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THE TRUTH OF INTENTION AND THE TRUTH OF IMPLEMENTATION. ARCHITECTURE FREED FROM THE CONSTRAINTS OF BUILDING

PRAWDA INTENCJI A PRAWDA REALIZACJI. ARCHITEKTURA UWOLNIONA Z WIĘZÓW BUDOWANIA

Abstract

During the lecture that Frank Gehry delivered over twenty years ago at the Warsaw MSN, words were spoken about how the architectural message fades out during implementation. It is to be the purest in the conceptual model, slightly blurred, although still alive during the erection of the building. After obtaining the finite form, the idea fades.

This thought, certainly exaggerated, touches upon a significant dilemma of architectural art. At the conceptual stage, we cannot fully express the spatial intention. We are condemned to partial representations and design actions closed in the sphere of ideas. The creators of all eras struggled with this, often facing the choice of ideological truth or functional and technical values.

The article presents the impact of post-war avant-garde architecture, which is released from the constraints of applications and thus gains the value of deep truth, reaching human needs, emotions and feelings. These thoughts will be juxtaposed with fabrication, performed at the beginning of the new millennium, concretized thanks to the use of IT and robotic building components. The analysis will lead the reader to the birth point of virtual space architecture implemented using a digital medium.

Keywords: model, representation, medium, information era, message, perception

Streszczenie

W trakcie wykładu wygłoszonego przez Franka Gehry'ego ponad 20 lat temu w Warszawskim MSN padły słowa o tym, jak przekaz architektoniczny gaśnie w trakcie realizacji. Ma on być najczystszy w modelu koncepcyjnym, nieco zatarty, choć nadal żywy podczas wznoszenia budynku. Po uzyskaniu formy skończona idea blaknie.

Myśl ta, z pewnością przejawiona, dotyczy istotnego dylematu sztuki architektonicznej. Na etapie koncepcyjnym nie możemy w formie pełnej wyrazić zamiaru przestrzennego. Skazani jesteśmy na częściowe reprezentacje i na projektowanie w sferze wyobrażeń. Zmagali się z tym twórcy wszystkich epok, stając często przed wyborem prawdy ideowej lub walorów użytkowo-technicznych.

Artykuł przedstawi plon powojennej architektury awangardowej, uwalniającej się z więzów aplikacji i zyskującej przez to walor prawdy głębokiej, sięgającej do ludzkich potrzeb, emocji i uczuć. Te myśli zestawione zostaną z urealnieniem, które na początku nowego milenium skonkretyzowano dzięki wykorzystaniu informatycznych i robotycznych komponentów budowl. Analiza doprowadzi czytelnika do punktu narodzin architektury przestrzeni wirtualnej realizowanej z wykorzystaniem medium cyfrowego.

Słowa kluczowe: model, reprezentacja, medium, era informacyjna, przekaz, percepcja

The conduction of thoughts in literature and fine arts takes quite often roundabout route. To stimulate the recipient's attention as much as possible, it may be necessary to skip realistic representations. Instead, symbols, metaphors and associations are used, that combine fragments of recollected impressions. The overall picture is not like the reality we see and hear. Is it true? Certainly so in the sphere of the author's intentions. It is also planned. All efforts are made to involve the recipient in the process of communication and to trigger his emotions.

The truth of architecture according to Kengo Kuma¹ is the truth of human relations with the environment. It bypasses methods of reasoning rooted in Western culture. It does not have to interpret impressions by adding geometric definitions. Following the archetypes of Greek culture, we are used to think mathematically in Europe. Like the Pythagoreans, we try to construct abstract proofs based on axiomatic assumptions. Our truth is proven through strict reasoning or empirically substantiated. Anti-object thinking of Kuma overlooks the sphere of mathematical representation. It refers directly to feelings. In the psychic sphere, it seeks confirmation of the truth as the primary compliance with intuition. The author purposely mentioned the inspiration he drew from expressionism, especially from Bruno Taut.

The article will discuss these threads of European architecture that depart from realism, Pythagorean thought and its engineering consequences. With no relation to hard theories, they look for the truth by experimenting with possible imaginable solutions. It turns out that after many years, futuristic ideas may also be true in the sense of application opportunities it creates. The juxtaposition of the theoretical concepts of *Archigram* with the experiments of the team of Professor Kas Oosterhuis make us closely follow avant-garde ideas. Perhaps, what today seems to be exaggerated or even false, in the future will gain value of truth.

