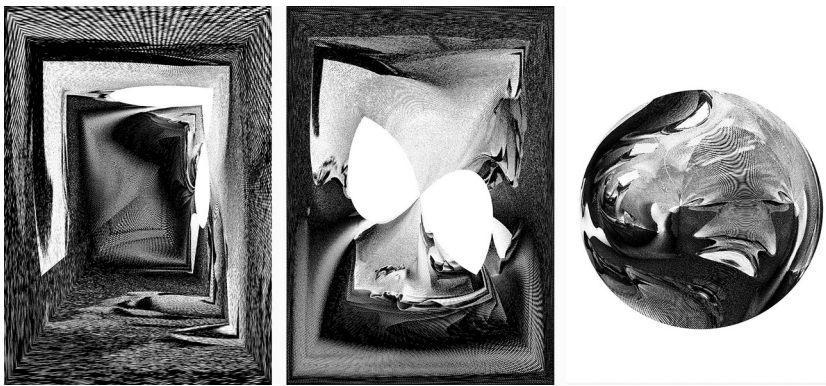


Fig. 1. Trompe-L'Oeil: Realistic in Ilusion, Master thesis, Life is a Dream (Calderon), Open air theatre, Natural core of Belgrade, Luka Grgić, (Tutors: Milenković, Čuković Ignjatović, Milojević, University of Belgrade - the Faculty of Architecture, 2020)

## ARCHITECTURE IN GEOMETRY

The connection between geometry and architecture is unbreakable because the first has always been the very language of the second. The discovery of geometry in the Renaissance was a symbolic moment that marked the beginning of identifying the discipline of architecture beyond the crafts. This basically means that the middle of the fifteenth century announced the separation of architecture and its emancipation through approaching speculative sciences and philosophy. On the other hand, the essence of geometry has enabled architecture in modern era to be understood in its totality and to be developed in accordance with norms and using only its own language - separate from the idea of transforming reality. Nevertheless, unlike sculpture and painting, architecture has never gained the status of the so-called liberal art.

We are not sure, although it is likely, that Brunelleschi (1377-1446) was the first to prove the exact mathematical method of perspective in a plane, and whether this method factually existed in the construction of horizontal and vertical projections given that written accounts appeared only later.<sup>14</sup> However, Masaccio's (1401-1428) frescoes already show a recognisable coherence of space that indicates a constructive method carried out 'as a rule' and uniformly.<sup>15</sup> Panofsky argues that the emergence of systematic depiction of spatial depth that the Northern painting discovered empirically, using the methods of the Italian Trecento (Duccio and Giotto) in the Italian Quattrocento (Brunelleschi, Donatello, Masaccio), was uncompromisingly determined by reference to mathematical theory. In the mid-1430s, there was unambiguously described system that was at the time used primarily as a *costruzione legittima*, which was based, as Panofsky states, on a completely new principle, although presented as an improvement of what had already been known in painting.<sup>16</sup>

Filippo Brunelleschi, who was responsible for its initial application, is also the first known independent professional figure. In this sense, we can state that the subject of architecture appeared on the horizon of the European Renaissance together with geometric perspective. Once again, from the Renaissance onwards, this discipline has been something absolutely different from the crafts industry developed in the Middle Ages, while its constitution involves a shift of object from the built or material one to the ideal – the subject of thought and reflection. Such application of geometry not only elevates the artistic representation of space to sublimation of scientific knowledge, but it enables the idea of architecture as *cosa mentale*, whose understanding is often imbued with Neoplatonic thought and promoted by humanists and philosophers from Alberti (1404–1472) onwards. Prominence of the ideal, with the basis in drawing and geometry, enabled the emergence of the so-called 'paper architecture' two centuries later, represented by fantastic works of Piranesi (1720-1778) or Boullée (1728-1799). If the entire domain of the representation of object character is accepted, there is a relatively safe basis for forming the modern concept of disciplinary autonomy.

Architecture, like any other modern discipline, signifies an imaginary entity. Its vague boundaries and dispersion, according to Tahl Kaminer, are 'constituted by the accumulative effect of real institutions, organisations, and products.'<sup>17</sup> No matter how diffuse and elusive in its appearances and character, architecture remains an instrument of a generalised, central power of prescribed language and norms. This excludes what would be absolutely the same or absolutely different: our comprehension of architecture is not without limitations, but it has

a primary empirical condition and limits of possibilities. In this way, its central domain is protected, preceding any idea or theory of an explicit form. The discipline of architecture has a certain geometric and perspectival awareness, a specific understanding and world view – a place and time in its canons - the issues and perceptions raised in debates. Its elusiveness is comparable to the elusiveness of object.

Discovery of the mathematical method of perspective in a plane, and the subsequent consolidation of architectural drawing and geometry, was not only the basis of its transformation, but also a hint of modernity. Once the systematic space was achieved as a specific expression of what was taught by the theory of knowledge and natural philosophy at the same time, partial spatiality of the Scholastic view was replaced by the construction of central perspective. Its infinite extension, with the centre in an ‘arbitrarily’ assumed point of view, would result in the lines of abstract thought that breaks with Aristotle’s view. Abandoning the notion of closed universe built around the centre of the Earth and the celestial sphere as the absolute limit,<sup>18</sup> function of the Renaissance perspective becomes comparable to the function of modern criticism. The subjective impression has been so rationalised through the perspective that it could form the basis for the construction of this very (objective) modern (infinite) experiential world. The space that has already been united in the aesthetic image in the late Gothic period has been systematically united based on the natural formula of opposition to the Earth’s gravity.

The central perspective from the Renaissance has been only technically improved and facilitated later. This is due above all to its exactness and stability of visual representation, where all figures are included without exception in a unique and unlimited system of size relations. Shaping of such a completely rational, which means infinite, homogeneous, and continuous space, required a bold abstraction of reality. In order to express the totality of content, it, in Panofsky’s words, ‘negates the difference between the front and back, left and right, body and the medium (...); it disregards the fact that we do not see with one fixed eye, but with two constantly moving eyes.’<sup>19</sup> In addition, the visual field includes a spheroidal plane of projection, which means that the perspective does not take into account a ‘huge’ difference between the real projection and mentally determined visual image. Hence, perspective, not so much the result as the definition itself – is the instrument of abstraction – the objective in which homogeneity and infinity that are completely unknown to mental experience are achieved through the representation of space. Thus, perspective transforms the space into mathematical and logical one, it implements consistently

the constructive and real space of Euclidean geometry. Once established, perspective has become a visual tool that links the language of architecture with geometry for good. Separating the subject from the object, it reduces the phenomena to stable, exact rules, but it also makes them contingent upon the individual given that how it will consequently appear depends on a subjectively determined central point, freely chosen. On the one hand, it announces a triumph of the distancing and objectifying a sense of the real, while on the other, it strengthens subjective tendencies towards the power to negate the distance. Subjective power is manifested not only as the systematisation and stabilisation of the external world, but also as the expansion of inner sphere of the self.

