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(NEURO)ARCHITECTURE – IN SEARCH OF ABSOLUTE TRUTH?

(NEURO)ARCHITEKTURA – W POSZUKIWANIU PRAWDY ABSOLUTNEJ?

Abstract

The analysis of selected examples from the history of architecture indicate that the issues related to true/false antonym are not new. The discourse undertaken for centuries now takes on a new meaning. The multithreading of modern architecture does not allow for a clear definition of one, right approach. Comparative study, covering achievements in various fields of science, indicates that modern architectural theory must be created taking into account the latest scientific achievements. Research in the field of neuroarchitecture allows a better understanding of the impact that architects and their work have on society.

Keywords: neuroarchitecture, comfort of use, psychophysiology of place

Streszczenie

Analizy wybranych przykładów z historii architektury wskazują, że problematyka związana z antoniem prawda/fałsz nie jest nowa. Dyskurs podejmowany od wieków obecnie nabiera nowego znaczenia. Wielowątkowość współczesnej architektury nie pozwala na jednoznaczne określenie jednego, słusznego podejścia. Badania porównawcze, obejmujące dokonania z różnych dziedzin nauki, wskazują, że nowożytna teoria architektury musi być tworzona z uwzględnieniem najnowszych osiągnięć naukowych. Badania na polu neuroarchitektury pozwalają lepiej zrozumieć wpływ, jaki architekci i ich twórczość wywierają na społeczeństwo.

Słowa kluczowe: neuroarchitektura, komfort użytkowania, psychofizjologia miejsca

*Indeed, using the word 'truth' in the singular in a polyphonic world
is like trying to clap with one hand*

Z. Baumann

1. INTRODUCTION – THE TRUTH AND FALSEHOOD

For centuries, the physicality of architecture has enriched experiencing the world and enabled its deeper understanding. Architecture tends to be a strong spatial communication, permanent and stable, built for a specific purpose, beautiful. It is true as it exists. How could anyone perceive any falsehood or lies in it? How to interpret the play on the words true/untrue? If something does not exist (untrue), is it a lie? How should we describe virtual architecture – as

false, since it deludes the senses and deceives? Or as honest – because it meets the computer program requirements and serves the purposes of its creation?

On the other hand, does the mere fact of the existence of a building guarantee its ‘good intentions’ towards the user? After all, architecture is the art of illusion. From the darkness of Lascaux to the light-filled Sainte-Chapelle, to this day, it has been transforming and giving a new meaning to space. It creates an artificial environment that modifies human behaviour and habits. It influences the manner of bringing up children, builds or destroys social bonds, evokes emotions, sometimes extreme ones – terror, euphoria, delight. It educates. It is a tool that can become a cure or a weapon, depending on its use. It impresses monumentality, protects from changing conditions of the environment. It tends to be a symbol; as a symbol, it may be elusive or, frequently, misunderstood.

Nowadays, the boundary between the truth and falsehood often becomes blurred (not only in architecture), as the dividing line between the public and private spheres. Present-day society is post-modern society – ‘born liquid’, as described by Z. Bauman. The scope of action of this generation “is bounded by each member’s own individuality, and they frantically try to give it public notoriety by invading the public sphere.”¹ Their problems with finding their identity and the lack of a community spirit affect their social and spatial relations. They avoid commitments, feel no connection with their places of residence. Subsequent generations of young people become adults with conditions different from those characteristic of prior generations. Millennials, Generations X and Y, soon presumably Generation Z² – for them, a developed environment (whether real or virtual) is the natural one – they spend most of their lives within its ‘walls’ that determine the framework of their existence. True nature, in its wild dimension unaffected by humankind, practically does not exist for them.³ The state of affairs may be the reason for increasing interest from scholars and designers in issues related to the effect of architecture on the user’s frame of mind.

2. THE FANCY-DRESS BALL OF ARCHITECTURE

The concepts of the truth and falsehood in architecture were raised at the forum of architecture criticism in the late 19th and the early 20th centuries. At that time, a number of designers, architecture critics and historians reflected on the declining condition of architectural design. Due to the discrepancy between teaching methods in Technical Schools and Art Schools, architects felt that their privileged position was in jeopardy and that they increasingly played the role of ‘space decorators’. Young and creative engineers designed bold structures that astonished the world, whereas architects ‘merely’ chose façade décor to satisfy the tastes of frequently unsophisticated customers.