1. VIRTUAL ARCHITECTURE OF THE MODELS IN THE 20TH CENTURY. FROM ILLUSIONS TO THE ALTERNATIVE SPATIAL REALITY OF ARCHIGRAM

After the Second World War, the "impracticability" criteria underwent a major reevaluation. The inventions that were made on the basis of the arms race gave the fantastic literature of the nineteenth century a prophetic mark. Underwater travel, exploration of inaccessible lands, and even a flight to the moon were no longer just imaginations. They have become goals that can be achieved in the short or long term. The world community presented the views arising from these inspirations at the world exhibition in Brussels in 1958. The EXPO slogan was: *Between utopia and reality*. The ideas presented in the pavilions were an incentive to start bold engineering implementations. On the other hand, they proved need for futuristic considerations that after a few decades often transform into application solutions.

The architectural environment of the 1960s had solid foundations for implementing innovative spatial solutions. From the theoretical point of view, they were built by the legacy of modernism, including the experimental Bauhaus methodology. From the technical side – they were based on new materials, such as reinforced concrete and steel, as well as on calculation

¹ K. Kuma, *Anti-Object*, Architectural Association, London 2013.

tools allowing to verify static and dynamic assumptions. Nevertheless, the search for new roads continued, including those leading through alternative spatial environment models. In 1961, thanks to the cooperation of a group of young British architects, the first issue of *Archigram* magazine was published. The two-page newspaper was simply copied in four hundred copies. The collage of text, diagrams and perspective sketches presented comprehensive vision illustrating non-existent spatial reality. The method of ideological representation, resembling a comic book, was continued in subsequent notebooks. The models created by *Archigram* concerned all scales and all architectural problems. Futuristic urbanism has been discussed, on the base of models such as Plug-in-City (Peter Cook, 1964) Walking City (Ron Heron, 1964), Instant City (Peter Cook, 1969).² The cities of *Archigram* moved with people, following the resources and favorable living conditions, using mechanical and balloon propulsion. Machines sometimes played a superior role to living creatures, which brings to mind fantastic literature and film concepts. On a scale of detail, *Archigram* analyzed the issues of existence minimum. Architects used the universal collage method, but also physical models. Thanks to them, the concepts of survival capsules, such as Living Pod (David Green, 1966), could suggestively speak to the public.

Archigram's work can be qualified in its entirety as an alternative environment domain. It was a contribution to discourse, offering ideological models that could only partially penetrate the realm of real architecture. The authors involved in the group's activities tried to organize the positions of "experimental"³ creativity by defining its three main methods: seeking an independent, external laboratory / context, making gradual improvements, and finally drawing on experience coming from outside (in a global context). Alternative spatial environment models published in the magazine are located mainly in the first area, constituting a tool for searching for solutions beyond the conditions resulting from current use. Peter Cook presented the typology of six architectural motivations, which, apart from experience and tradition, are inspiration for creativity.

In the sixties and seventies many theoretical models were created, which, on the basis of exploration of alternative environments, sought architectural solutions corresponding to the aspirations of a rapidly developing civilization. They concerned the use of curvilinear surfaces (Otto), modularity based on cellular patterns (Metabolists), mass production (Friedman), oversized megastructures (Superstudio), and habitat enclosed in a glass bubble (Fuller). None of the trends, however, achieved cohesion, which *Archigram* maintained for several years of its active activity. In a commentary to the album released in 1999, Arata Isozaki gave the reasons for the British success. He noticed that, unlike other artists, they broke with methods shaped in architectural tradition. By questioning the existing goals and rules, they have developed not only a separate style, but also a system of values and language of communication. Isozaki compared the attitude of *Archigram* and Japanese Metabolists. He noticed that the latter lacked the boldness to break away from cultural patterns and the ability to establish hypotheses breaking with tradition. As a result, their concepts were partly virtual and partly embedded in reality. They did not easily materialize, but at the same time did not reach the level of abstraction characteristic of the theory. *Archigram* chose a consistent path.

² P. Cook (ed.), *Archigram*, Princeton Architectural Press, New York 1999.

³ The term "experimental" was used here in the original sense, not as a reference to scientific empiricism, but the intention to create innovative solutions that have not been tested so far; see P. Cook, *Experimental Architecture*, Universe Books, New York 1970, p. 14.

They deprived themselves of implementing skills, getting the freedom to propose innovative hypotheses for the price. The models of alternative spatial environments outlined in *Issues* worked late, as did fantastic literature and films. For contemporary people they could only deliver intellectual game on the border of anarchy and entertainment. Today, in the era of new technological revolution, they become an inspiration and methodical base for works of generative, mechatronic and virtual architecture.

2. ARCHIGRAM BROUGHT BACK TO LIFE. PROOF OF TRUTH AFTER YEARS

Experiments conducted by the Oosterhuis research group seek to obtain the effects of spatial interactivity using physical structures. The use of Festo pneumatic, springy cylinders allows to move architectural components in a manner similar to the operation of the animal skeleton system. Mounting sensors detecting movement, temperature, sounds and performing computer coordination open the field of design by programming the behavior.