Architectural drawing has a specific, peculiar status in this regard because as a representation of an object that does not exist yet, it hardly fits in the Renaissance category of mimesis. Nevertheless, it relies on the idea of semblance. In the sixteenth century, the projection tends to resemble, while in the seventeenth century Classicism, it tends to be identical with the representation of the future object. The manner in which the discipline functions, as well as the manner in which architecture perceives itself, is largely shaped by the relation to the drawing technique (projection) and the projection of reality.<sup>20</sup> The ambivalence of the perspectival method further destabilises this order, raising the very problem of meaning: the claim of ‘the object confronts the ambition of the subject.’<sup>21</sup> There is no doubt that this nineteenth century paradigm could be expressed only through well-known historical oppositions - formalism and rationalism, individualism and collectivism, but also through free will and established norms. The tendency to perceive architectural drawings as notations, sets of abstract functions and instructions rather than complete representations, as argued by American philosopher Nelson Goodman in the late twentieth century, has resulted in insufficient divergence from the classical representative content of architectural drawing. Naturally, its theoretical disintegration has begun even before the early modern discourse, but this aspect has been still retained and tacitly accepted in practice. This means that our perception of architecture is still governed by dialectical oppositions, such as the one between form and programme, or appearance and function. Hidden in the aspect of representation, projections remain undisturbed by the practice or courage of architects.

This may be the reason why the issue of geometry is wrongly linked to the object because together with the idea of determining what it is, there is a recurrence of the mentioned dialectical oppositions. More important question is what it means, not only to the space surrounded by it, but also as a moment of stylistic history and a symbolic form of spiritual significance. In this sense, for certain

epochs it is important not only whether they have a perspective, but also what kind of perspective they have.<sup>22</sup> In early modern architecture, whose language and norms remain inextricably linked to constructive geometry, regardless of their transformation, there is a ‘secret history’ of divergent relations: turning a work against its own geometric truth. Every decadence initiates three categories: truthfulness, unity, and purposefulness. The first equals the breakdown of certain structural logic. The second degrades the unity of space. The third fragments the directed, anticipated, and finalised temporality.<sup>23</sup>

Since a three-dimensional object casts two-dimensional shadow, we should be able to imagine the unknown four-dimensional object whose shadow we are (Fig. 2).

- Marcel Duchamp (Regions which are not ruled by time and space, TV interview by James Johnson Sweeney, January 1956).

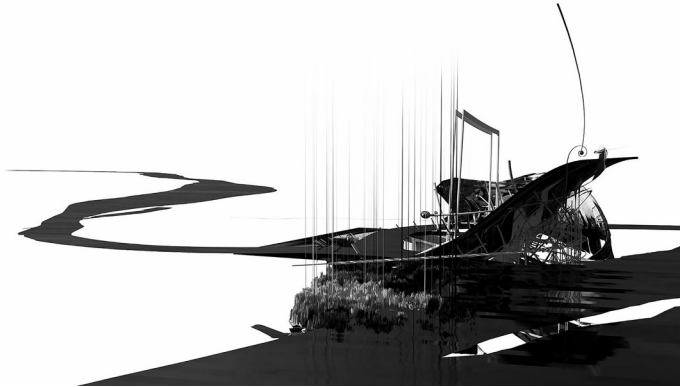


Fig. 2. Trompe-L'oeil, Final project, Life is a Dream (Calderon), Open air theatre, Natural core of Belgrade, Luka Grgić, (Tutors: Milenković, Čuković Ignjatović, Milojević, University of Belgrade – the Faculty of Architecture, 2020)

## BETWEEN SCALE AND PROPORTION

The proportional system as a principle of shaping has had a greater significance in architecture than in other arts since architecture primarily works with models in relation to the immediate content of reality. For this reason, in the sudden prevalence of digital production, the loss of the Module could be equated with disappearance of the Ideal. The lost substance tacitly transcends into the model of representation. Thus, before any shaped content, the idiom of authenticity shapes architecture, adapting it to the ideology of use, even when it tends to

oppose it the most. Some (special) fragments acquire a (special) value as part of material truth because their empirical accessibility deceives with almost physical closeness. Incomplete or over-emphasised figures combine in them the metaphysical and specific. Full of pretensions to the Ideal, they actually do not go beyond the standardisation of the world they refer to.

Stratification of space in open fragmentation hides the logic of a system that uses its opposite as a principle of organisation. This means the disintegration of the linear geometric code to impressions that speak of themselves, and at the same time, the beginning of the disappearance of style. Perhaps it is precisely thanks to the projected linear geometry, leading to the emancipation of drawing, that nonlinearity and curvature of the image of our times no longer has the constitutive value of architectural knowledge.

Due to optical constraints, such as lateral deformations and subjective distance from projection, the so-called *prospectivae artificialis* loses its character of a craft and becomes solely a matter of artistic form. Restoring its scientific value through the early modern discourse of applied geometry corresponds with restoring faith in the integrity and purposefulness of the model-truth contained in the fragment of architecture.

On the other hand, geometry still does not exclude the possibility of systematic abstraction of physical and metaphysical space of the Deleuzian position and material being of the object of architecture. The presented figures would otherwise remain a void in content – Descartes' void with ideal proportions – Deleuze's memory of something that no longer exists – Kasirer's issue of the difference between body and the medium – once again, Cartesian *quantitative continuum*. Does this mean that geometry really abstracts spatial material?

Architecture generates a continuous experience in heterogeneous space, and according to Deleuze, there are only separate effects. Architecture based on geometry breaks with the economy of *mimesis* because it does not produce copies (icons) but models (simulacra), and thus does not repeat, but constitutes the order. In contemporary times, but only by losing the pretension to realise its own ideas about the world, it has the possibility of turning to creation of alternative world models.

Rather early, in the early twentieth century, Duchamp realised that the world cannot be repeated, but only represented, duplicated, negated or quoted, in the way characteristic of language mechanisms. His 'Large Glass' is a challenge of

perspectival ambiguity: optics, geometry, and mathematics lose their value of conceptual abstraction when they are used by the narrative. The Renaissance believed in the value of interpretation because the language formulated contents that were within space and time. What was visible was also fully comprehensible. Hence the justification for its condensation of reality.

A modern-day fragmented narrative has its historical parallel in uncontrolled exterior (literally and phenomenally) that only confirmed the internal architectural order. Triumph of the construction of rational perception of the domain of reality and an appropriate sense of it has always required acceptance of the disposition of true reality. As before, today it also seems more real than reality itself: anti-geometric experiment in which myth and discourse still persist together, turning into the other, and finding themselves in the other. The inability to imagine that mathematical sense in architecture can be expressed by means other than geometry originates from the fact, as Spengler argues, that the so-called written mathematics is identified with the broader view and cumulative thought of civilisation.

However, a sense that lies in the abstract basis of numbers could be realised sensorily in some other way, but never without a new instrument, never separated from technology, never without methodological uncertainty. In this way, we can observe the similarities and dynamics of the modern era with the Gothic and Mannerism. Incompleteness of form that is characteristic of every dynamic style only intensifies the impression of infinitely restless movement in which the balance is only temporary. This is the origin of modern affinity for incomplete, fragmentary, and only suggested.

In Mannerism, it is a matter of another kind of incompleteness that results in fragmentation of a geometric nature. Since that era, all great art has something fragmentary in itself, certain external and internal incompleteness, reluctance to say the last word. 'There is always something left over for the spectator or reader to complete. The modern artist shrinks from the last word because he feels the inadequacy of all words - a feeling which we may say was never experienced by man before Gothic times.'<sup>24</sup>

Each form is the projection of another form according to a certain vanishing point and a certain distance (Fig. 3).

- Marcel Duchamp (Regions which are not ruled by time and space, TV interview by James Johnson Sweeney, January 1956)





Fig. 3. Trompe-L'Oeil, Final project, Life is a Dream (Calderon), Open air theatre, Natural core of Belgrade, Luka Grgić, (Tutors: Milenković, Ćuković Ignjatović, Milojević, University of Belgrade – the Faculty of Architecture, 2020)

Mannerism has been neglected, in a similar way to the Gothic, by the classical theory of architecture. Architecture that is based on a pure geometric idiom can only see irregularity in it. However, Mannerist architecture makes a real deviation from the Renaissance principle of completeness, closest to the one in contemporary architecture. Nouvel does it by repeating, with the curvature in one dimension – in which the anxiety that prevents direct relationship with things is released. Bofill uses oversizing to position the object in counterpoint to the landscape.