In his book entitled *Space, Time and Architecture*, Sigfried Giedion mentions that in the 19th century critics referred to the architecture of the 18th and 19th centuries as “the Harlequin dress of architecture.”⁴ In *An Outline of European Architecture*, Nikolaus Pevsner writes: “So

¹ Z. Baumann, T. Leoncini., *Plynne pokolenie*, Czarna Owca, Warszawa 2019, p. 20.

² Millennials – 1980–2000, Generation Y; Generation X – 1950–1980, *ibidem*.

³ This phenomenon concerns all generations, not only the young ones – although they are particularly at risk of the lack of direct contact with ‘unprocessed’ nature.

⁴ S. Giedion, *Space, Time and Architecture. The Growth of a New Tradition*, Harvard University Press, Cambridge 1971, p. 182.

here, in the early years of the 19th century, the fancy-dress ball of architecture is in full swing: Classical, Gothic, Italianate, Old-English.”⁵ In their arguments, Pevsner and Giedion referred not only to the inconsistency between the décor (packaging) of a building and the technology having contributed to its construction, but also to disagreement between the decoration and the time of construction. In *Modern Architecture*, Otto Wagner called: “Our starting point for artistic creation is to be found only in modern life.”⁶ Only architecture originating exactly from its time and using contemporary technical capabilities offered can be true. The above-mentioned authors accused their times of lying – the packaging of new technology in details belonging to ideas of prior times and originating from other principles of construction, from other symbols. The age of machinery required designers to adopt a new approach, but the lack of acceptance for new construction methods was deeply rooted in society’s consciousness. Changes did not occur until the 20th century. Were they brought about by numerous exhibitions and impressive engineering structures or rather by attitudes of the creators – dissatisfied with the necessity to hide under the cloak of history-related or Art Nouveau details? It is difficult to tell.

Due to the cruelty of World Wars I and II, combined with new scientific discoveries in sociology, psychology or ergonomics and the need for world’s physical reconstruction after 1945, for years those issues were solved time and time again on the drawing boards of the greatest architects of the period and constituted the main subject-matter of articles, books and lectures. In search for absolute truths, authors sought honesty in the adequacy of the solutions applied to the shape and detail of the building concerned. Following that line of reasoning, the truth could be sought in the characteristic shape of a Greek temple⁷ whose details were related to their construction purpose; in a Gothic cathedral – filled with the action and counteraction of forces, hidden in numerous buttresses; or in classicism – when decorative elements regained their construction role lost in the Baroque.

After the end of World War II, modernism became the fashion. One after another, erected buildings proved that they were inevitable consequences of the intellectual, social and technical conditions of the new times rather than their designers’ whims. Fundamental changes concerned not only details (or the lack thereof), but primarily the structure of buildings. In doing away with the past, new architecture emerged and corresponded to the civilisation that created it. However, as put by Walter Gropius, “[i]mitation, snobbery and mediocrity have distorted the fundamentals of truth and simplicity on which this renaissance was based.”⁸ It soon appeared that ‘functionalism’ was another overused platitude drawing attention away from the substance – the creators’ true motivation where the idea of rationalisation played a purifying role in design work and “the satisfaction of the human soul, is just as important as the material [...]. What is more important than this structural economy and its functional emphasis is the intellectual achievement which has made possible a new spatial vision – for whereas the practical side of building is a matter of construction and materials, the very nature of architecture makes it dependent on the mastery of space.”⁹

The absolute truth of architecture was not discovered, despite efforts to do so. What was intended to be the cure became another substitute. Modernism was followed by post-modernism

⁵ N. Pevsner, *An Outline of European Architecture*, Penguin Books, Harmondsworth 1943, p. 378.

⁶ S. Giedion, *op. cit.*, p. 317.

⁷ Even though after shifting from wooden to stone structures some of them only remained decorative symbols.

⁸ W. Gropius, *Scope of Total Architecture*, Collier Books, New York 1962, p. 59.

⁹ *Ibidem*, p. 60.

and diverse styles, characteristic of modern times, which combined with increasing globalisation, the fading away of local differences, spatial identities and disrespect for cultural heritage has not improved the situation. The fact that nowadays it is possible to design almost anything and the designer is usually constrained by the content of the investor's wallet does not have a positive effect on building clear and transparent design rules either. The title question remains unanswered. Faced with the necessity to coordinate a number of disciplines in the design process, the architect has paradoxically become its least appreciated link. The humanistic aspects of the architect's work disappear, squeezed out by technological issues. There is a growing gap between the theory of architecture – taught at universities – and the practical side of the profession, with many students feeling inadequately prepared. The real life, starting in the architects practice, frequently has nothing in common with the university-promoted conceptual and holistic approach.