Muscle Body installation is a “home” reacting to users’ activity, or rather as the author says – players⁴ actions. The outer skeleton made of 26 muscles supports a membrane made of flexible Lycra fabric. Sensors located inside transmit signals regarding the presence and movement to a computer that controls the pressure in the actuators. As a result – the form of shelter transforms smoothly. This is accompanied by modulation of the transparency of the walls (the tensioned surface becomes more transparent) and the sound emitted by speakers arranged in the structure.

The *Muscle Tower* from 2004 moves the considerations into the area of general engineering conditions. The building prototype in 1 : 20 scale consists of aluminum rods (bones), actuator braces (muscles) and steel ball connectors (joints) that connect the structure together. The programmable organism changes shape under the influence of external factors (e.g. weather, geological phenomena) and functional factors (e.g. filling with users).

Designing mobile structures using “muscle skeletons” allows you to shape interiors that match the conditions. Prototype of portable shelters described by Peter Cook, ideologically advanced, in a technical sense were very limited in their behaviors.⁵ *Man-container* was a hybrid of a simple pneumatic building and a futuristic robot vision. By adding IT components – the concepts of the sixties come to life now.

The *Muscle* installation presented by Oosterhuis group in 2003 in Paris pushes limits of the freedom of architecture to the point that is defined only by decisions of the creators.⁶ The blue cubature wrapped around the structure of the cylinders changes shape due to the interference of visitors (sensors and control sliders). Experiments allow you to orientate how the object reacts. In this sense, the installation does not depart from the ideas of the models described earlier. The difference is in the software. Not all user actions will trigger the expected reaction of the “building.” *Muscle* has a “will” that shapes its individuality

⁴ K. Oosterhuis, *Swarm Architecture II* [in:] Hwang I. et al. (eds.), *Verb Natures*, Actar, Barcelona 2006, p. 188.

⁵ P. Cook, *Experimental*, op. cit., p. 115.

⁶ *Muscle Pavilion* by K. Oosterhuis with ONL; Center Pompidou, Paris 2003.

– not at the level of physiognomy, but behavior. It treats certain signals from the outside favorably – undergoing deformation, ignores others, tries to counteract others – by stretching the surface.

Imagine a family of buildings that are identical in shape and whose behavior varies significantly. Some are influenced by users, others react passively, while others oppose. The truth of architectural individual depends on its character...

3. THE TRUTH OF ARCHITECTURE IN MOTION. PARAMETRIC MODELS

Is truth always individual? Can an architectural solution be evaluated only as a closed, finished space and use concept? Nowadays, these questions must be answered taking into account the openness of the digital architectural model and its changes that occur through external influences, intentionally introduced or brought through parameters. Samuel Geisberg, founder of Parametric Technology Corporation, synthetically defined the specificity of this trend. He pointed out the need to reconcile two contradictory goals: maximum flexibility of design applications and minimum cost-effectiveness of changes made during model creation.⁷ The term “parametric” appeared in the context of architecture even before the dissemination of digital tools, in relation to the work of Luigi Moretti. The Italian architect and theoretician, founder of the *Space* magazine devoted to problems of art and space, in the 1940s described a method of shaping forms based on mathematical interpretation of data.⁸ He developed the concept of parameterization after 1958 as part of IRMOU, an institute created to revive the cooperation of mathematicians and urban planners. He completed his theoretical searches concerning designs for football stadiums and swimming pools. The dimensions and shape of the auditoriums of these facilities were a function of visibility parameters, capacity, circulation and even concrete costs. Moretti maximized the number of audience points offering high quality visual contact with the playing field. Their arrangement in plan and cross-section determined the shape of terraces, which formed expressive, organic shapes. The results were presented at the twelfth Milan Triennial.

Moretti's interest in the conditions of visual perception should be seen in the context of his early work on the works of Michelangelo.⁹ The architect studied the composition of the buildings, including the Palace of Conservators and the paintings of the Renaissance master. The fresco in the Sistine Chapel submitted detailed studies on the relationship between perception and observation points and exploration paths. An analysis of these historical precedents led Moretti to believe that properly shaped space can be described by using algorithmic formulas. He used the hypothesis to design an innovative cinema room, with curved, sloping screen and an amphitheater auditorium composed of balconies allowed viewers to better interact with the projection. Moretti was aware that it could be difficult to describe all the components of an architectural work with a strict description. Those that managed

⁷ J. Teresko, *Parametric Technology Corp.: Changing the way Products are Designed*, Industry Week, December 20, 1993.

⁸ F. Bucci, M. Mulazzani, *Luigi Moretti: Works and Writings*, Princeton Architectural Press New York 2000, p. 21.

⁹ A. Viati Navone, *Architekt Luigi Moretti. Od racjonalizmu do "l'art informel" – sztuki informelu*, Kwartalnik Architektury i Urbanistyki, 2012, vol. 57, no. 2, p. 5.

to define parametrically laid the groundwork for later thoughts made by continuators in the realities of the digital workshop.