In a similar manner, Perrault attempts to control the internal content of architecture through geometry. Barragan questions the visibility of pure geometry using colour, including figuration as a necessary reference system. Manneristic collapsed perspective indicates the disappearance of rigid distance separating the present from the past and the future as well as the form from vague materiality. The metaphor becomes the main means of expression; open forms appear without structure. There is a tendency towards atectonic form, voidance of the volume, while construction tends to use attenuation to represent works as drafts, i.e., mental images.

Oliva interprets the tension in relation to integrity as an attempt to functionally express parts of the internal content. For him, to form means to block the movement completely and take away the tendency of object towards integrity – to use at the same time the possibility of a formal blockage in the metaphysical language space. In contemporary representation of architecture, transparency has withdrawn in favour of masks and scenography. Language is activated against the archetype, the inability of language to speak of itself except through

tautologies. In contemporary times, architectural position is achieved between the extremes of the metamaterial and the fragmentary – in broken geometry of form and the idea of form.

My work is dry in relation to technique (Fig. 4).

- Marcel Duchamp (Interview by Dorothy Norman, 1956)

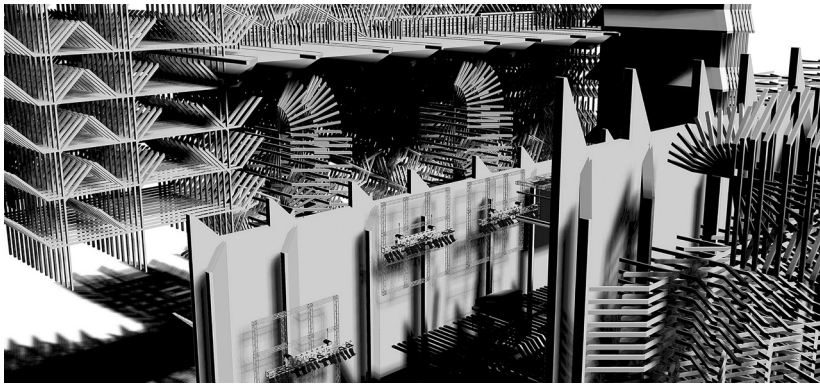


Fig. 4. Centre for Image and Sound, Kosančićev venac, Belgrade, M1 Design studio, Kemal Hasanagić, (Tutors: Milenković, Mojsilović, University of Belgrade - the Faculty of Architecture, 2020)

## ARCHITECTURE IN FRAGMENTS

Contemporary architecture rejects the idea of totality in terms of continuity and fluidity, turning to the fragmented experience of spatial gaps and its structured narratives. The narrative itself, which is included in the vague dialogue of spatial fragments, becomes a narrative of discontinuity. In terms of such discontinuity of both space and time, conditioned by the compression of distance and the speed of contemporary life, the sequences of future memory emerge, blurred and not rooted in space and time. If architecture still survives as a system of metaphors (as Derrida once argued), and as a form of writing and a form of life, fragmentation is a logical outcome of the idea of general in individual, irrespective of its elementary materiality and linguistic function. Literally, it is an intention visible in its wake. In Baudelaire's words, if the *universe is nothing but a store of images and signs*, it could be said that fragmentation is a new study of modernity. As always, there are technology, institutions, symbols, and forms of new representations based on the myth of the Tower of Babel, the Fall of Icarus, and the false Wizard of Oz, the inevitable deconstruction of integrity that is already known. Fragments become elements used for the

interpretation of reality - a radical critique of contemporary society - the genesis of multiple layers of perception and experience of the impossible. It could be said that architecture survives only if it negates the form that is expected of it. If it negates itself and transcends its own framework, architecture emerges as an expression of this deficiency, defect, incompleteness, always leaving something out, reality or concept. Relating to overlaps between images and narratives, layers of the appearance of architecture include the polyvalence of what the object really is, and what becomes as its reflection. Such overlaps lead to decomposition of objects, systemic dematerialisation and variability of its geometry. If the appearance of variability is free from pure spatial definition,<sup>25</sup> then variability can be understood as an intensification of experience.

Different forms of transformation of spatial categories, as defined by Deleuze long ago, are processes of constant becoming and they carry the idea of infinite potential as a model of survival of architecture and 'the right to new.' The differences still serve to conceptualize spatial categories in terms of their fragments and interpretations beyond confirmed formulations. If the duration is both the future and the form of its change defined by speed, transcendence, ease, and transition from one state to another, can it be said that architectural contemporaneity becomes the capacity of architecture to enable multivalent content in itself.<sup>26</sup> In this case, we renounce in advance the possibility of omnipresence of the concept of the world. Its textures in traces tend to exist autonomously, only in relation to one another, reaching the meaning that is always somewhere outside - beyond the material world we know, in a position from which the other is not only the visibility of potential, but also its reality

## NOTES

- 1 Jeremy Till, *Architecture Depends* (The MIT Press, 2009), 55-61.
- 2 Sylvia Lavin, *Flash in the Pan* (Architectural Association Publications, 2015), 174.
- 3 Paul Rabinow, "Beyond Ethnography: Anthropology as Nominalism", *Cultural Anthropology* 3(4): 355-364. [http://anthropos-lab.net/wp/publications/2009/10/fs\\_anthro\\_of\\_contemp.pdf](http://anthropos-lab.net/wp/publications/2009/10/fs_anthro_of_contemp.pdf)
- 4 Guy Debord, *Society Of Spectacle* (Detroit: Black&Red, 1983), 7.
- 5 Wallace Stevens, *The Collected Poems of Wallace Stevens* (New York: Vintage Books, 1990), 86.
- 6 Gaston Bachelard, *The Poetics of Space* (Beacon Press, 1994), 137.
- 7 John Hendrix, *Theorizing A Contradiction Between Form And Function In Architecture* (Routledge, 2013), 166.
- 8 Renaud Barbaras, "Invisibility at the heart of appearance: on perception, art and desire" in *Paradoxes of Appearing: Essays on Art, Architecture and Philosophy*, ed. by Michael Asgaard Andersen (Lars Müller Publishers, 2009), 169-185.
- 9 Jean Baudrillard, *Why Hasn't Everything Already Disappeared?* (Seagull Books, 2009), 32.
- 10 Frederic Jameson, *Postmodernism or the Cultural Logic of Late Capitalism* (London: Verso, 1991), 18.
- 11 Paul Virilio, *War And Cinema* (London: Verso, 1994), 33.
- 12 Jelena Mitrović and Vladimir Milenković, "Arhitektura kupole: mapiranje nebeske dubine." *Theoria* 1, no 63. (2017): 163-175. <http://www.doiserbia.nb.rs/img/doi/0351-2274/2017/0351-22741701163M.pdf>.
- 13 John Berger, *The Ways of Seing* (Penguin, 1992), 5.
- 14 In: "O slikarskoj perspektivi" (*De Prospectiva Pingendi*, c1474), Piero della Francesca
- 15 We refer here primarily to the fresco 'Holy Trinity' located in the in the Dominican church of Santa Maria Novella in Florence, dating from 1427, shortly before the artist died.
- 16 Erwin Panofsky, *Rasprave o osnovnim pitanjima nauke o umetnosti* (Bogovađa: Samostalno izdanje, 1999), 144-180.
- 17 Tahl Kaminer, *Architecture, Crisis and Resuscitation: The Reproduction of Post-Fordism in Late-Twentieth-Century Architecture* (Routledge, 2011).
- 18 Erwin Panofsky, *Rasprave o osnovnim pitanjima nauke o umetnosti* (Bogovađa: Samostalno izdanje, 1999), 144-180.
- 19 Erwin Panofsky, *Rasprave o osnovnim pitanjima nauke o umetnosti* (Bogovađa: Samostalno izdanje, 1999), 146.
- 20 Tahl Kaminer, *Architecture, Crisis and Resuscitation: The Reproduction of Post-Fordism in Late-Twentieth-Century Architecture*. (Routledge, 2011).
- 21 Erwin Panofsky, *Rasprave o osnovnim pitanjima nauke o umetnosti* (Bogovađa: Samostalno izdanje, 1999), 144-180.