3. NEUROARCHITECTURE

Perhaps it is a mistake to seek the truth in the structure and detail; it may be more appropriate to focus on issues related to the effects of the developed environment on the user. As presented in the introduction, architecture is the art of illusion, but simultaneously its influence on the user is extremely strong. Neuroarchitecture as a field of study is relatively young. Its potential lies in the possibility to check the response of the human body on the space that it is exposed to. The body's response to contact with nature is the simplest proof of the existence of the above-mentioned relationship. For the brain, a natural landscape is the easiest way to relax, to decouple from unfavourable conditions of the developed environment. Plants purify the air, whereas the very looking at greenery has calming and healing effects. Singing birds and humming watercourses relax. Surveys conducted at hospitals have proven positive effects of nature on the healing process – the convalescence of patients with permanent contact with nature is faster and more efficient. Such responses of the human body are atavisms – their existence and effects on the user are quite obvious. Experiments related to the influence of man-made spaces on the user are more interesting. In very general terms, such studies are aimed to create design guidelines resulting in the creation of shapes and the application of colours, finishing materials or lighting that will have positive effects on the user. Those may reduce stress and anxiety, increase productivity, support the users' personal development. The primary goal is to create optimal conditions for human life and development. During design work, it is necessary to consider the likely responses of the body to aspects such as lighting, acoustics or the arrangement of individual rooms.

The assumption of neuroarchitecture is to create buildings that would influence brain chemistry as well as emotions, thoughts and behaviour in a manner consistent with the creators' intentions. In 1998, Fred H. Gage (Salk Institute for Biological Studies, La Jolla, California) and Peter Eriksson (Sahlgrenska University Hospital, Gothenburg, Sweden) carried out studies concerning the effects of environmental changes on the brain. They discovered that – contrary to previous beliefs – a human being is not born with a full set of nerve cells in the brain; instead, some of them are created also at a later time.¹⁰ In their research, they attempted to understand

¹⁰ F.R. Gage, *Do Changes in the Environment Affect the Brain?*, <https://www.youtube.com/watch?v=ZJs-GJ2NWtIE> (access: 4.06.2020).

how the brain interpreted, analysed and rebuilt the surrounding space; how it changed on the basis of acquired experiences and the individual's environment. They discovered that a developed environment could change the structure of nervous connections in the brain and influence human behaviour. Some of the factors present in the space around us may force the brain to produce hormones necessary to the development of emotions and experiences in motion, they may influence creativity and productivity, stimulate team work and increase the need for seclusion. However, is our knowledge sufficient to use this relationship?

Neuroarchitecture may provide designers with a number of guides for the method of creating developed spaces. But it must be noted that a similar approach – believing in the power of an appropriately designed space – is no novelty. For centuries, it has been used during the construction of sacral buildings and structures, from Stonehenge to steeple-shaped Gothic cathedrals to, for example, the phenomenal chapel in Ronchamp Le Corbusiera. Similar motives, although not always humanitarian, can be seen in the architecture of the periods of communism or totalitarianism – e.g. the works of Albert Speer, aimed at making a specific impression on visitors. The degree of the effectiveness of similar measures can be assessed on the basis of one's own experiences – an attempt to scream in a Gothic cathedral usually involves overcoming an individual's internal barriers. However, an analysis of various examples from the past may lead to the conclusion that the history of architecture contains more buildings that were intended to provoke negative reactions in users, limiting their freedom and, more broadly, relating to setting boundaries and emphasising the user's subordination to a 'superior power'. It could be God (gods), a ruler (or a ruler's representative); it could also be an abstract concept such as Justice. In a sense, neither was contact with art devoid of the will to find a certain distance from it – as can be seen, *inter alia*, in various buildings of National Museums. Considering that those were usually covert measures, but having strong effects on the user's subconsciousness, they can be classified as architectural lies. Could the reversal of the relationship and undisguised use in design of the guidelines of neuroarchitecture be the road to the truth?