Parametric techniques are sometimes interpreted as the ability to shape irregular forms of buildings. Organic lines and surfaces have fascinated architects at least since the Baroque. Nowadays, the phenomenon of building skin folding has found a philosophical interpretation, which has become an impulse for creativity exploring the problem of curvature. The geometrical definition and determination of complex topologies has always been associated with considerable difficulties. Computerization facilitated both activities, among others, by developing parametric geometric definitions. However, this does not justify the statement that curvilinear architecture created using digital tools is always based on a parametric model. Many objects created as a result of formal expression refer only to creative intuition and emotional conditions of creation. The sculptural forms of the Bergisel ski jump, the Wolfsburg art museum or the London swimming center designed by the Zaha Hadid studio are physiologically approaching the soft outlines of Moretti's stadiums. Although parametric digital geometric definitions were used, the created model is phenomenological or even poetic. The rationale for the design decision is individual perception of conditions and interpretation, based both on the features of the perceived world and on the artist's internal experiences.

4. TOWARDS AN INDEPENDENT CREATIVE ENVIRONMENT

The idea of introducing man to an artificially created environment, implemented through technical means, is called virtual reality (VR). In a 1992 book, Sherman and Judkins gave a precise definition of VR, based on terms called the five "I."¹⁰ In the light of this concept, virtual reality should be at the same time: (1) "intuitive," i.e. consistent with reactions established in the sphere of recipient's expectations, (2) "illustrative," i.e. using clear, clearly associated signals, (3) "interactive," i.e. responding in real time to user actions, (4) "intense," i.e. providing many sensations, absorbing the recipient's attention to the fullest possible extent, (5) "immersive," i.e. flowing, distracting the user from the real world.

The early technological implementations of the idea of virtual reality were presented in the 1950s, initially using purely mechanical devices. In the seventies of the twentieth century, the first virtual reality interfaces used a computer to control visual message. In this case, the senses contact the model indirectly. The computer analyzes user's behavior (head movements, walking, etc.) and generates real-time projection. Cameras used today, ensuring contact with virtual reality, focus on simulating visual sensations. Stereo vision goggles create a separate image, different for each eye, which gives the recipient the impression of spatial vision. However, it is not perfect. In real exploration, the eye muscles adapt the shape of the lens to the distance from which you look. The accommodation process provides the perception with an important portion of information about the depth of the stage. Unfortunately, modern HMD technology does not offer holographic projection. The image for each eye is displayed on a flat screen whose distance from the eye remains unchanged. That is why, even in VR goggles we do not receive an architectural model as in reality.

¹⁰ B. Sherman, P. Judkins, *Glimpses of Heaven, Visions of Hell: Virtual Reality and Its Implications*, Coronet Books, London 1992.

It seems that contemporary virtual scenery created for the needs of electronic media, computer games, stage design, and increasingly also for independent architectural expressions, they draw from both: the nineteenth century heritage and the theoretical concepts arising in the sixties. The main fields of digital VR technology are the entertainment industry and simulation training applications, used, among others, for military, educational and medical applications. Architecture explores virtual models for two reasons. First of all, they allow to check the feelings of the users of the designed buildings in conditions similar to real ones. Jose P. Duarte took advantage of this by defining the process of automatic production of Siza-style houses.¹¹ It allowed users to experience contact with the virtual spatial environment using HMD cameras. Comments were introduced to the design algorithm, correcting inconsistencies with expectations. Secondly, virtual reality creates an alternative creative environment in which part of the architectural goals can be achieved without restrictions resulting from the laws of physics. An example of this approach is the work of the American studio Asymptote: the New York Virtual Stock Exchange and the Guggenheim Virtual Museum.¹² A spatial arrangement has been planned in both objects, which is subordinated to the implementation of a specific function. It differs from the traditional architectural arrangement due to the lack of gravitational conditions, the possibility of free, interactive changes in geometric forms, and finally – the discontinuity that results from the use of corridors operating analogously to hyperlinks.

Marcos Novak goes even further in the use of virtual reality. He built his own concept of “transarchitecture”, which he based on the belief that the utility function is not a condition for creating spatial objects. He emphasized the value of spatial sensations in the absence of gravity. The architectural worlds of Marcos Novak can be seen as a contemporary version of the idea of an alternative spatial model. With the concepts of constructivists, Garnier and Taut, they share a contestation of utilitarian justifications. However, they have a much more effective communication mechanism. Thanks to the use of a digital medium, the user does not have to imagine virtual scenery. By putting on HMD goggles, he can immerse himself in the projection and experience sensations close to real perception.

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¹¹ J.P. Duarte, *Customizing Mass Housing: A Discursive Grammar for Siza Malagueira Houses*, Ph.D. thesis, Massachusetts Institute of Technology, 2001.

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