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- 22 Ibid.
- 23 Fridrih Niče, *Volja za moć* (Dereta, 2012).
- 24 Arnold Hauzer, *Socijalna istorija umetnosti* (Beograd: Kultura, 1966), 224-226
- 25 Vladimir Milenković, *Arhitektonska forma i multi-funkcija* (Beograd: Zadužbina Andrejević, 2004), 15.
- 26 Hans Ibelings, *Supermodernism: Architecture in the Age of Globalization*. (NAi Publishers, 1998), 9.

## BIBLIOGRAPHY

- Bachelard, Gaston. *The Poetics of Space*. Beacon Press, 1994.
- Baudrillard, Jean. *Why Hasn't Everything Already Disappeared?* Seagull Books, 2009.
- Barbaras, Renaud. "Invisibility at the heart of appearance: on perception, art and desire." In: *Paradoxes of Appearing: Essays on Art, Architecture and Philosophy*, ed. by Michael Asgaard Andersen, 169-185.
- Bergson, Anri. *Materija i pamćenje*. Fedon, 2013.
- Bourriaud, Nicolas. *Formes de vie. L'art moderne et l'invention de soi*. Denoël, 2009.
- Bourriaud, Nicolas. *L'exforme*. Presses universitaires de France - PUF, 2017.
- Delez, Žil. *Razlika i ponavljanje*. Beograd: Fedon, 2009.
- Gavrić, Zoran and Bjelić, Branislava, ed. *Marcel Duchamp: Spisi – Tumačenja*. Samizdat Bogovađa, 1995.
- Hauzer, Arnold. *Socijalna istorija umetnosti*. Kultura, 1966.
- Hendrix, John. *Theorizing a contradiction between form and function in architecture*. Routledge, 2013.
- Ibelings, Hans. *Supermodernism: Architecture in the Age of Globalization*. NAI Publishers, 1998.
- Jameson, Fredric. *Postmodernism or the Cultural Logic of Late Capitalism*. London: Verso, 1991.
- Kaminer, Tahl. *Architecture, Crisis and Resuscitation: The Reproduction of Post-Fordism in Late-Twentieth-Century Architecture*. Routledge, 2011.
- Latur, Bruno. *Nikada nismo bili moderni*. Mediterran Publishing, 2010.
- Lavin, Sylvia. *Flash in the Pan*. Architectural Association Publications, 2015.
- Milenković, Vladimir. *Arhitektonska forma i multi-funkcija*. Beograd: Zadužbina Andrejević, 2004.
- Mitrović, Jelena and Milenković, Vladimir. "Arhitektura kupole: mapiranje nebeske dubine." *Theoria* 1, no 63. (2017): 163–175. <http://www.doiserbia.nb.rs/img/doi/0351-2274/2017/0351-22741701163M.pdf>.
- Niče, Fridrih. *Volja za moć*. Dereta, 2012.
- Oliva, Akile Bonito. *Ideologija izdajnika*. Svetovi, 1989.
- Oliva, Akile Bonito. A.B.O.M.D., Svetovi, 1977.
- Panofsky, Erwin. *Rasprave o osnovnim pitanjima nauke o umetnosti*. Bogovađa: Samostalno izdanje, 1999.
- Rabinow, Paul. "Beyond Ethnography: Anthropology as Nominalism." *Cultural Anthropology*, no.1 (2009): 355-364.
- Renaud Barbaras, "Invisibility at the heart of appearance: on perception, art and desire," 169-185. In *Paradoxes of Appearing: Essays on Art, Architecture and Philosophy*. Ed. by Michael Asgaard Andersen. Lars Müller Publishers, 2009.

- 
- Stevens, Wallace. *The Collected Poems of Wallace Stevens*. New York: Vintage Books, 1990.
- Till, Jeremy. *Architecture Depends*. The MIT Press, 2009.
- Vignjević, Ana. Metamaterijalnost: arhitektura i pejzažni kod. Doktorska disertacija. Univerzitet u Beogradu - Arhitektonski fakultet. 2016.
- Virilio, Paul. *War and Cinema*. London: Verso, 1994.
- Wingham, Ivana. *Mobility of the Line: Art Architecture Design*. Birkhauser Verlag AG, 2013.
- Ricoeur, Paul. "Architecture and narrativity." Translated by Eileen Brennan, Robbie Carney and Samuel Lelièvre. *Études Ricoeuriennes / Ricoeur Studies* 7, no. 2 (2016): 31-42.
- Ricoeur, Paul. *Memory, History, Forgetting*. Translated by Kathleen Blamey and David Pellauer. Chicago: University of Chicago Press, 2004.

# SCALE BEYOND ILLUSION: AESTHETIC WAYPOINTS

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## A B S T R A C T

Infinity is intellectually incomprehensible to the human mind. Yet visual and acoustical illusions create the impression of infinite staircases and endlessly rising sequences of tones. Through the conscious use of proportion, the perception of extremes of scale can be induced in the viewer or listener, yet their effect is achieved subconsciously. Likewise a work of art can play with our sense of scale or proportion and influence our perception of time and space. There is a fundamental difference between the common illusion and the visual and acoustic shifts that can occur with our perception of a work of art. With the artwork, the recipient is co-creating aesthetic impressions of repeatable quality and not simply following the effect of an illusion. The article examines the ontological differences between illusions and the pursuit of art that explores the perceptual preconditions of space and time. The aesthetic perspective incorporates two major approaches to its discipline: the reflection of art as well as perception in general.



## INTRODUCTION

All creation myths and each and every human life begins and exists within the framework of space and time. The appearance of light in the Book of Genesis marks the point from which both spatial and chronometrical extension is manifested. It is not surprising that creation myths start with this point as it corresponds to the basic framework of human life. No move or thought can be made without a direct or indirect reference to space and time; classifying these as the preconditions of perception is a major essence of Immanuel Kant's *Critique of Pure Reason*.<sup>1</sup> To be capable of action, humans must be familiar with and have a relationship with space and time. Obviously, space and a progressive sense of time are factors humans must be able to rely on to move about without injury and to draw up future plans. We do not encounter these in an empty abstract way, but rather we encounter them naturally and only in such a way that they correspond to our perceptual apparatus. Within the facilities of logical thinking it is impossible to experience an infinite sense of time, an infinite extension of space, or a separation of these two units from themselves or from us. To experience Kant's categories of perception they must be complete. They embody our relationship to the world. This is the framework within which all relationships are defined. Our own body and our own temporality exist in proportion to all other entities in the world. A definition of proportion as the relation between parts of an entity and the relation of these to the entity as a whole has to also be considered, and that we are in relation to Kant's preconditions of perception; that we are built in but cannot experience them directly. While proportion is a static state, scaling is a process, a relational change. Both are a part of everyday life as a general frame of perception and occur in art as a part of the interplay between an artwork and the viewer.

Proportion becomes obvious when it is experienced in the extreme or when mismatches between expectation and manifestation occur. The incongruity of this basic perceptual guideline touches the sphere of mental diseases as well as that of art. The psychological terms of *depersonalisation*<sup>2</sup> and the *Alice-in-Wonderland syndrome*<sup>3</sup> describe this shift away from the familiar relation. What appears as frightening on the one hand offers at the same time the experience of the potential of scale and proportion both in the visual arts and the performing arts. This potential does not just apply to the inherent principles of an artwork, but also to the general handling of proportion within the preconditions of perception. This manifests an epistemological strength of art. The relation between the artwork and the viewer is driven by a mutual process and can be understood in the classical categories of aesthetics as theory of art, beauty and the reflection of perception in general.<sup>4</sup>

## TIME RELATIONS AND REPRESENTATIONS IN SPACE

In order to show the similarities of proportion and scaling in both space and time more clearly, I will present a few basic thoughts to mind. It is interesting that time is depicted in conjunction with the principles of space. The attempt to objectify time goes hand in hand with its spatial representation.<sup>5</sup> The chronometric measurement primarily serves to organise everyday life; although it offers intersections at perceived times, it does not exhaust them. The measurement of time is bound to a process of nature: the atomic oscillation of caesium 131 is the authoritative movement that underlies the course of the world clock.<sup>6</sup> Abstract time, however, manifests itself in something that can be experienced. Moreover, it becomes obvious how our understanding of time is built up anthropologically. The idea of an objective time that courses universally through the universe has given way to the idea of a subjective time,<sup>7</sup> hence Einstein's Special Theory of Relativity.<sup>8</sup> Nevertheless, the relativisation of time and its subjectivisation are not to be confused with each other. On the one hand is the physical time proper of the subject, on the other, subjectively experienced time. Movement is essential for our relationship as a prerequisite for measuring and experiencing time, but the course of time, it should be noted, is not congruent with our perception of it. Thus I speak here of the perception of time as a phenomenon.<sup>9</sup> The number and intensity of experienced events determine the perceived duration of a temporal event. Our linguistic conventions bear witness to this effect in expressions such as 'time flies.' Thus, the dichotomy between chronometric time and perceptual time is not only a part of musical experience, but also takes place here in its most intensive form. Aristotle stresses the significance of movement for time:

Moreover, we not only measure movement by time but we also measure time by movement, because (measured time and movement) determine each other.<sup>10</sup>

The Aristotelian concept is very modern. In fact, as described, time is measured in a fixed manner with the aid of a movement. It is no surprise that primarily spatial-based and primarily time-based arts share analogous phenomena.

Coming back to the question of how our thought process is affected: In such a situation of great atmospheric force leading to an intensive response of mind and body, it is unlikely to have clear thoughts, keeping a rational perspective. The beholder is affectively agitated and absorbed in the experience.

## VERTICAL SCALING IN AN ILLUSION

The strangeness of M. C. Escher's impossible buildings is familiar to us and is a part of our cultural heritage, attracting those with a strong interest in mathematics, less so those with an interest in arts, and very much those interested in popular culture. One of Escher's most famous works, the lithography *Ascending and Descending* from 1960, shows a multi-level building crowned by seemingly infinite stairs. This illusion is further expanded on in the so-called *Penrose stairs*.<sup>11</sup> The pseudo depiction of a seemingly three-dimensional structure on a two-dimensional sheet of paper tricks the eye. The building in the Penrose illusion is imaginary and does not exist. As Penrose explains, its parts are logically constructed and understandable, but in the totality of the constellation logic fails. The illusion is effective because the start and end points are not fully processed at first sight; the irritating sense of illogic only comes later. This same feeling induced by the Penrose stairs is used in Christopher Nolan's movie *Inception* from 2010, as a sign whether the protagonists are moving within a dream or a waking state.

The principle behind the Penrose stairs is analogous to the acoustical illusion known as the *Shepard effect*. First identified in 1964 by Roger Newland Shepard, it describes the phenomenon of a barber pole-like sequence of notes that seem to endlessly rise or fall (Fig. 1). In fact, the listener is just hearing the same sequence of sinewave tones repeating over and over. The effect relies on the use of multiple tones spaced an octave apart that carefully fade in and out

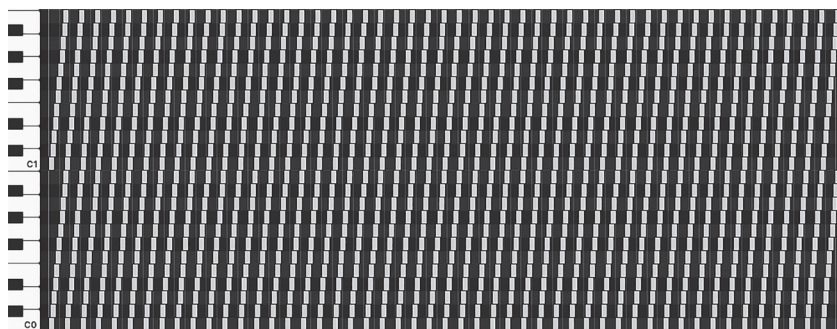


Fig. 1. Shepard Tone presented in a sequencer. Visual progress appears close to the barber pole effect. (Illustration by author)

as they are repeated. Despite an awareness that our hearing is limited to a range between 20 Hz and 20 kHz, it seems to us that the tones are infinitely rising or falling.

Both of these illusions demonstrate spatial extension, the sense of a larger space than in fact exists. Our sense of space ‘scales’ and for a moment it seems that this scaling is infinite, much like the illusion of the revolving barber pole,<sup>12</sup> whose rotating stripes seem to endlessly rise. What the three phenomena have in common is that they blur the discernible beginning and end of space and sequence. The unconscious impression is the one of infinity, though we recognise that it is rather a question of infinite repetition. In moments of uncertainty, however, the brain fills in gaps, including the gaps between beginning, ending, and new beginning. Indeed, we follow these illusions for a moment and scale the dimensions of our perception from a limited to a seemingly unlimited space. Still, after discovering that something is wrong we distance ourselves from the reality of this scaling, and of course our proportional sense of it. We sense irritation and remain at a certain (emotional) distance.

The illusions described here give hints as to how our sense of perception addresses the issues of scaling, but not necessarily how this functions with a work of art. What is the difference? How is the use and perception of scaling in a work of art different from an effect of these illusions? First, in these illusions we are looking at separate phenomena that can be a part of an artwork, but not necessarily fulfil artificial capacities on their own. This is connected to a key second point – instead of following an illusion, an artwork is usually made complete in an act of co-creation, in the interplay<sup>13</sup> between the artwork and its audience. Scaling in art goes beyond everyday experience in this process without following an illusion; this will be shown with a musical example after a short remark on musical materiality

## SCALING IN MUSIC - MATERIALITY AND PROCESSUALITY

Much like the use of enlargement and reduction in spatial art, in music we find the potential to accelerate or slow time. Whereas space is the material of architecture, time is the material of music. The essential aspect of immediate musical materiality, its extension in space, refers to the air that is brought to vibrate, the sound. Upon its impact on the eardrum, the spatial mechanics and the following acoustic impulses are translated into electrical stimuli that are introduced to the brain as the processes of cognition and understanding. As the German composer Karlheinz Stockhausen (1928-2007) notes on the

physical level of music, time not only determines the sequence of tones, but also their height as the pitch is determined by the oscillation interval and the musical material for this purpose. With the vibrations of the air the materiality of music seems to be reduced to the minimum. Nevertheless, its materiality is also a part of the aesthetic quality of music. Thus, the overtones of a particular frequency assign different sounds to its character. The resulting timbre makes the trombone sound distinguishable from the sound of a bassoon. This aspect of materiality is analogous to the brushwork in painting or the material finishes of architecture. In this sense, I speak of a residual materiality in music. The characteristic relationship between time and music is described by this thought. The relationship between listener and music starts exactly here.

Man finds himself more fundamentally exposed to time than to space. The existential space-time asymmetry lies in the fact that the here can be influenced by one's choice, the now not; no active time change analogous to the change of location is possible.<sup>14</sup>

It is not a peculiarity that music takes place in time, since every form of apprehension and thinking occurs *a priori* in time. And yet, music is able to modify our sense of time without resorting to extra-musical devices; thus, it exists in a unique relation to time.

The organisation of music takes place within its metre and tempo. The musical tempo, in addition to the temporal forms of manifestation of rhythm, is also dependent on melody and harmony, in particular their cyclical effect. These include tonal movement, contrapuntal processes, dynamics, articulation, and aesthetic factors such as the increase and decrease in instrumentation. In the range of directly quantifiable factors, tempo is determined by the increase in musical event density at the rhythmic level or by the acceleration of the tempo (e.g., the change from an *andante* of 76 beats per minute to an *allegro* at 120 beats per minute). The tempo can be represented by a metronome indication or a verbal instruction that combines both character and tempo (e.g. *andante con moto* - walking with motion). Prior to the seventeenth century, music was a product of the notation and the effects of the music, and the tempo was to be read from the form of the music itself. Examples of this are dance forms such as the courante or the minuet. In addition, there are musical instructions that show a successively changing tempo. *Accelerando* accelerates the musical pulse; a deceleration is expressed as *ritardando* or *rallentando*. The degree of this tempo change is determined by the performer. The deliberate variation of the metre is called *agogics*.

## MAHLER'S RESURRECTION: SLOWING DOWN TIME

The excerpt below from the score of Gustav Mahler's second symphony Resurrection (Fig. 2) comprises six bars from the last section before the beginning of the quasi-reprise - the modified repetition and processing of the thematic material from the beginning. The section is notable here for a tempo modification carried out at both the rhythmic and the metric level. To simplify matters, only the percussion and string instruments are shown. The line of the first timpani (*Pauke*), in particular, is instructive, as it most easily illustrates the temporal relations.

Fig. 2. Gustav Mahler, Symphony No. 2 in C minor, first movement, bars 325-331.

To define the basic pulse, the first bar is marked with the articulation and tempo *molto pesante*<sup>15</sup>. The bars 325 to 327 are played in the same meter and tempo. Although measure 328 begins with the same metronome number as the previous measures, it is provided with the additional notation “Rit.” (ritardando) or gradually slower. The indication of tempo primo in bars 329 and 330 tells us that here we return to the faster tempo of the beginning section. The tempo slows in bar 328 and then in the next bar picks up again. The metric structure of these measures is thus divided into three bars of the same tempo, one transitional measure and two bars of a new, faster tempo. At the level of rhythm and counting, the number of pulses in bars 325 and 326 is the same, but they differ in their rhythmic organisation. Although the bars are subject to the same meter and tempo, they create an impression of a different time flow through the rhythm. The change between duplet and triplet units<sup>16</sup> is decisive for the

tempo effect of these bars. In bar 325, quarter notes alternate with three eighth-note triplets. A quarter note and three triplets each have the same chronometric extent but at a different density of momentum. With the quarter note as the basic pulse, the three rhythmic figures are subject to the same pulse. The same applies to the figure eighth-sixteenth-rest sixteenth in the following bar 326. In each case, they fill the temporal space of a quarter note. The figure eighth-sixteenth-rest semiquaver gains its accelerating effect in contrast to the eighth note triplets of the previous measure.

At the same time, the rhythm in these bars prepares for the change in tempo. Especially in bar 328, tempo and rhythm intermesh to an intense striving into each other. The slowing of the tempo, with simultaneous acceleration on a rhythmic level in the change of the note values of duplet and triplet structure, forms the impressiveness of this change of tempo for the listener. Rhythm and tempo are slowed down at the beginning of bar 328. The basic measure is slowed down, the triplet become duplets. The tempo becomes progressively slower while the density of the rhythm increases, i.e. becomes faster. Further striving causes the rhythmic superimposition or opposition of the duplets in the timpani and the triplets in the strings that already fall on the first beat.

The sense of time here is constituted by contrasts and the resulting tension. Listening expectations and momentary perception strive for dissolution. The ear wants to perceive a tempo as established and, as a result, strives for a new order. In his book 'Sweet Anticipation,' David Huron describes this from a cognitive perspective:

Music plays with our expectations. Because it runs differently from other art in time, the brain is constantly speculating on how to proceed, and its tremendous fun. The correct prediction of the immediate future was vital to our ancestors and man developed a veritable sense of the future.<sup>17</sup>

## OPENING ROOMS - SCALE BEYOND

Within the frame of time and space, artworks are created by human minds for other human minds. The architect or the composer is the initial source of an artwork, but as a vital entity the work is recreated in the moment it is confronted with by an audience. The audience, of course, bring its own contexts and experiences when approaching a work of art.<sup>18</sup> Roger Scruton points out these cultural circumstances and traditions in human relation towards the

arts. In this process of interaction between the artwork and audience – which has been characterised in the history of aesthetics as a game, for example, by Schiller<sup>19</sup> and Gadamer<sup>20</sup> – both spatial and chronometrical space can be scaled and expanded. A time span of x minutes is extended or shortened by the musical events taking place within that span. This happens with and through the listener, who is swept forward or even given pause, with the impression that time has for a moment briefly stopped. Likewise, the now in music is a mutual now. As illustrated in the example of Mahler, the listener cannot pass by the moment but submits to its temporality. Of course, listening to a symphony requires a chronometric framework that the listener and composition share together. The listener requires as much time to listen to the symphony as its chronometric length manifests. In addition to this simple fact, the shared pulse to which the musical work and listener come together plays a more essential role. The proportion and scaling of perceived time, which is accelerated or decelerated, places the subject on the experience level in an intense relationship with their preconditions of perception. Subjective time clearly splits from chronometric time. It is characteristic that this contrast is achieved by means of a brief chronometric dilatation, as otherwise might only happen in extreme situations such as traffic accidents, when our perception of time greatly deviates from its norm. Art opens up rooms and increases awareness of our perceptual framework. In this sense a work of art scales beyond illusion.

## CONCLUSION

We saw that the process of scaling is able to create an awareness of time and space, the preconditions for perception. This occurs both as an effect in everyday life as well as within the artistic experience. Some effects of scaling are able to provoke illusions, both optical and acoustical. While our example of the Shepard illusion seemingly extends the vertical tonal space toward infinity, the example of Mahler's symphony (one of many hundreds of musical examples that would be possible) is based on the mutual structure of the interplay between musical work of art and audience. How do these illusions differ from each other and what does this mean ontologically for a work of art as an entity?

The Shepard illusion is based on the inattentiveness of the human brain. Looking at the effect in the Mahler Symphony as a form of art, two characteristics become obvious: co-creation and repeatability. The artwork is ontologically composed through the co-creative relationship between the work itself and the listener. Elements of illusion might appear in this relation, but this is not yet exhaustive



for the relationship, which moves forward within the ability to extend the moment or in general: to scale beyond. Here the ability of repeatability comes into play. An optical or acoustic illusion is not able to sustain its full effect when one has understood how it is derived. This might be compared to a magic trick whose ‘magic’ has been exposed by someone in the audience. The magical component vanishes, while the expansion of the ‘now moment’ in Mahler’s second symphony can take place again and again; regardless of the number of repetitions, it maintains its aesthetical quality and veracity. The development of play is not exhausted and remains up-to-date. This is one major aspect Gadamer has in mind when he writes about the timeliness of the beautiful.<sup>21</sup>

## NOTES

- 1 For a holistic understanding, particularly in the context of this paper, two of Kant's major works have to be considered: Kant, Immanuel, *Critique of Pure Reason* (New York: Cambridge University Press, 1998) and Kant, Immanuel, *Critique of Judgment* (Cambridge: Hackett Publishing Company, 1987).
- 2 ICD Classification: ICD-10 / F48.1. Affected patients experience a distance to various basic reference points of their life. This may include their own feelings, but also their relationship to surrounding objects.
- 3 ICD-10 / H53.1. occurs as part of the group of sight disorders.
- 4 In particular, the early conception of aesthetics by Alexander Gottlieb Baumgarten is emphasised by the role of aesthetics for the general reflection of the sensual perception and its own character toward knowledge that is only based on the mind. The criticism that has been produced toward this determination can be summed up in the formula: not every form of perception is an aesthetic experience and, of course, the question must also be clarified whether, in fact, every aesthetic experience is, conversely, a perception experience. Independently from this, Baumgarten's concept forms the basis for the further conceptual differentiation of the term aesthetics. See also: Alexander G. Baumgarten, *Aesthetica* (Hamburg: Felix Meiner Verlag, 2007).
- 5 In the context of intersubjective commensurability, time should also be conveyed symbolically. In the management of time two ideas come into play: those of the linear and that of the cyclical course of time. Linearity is depicted in the timeline, while cyclicity finds its representation in the circle of the clock. The sundial, known since the Babylonians, may serve as an example of the connection of temporal manifestation through movement and temporal symbolisation in space. The cyclical path of the sun is revealed in this early clock as the shadow of a staff in a circular space. The first sundials used in the northern hemisphere explain the mathematically negative direction of rotation of clock hands. The shadow cast wanders right around its centre. Against this background, the time shown in the clock is not a representation of time, but an illustration of movement and thus a temporal illustration. In this sense, the concretisation of time, namely its movement, finds an abstraction in space. On the other hand, the visualisation of the linear representation of time in the timeline has no direct connection to a concrete movement process, but rather is already conceived in geometric space as an extension between two points. Here is the idea of an irreversible (quasi vectorial) directionality. An example is the use of the timeline to illustrate historical epochs between event points. Although the suggestion of linear directionality evoked here is incompatible with determinations since the dawn of quantum physics, it is decisive for its perceptual dimension insofar as anthropological causality-based thinking is reflected here. These ideas are also reflected in the portrayal of music. Just as historical events in the timeline are represented by epoch, year and date, the score forms the scale of horizontal and vertical musical events. Bar lines establish the optical cyclicity of music. It is part of the reality of our world that time is symbolised both in intersubjectively action-oriented everyday life and in dealing with music.
- 6 The determination of their units is bound to movement, predominantly cyclic movement. This is common to concepts of measurement. Thus, the tropical time

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- finds its orientation in the orbit of the earth around the sun, the sidereal time its reference to fixed stars, while the latter refers to the approximate duration of a heartbeat. The SI unit of time is the second defined by the *Bureau International des Poids et Mesures* as ‘the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of caesium 133 atom.’ Resolution 1 of the 13th CGPM (1967/68).
- 7 Henri Bergson’s 1922 publication *Durée et simultanéité. A propops de la Théorie D’Einstein* explains the physical entity time as a phenomenon of human perception. The publication’s title already marks the direct reference to Albert Einstein’s thinking.
- 8 First published in his paper *Zur Elektrodynamik bewegter Körper*.
- 9 The meaning of the highly influential works *The Phenomenology of Internal Time-Consciousness* by Edmund Husserl (lectures from 1893-1917) and *Being and Time* by Martin Heidegger (1927) should be only brought to mind here.
- 10 Richard Hope, *Aristotle’s Physics* (Lincoln: University of Nebraska Press, 1961), 83.
- 11 First described by Penrose in: L.S. and R. Penrose, ‘Impossible objects: A special type of visual illusion,’ *British Journal of Psychology*, 1958. I underscore the role of the Swedish artist Oscar Reutersvärd (1915-2002), who was creating such impossible objects before Penrose. Also, the cooperation of Penrose with Escher has to be considered in the history of the Penrose figures in this context.
- 12 Named by coloured, rotating poles in front of barbershops in the United States, the effect is based on the disturbance of apparently vertical moving lines that are physically driven horizontally. Described by Joy Paul Guilford in 1929 and further by Hans Wallach in 1935.
- 13 The idea of playful connection between artwork and audience is prominent in Schiller’s *On Aesthetic Education of Man* as well as in Hans-Georg Gadamer’s conception of Art in *The Relevance of the Beautiful: Art as Play, Symbol and Festival*.
- 14 Simone Mahrenholz, *Musik und Erkenntnis* (Stuttgart, Weimar: Verlag J.B. Metzler, 1998) 155. (Quote translated by L. Straehler-Pohl).
- 15 *Molto pesante* = very heavy.
- 16 Three notes fill the timespan that would regularly be filled by two notes.
- 17 Quoted from the weekly newspaper *Die Zeit*, 26.08.2010, No.35 (translation by author).
- 18 See Roger Scruton’s Introduction Chapter from *Understanding Music*.
- 19 Friedrich Schiller: *On Aesthetic Education of Man*. (s. Footnote 13).
- 20 Hans-Georg Gadamer, *The Relevance of the Beautiful*.
- 21 The German title, *Aktualität des Schönen*, translated by Nicholas Walker as *The Relevance of the Beautiful*, could perhaps also be translated as *The Topicality of the Beautiful* to emphasize its reference to time.

## BIBLIOGRAPHY

- Baumgarten, Alexander Gottlieb. *Aesthetica*. Hamburg: Felix Meinel Verlag, 2007.
- Bergson, Henri. *Durée et simultanéité. A propops de la Théorie D'Einstein*, Paris: Félix Alcan, 1922.
- Einstein, Albert. 'Zur Elektrodynamik bewegter Körper.' In: *Annalen der Physik und Chemie* (pp. 891-921), Nr. 17 (Jg. 1905), Leipzig: Verlag Johann Ambrosius Barth, 1905.
- Gadamer, Hans-Georg. 'The Relevance of the Beautiful: Art as Play, Symbol and Festival.' In: *The Beautiful and Other Essays* (pp. 3-53), Trans. by Nicholas Walker, ed. and with an introduction by Robert Bernasconi. Cambridge: Cambridge University Press, 1986.
- Heidegger, Martin. *Being and Time*, translated by Edward S. Robinson and John MacQuarrie, New York City: Harper & Row Edition, 1962.
- Hope, Richard. *Aristotle's Physics*. Lincoln: University of Nebraska Press, 1961.
- Huron, David. *Sweet Anticipation: Music and the Psychology of Expectation*. Massachusetts: MIT Press, 2006.
- Husserl, Edmund. *The Phenomenology of Internal Time-Consciousness*. Edited by Martin Heidegger, translated by James S. Churchill, Bloomington: Indiana University Press, 1964.
- Kant, Immanuel. *Critique of Pure Reason*. Trans. by Werner S. Pluhar. New York: Cambridge University Press, 1998.
- Kant, Immanuel. *Critique of Judgment*. Trans. by Paul Guyer. New York: Cambridge: Hackett Publishing Company, 1987.
- Mahler, Gustav. *Zweite Sinfonie*. Leipzig: Verlag Friedrich Hofmeister, 1897. (Score).
- Mahrenholz, Simone. *Musik und Erkenntnis*. Stuttgart, Weimar: Verlag J.B. Metzler, 1998.
- Scruton, Roger. *Understanding Music*. London: Bloomsbury Academic, 2016.
- Schiller, Friedrich. *On Aesthetic Education of Man*, Trans. and with an introduction by Reginald Snell, New Haven: Yale University Press, 1954.
- Stockhausen, Karlheinz. '...wie die Zeit verging...' in: Metzger, Heinz Klaus Metzger: *Musik-Konzepte*. München: Edition Text+Kritik, 1981.



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## VELIKA ILI MALA RAZMERA: TIPOLOGIJA ARHITEKTONSKIH IZLOŽBI ODRŽANIH U JUGOSLAVIJI (SFRJ) I NJIHOV DANAŠNJI ZNAČAJ

**Mladen Pešić**

S obzirom na to da se izložbe, nezavisno od svog formata ili sadržaja, uvek mogu smatrati i diskurzivnom i vizuelnom platformom za proučavanje određenih vremenskih perioda, ovo istraživanje će dati uvid u moguću tipologiju izložbi arhitekture koje su organizovane u socijalističkoj Jugoslaviji između 1945. i 1991. godine. Predmetne izložbe su posmatrane kao kolektivna aktivnost, čija analiza omogućava uvid u širi kontekst društvenih, ekonomskih, političkih i kulturnih dešavanja u Jugoslaviji posle Drugog svetskog rata, kao i status koji je arhitektura kao praksa imala u njima. Imajući u vidu da se govori o različitim izložbama, sa velikim brojem parametara po kojima su bile slične ili različite, u ovom radu će se ukazati na proces formiranja izložbene tipologije, kako bi se omogućila klasifikacija za njihovo sistematsko proučavanje. U posebnoj studiji će biti urađena tipologija koja će se primenjivati u procesu istraživanja arhitektonskih izložbi, njihove uloge i značaja na određenom rasponu u određenom vremenskom periodu.

KLJUČNE REČI: IZLOŽBA, ARHITEKTURA, TIPOLOGIJA, JUGOSLAVIJA, PROCES, MODEL

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## VELIČINA U PROCESU PROJEKTOVANJA I REALIZACIJE U ARHITEKTURI U NASTAJANJU – DIGITAL CHAIN PRISTUP

**Sladana Marković**

Arhitektura u nastajanju, zasnovana na računarskim metodologijama direktno povezanim sa projektovanjem i realizacijom, postavlja nove pristupe pred nas i zahteva ispitivanje postojećih pojmova. Jedan od njih je princip digitalnog lanca (Digital Chain), koji je uspostavila katedra CAAD u ETHZ-u kao neprekidni digitalni proces sa svakim korakom u vidu programiranog entiteta povezanog CAAD/CAM tehnologijom na univerzalne interfejse. Ovaj rad istražuje veličinu u projektovanju i realizaciji u arhitekturi u nastajanju prema Digital Chain principu, kao digitalnom pristupu zasnovanom na kodiranju - manipulativno iterativnom, sagledanog kroz razmeru i proporciju, pomoću varijabli. Kod je veza od dizajna do realizacije sa složenošću u svom sadržaju parametara (input) i u varijacijama primljenog proizvoda (output) na jednoj strani. Međutim, to je jednostavna manipulacija korišćenim parametrima (tj. arhitektonskim izrazima – veličina, razmera i proporcija) i složena kombinacija jedinstvene razmere sa različitim varijablama i direktnim korelacijama sa proporcijama kao što su korišćenje arhitektonskih proizvoda, kao što su crteži, modeli, prototipovi. ili realizacije. Ovaj rad razmatra pojavu veličine kao mešavine objedinjavanja razmera i proporcionalnog izlaza (dimenzionalnosti) kao komponenti koda koje arhitekta percipira kao fluidnu energiju pristupa digitalnom lancu.

KLJUČNE REČI: DIGITAL CHAIN, NOVE ARHITEKTONSKE METODOLOGIJE, DIGITALNI DIZAJN I PROCES REALIZACIJE, KOD, VELIČINA, RAZMER, PROPORCIJA

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## GEOMETRIJSKI ISKORAK U SAVREMENOM ARHITEKTONSKOM DIZAJNU: METAMATERIJALNOST I FRAGMENTACIJA

**Mila Mojsilović, Jelena Mitrović, Vladimir Milenković**

Studija povezuje dve istorijske kategorije koje ranije nisu bile povezane na ovaj način. Jedna se tiče uloge geometrije u transformaciji prostora u gotici, gde je geometrijska linija prvi put učinila vidljivim položaj fizičkih sila. Druga transformacija koja oslobađa anksioznost u osporavanju perspektive učinjena je u manirizmu instrumentalizacijom metafore pomoću vizuelnih sredstava deformacije i figuracije. Danas oba istorijska momenta doživljavamo u modifikovanom pojavnom obliku, i dalje pokušavajući da pitanju materijalnosti damo formalni karakter. Kako to nije moguće, ovaj pristup je rezultirao fragmentacijom u odsustvu jedinstvene radikalne kritike modernosti. Fragmentacija i metamaterijalnost savremene arhitekture danas predstavljaju moguću konceptualizaciju prostora, pozivajući se na sve poznate oblike dematerijalizacije i nestajanja sveta, uključujući i digitalizaciju. Pozivajući se još jednom na mit o Vavilonskoj kuli, Ikarovom padu i Čarobnjaku iz Oza, mit i diskurs opstaju zajedno u ovom eksperimentu, pretvarajući se u drugog i nalazeći sebe u drugom. Izgradnja arhitektonske pozicije između ekstrema metamaterijalnog i fragmentarnog je stvar razbijanja geometrije forme i ideje u njoj.

KLJUČNE REČI: FORMA, GEOMETRIJA, MATERIJALNOST, META-MATERIJALNOST, NEDOVRŠENOST, FRAGMENTACIJA

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## RAZMERA IZVAN ILUZIJE – ESTETSKE REFERENTNE TAČKE

**Lars Strahler-Pohl**

Beskonačnost je ljudskom umu intelektualno neshvatljiva. Ipak, vizuelne i akustičke iluzije stvaraju utisak beskonačnih stepenica i beskonačno rastućih nizova tonova. Kroz svesnu upotrebu proporcija, percepcija ekstrema razmera može se izazvati kod gledaoca ili slušaoca, ali se efekat postiže podsvesno. Isto tako, umetničko delo može da se igra sa našim osećajem za razmere ili proporcije i utiče na našu percepciju vremena i prostora. Postoji fundamentalna razlika između uobičajene iluzije i vizuelnih i akustičnih pomeranja do kojih može doći u našoj percepciji umetničkog dela. Sa umetničkim delom, primalac je su-tvorac estetskih utisaka ponovljivog kvaliteta, a ne samo neko ko prati efekat iluzije. Članak ispituje ontološke razlike između iluzija i traganja za umetnošću koja istražuje perceptivne preduslove prostora i vremena. Estetska perspektiva uključuje dva glavna pristupa svoje discipline: refleksiju umetnosti kao i percepciju uopšte.

KLJUČNE REČI: PERCEPCIJA VREMENA I PROSTORA, RAZMERA U MUZICI I UMETNOSTI, VIZUELNE I AKUSTIČNE ILUZIJE, ŠEPARDOV TON

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72

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