4. PSYCHOPHYSIOLOGY OF PLACE

Urban life separates humankind from the cycle of nature. The present-day human being spends nearly 90% (and during the pandemic – almost 100%) of their time in a developed environment; therefore, nowadays the knowledge of the rules governing changes in the brain in connection with the influence of the surrounding space seems to be of particular importance. If the environment can have such strong effects on an individual, architecture should take account of that. Neuroarchitecture is not reduced to purely aesthetic issues. The brain of an adult person is filled with knowledge and much more subtle connections. Symbolic meanings, semiotics, archetypes rooted in the subconscious build connections frequently going beyond the traditional understanding of beauty in architecture. In addition, some of those connections result from a chain of individual experiences and impressions of the user, often at the subconscious level, difficult to be rationally explained and predicted in studies. Therefore, neuroarchitecture has a wide range of tools and concepts, in terms of room size, shape-related symbols and the cultural background of its users.

The main principles of the functioning of neuroarchitecture have been known for centuries. Acute angles increase stress, whereas deep colours stimulate and change the frame of mind, which can affect decisions taken under their influence. A ceiling that is too low gives

an impression of being overwhelmed and reduces the users' creativity; however, for less creative activities, it may improve the employees' concentration. A small number of windows in a room makes a person feel restrained; large glazed areas give a sense of freedom. Insufficient lighting in premises decreases productivity and increases fatigue; in different circumstances, it may favour relaxation and rest. On the other hand, today the world suffers the consequences of an enormous 'mess' of artificial light. According to studies using mice, even one-month distortions in the day/night rhythm cause changes in the functioning of the brain and increase the risk for individual organisms exposed to light at night (with the night light of around 5lx) to develop additional diseases.¹¹ How does it relate to permanent street lighting in urban areas at night or popular 'stand by' controls of electrical equipment?

Signals from other senses have the same importance as visual sensations. Hearing is crucial. Proper acoustics of rooms is a problem usually related to the design of large building, spectator facilities, concert halls, churches; however, it is often forgotten that issues connected with inappropriate spread of sound can concern any premises. Vibrations arising in rooms affect the users; it has been verified that a person's favourable music increases the level of dopamine – the 'happy' hormone, which in turn improves concentration. Individuals engaged in sound healing argue that exposure to an appropriate vibration may have therapeutic effects. Similarly, an inappropriate vibration can cause adverse consequences. The sense of touch – material texture, the feeling of cold and warm, air humidity, odours. The question whether architecture is connected with odours seems pointless for laypersons; how can the smell affect the perception of a building? But anyone who closes their eyes and uses their imagination will recall facilities inseparably related to the odours inside, not always 'desirable' – for example, the odour of cooked food in corridors of a primary school from the times of the Polish People's Republic.

Furthermore, the observation of experiments in the field of neuroarchitecture leads to interesting conclusions regarding the strength of effects of virtual architecture on the user. Some studies involve the use of man-made virtual environments – thanks to VR technology, the subjects in such experiments are 'transferred' to specially designed spaces, whereas their responses, blood pressure and changes in the functioning of various areas of the brain are monitored. The strength of effects of virtual architecture is comparable to that of a real developed environment. That fact implies more questions – concerning its quality, e.g. in computer games; its status – whether it is true or false; its importance to the future of architecture and the power to convey additional meanings.

5. CONCLUSION – IN SEARCH OF ABSOLUTE TRUTH

An individual's life is composed of material, physical and spiritual aspects. This is also the case of architecture – its physical shape is complemented with ideas, spirituality and psychophysiological conditions of its recipients. Determining the right combination of those factors is the key to finding the truth in design work. However, it is hardly possible to expect the truth to be always the same. New times require the development of a new ethics of architecture, taking account of the available scientific research and technical advancements as well as of users' changing needs. In liquid post-modernism, it is possible to find a valuable guideline – in going 'with the stream of change' one can find joy in a permanent 'journey'.

¹¹ *Ibidem.*

The polyphony of various possibilities, considered – for example – in the religious aspect, is a phenomenon accompanying humankind for a very long time. In contrast to monotheism, usually coupled with devastating fratricidal conflicts, polytheism is associated with peaceful coexistence of various lifestyles.¹² One example can be the collapse of ancient Rome – the policy of adding conquered deities to the vast Pantheon of the Roman gods was effective until the conquest of Judea, the stronghold of the ‘only God’ within the Roman Empire. Treating religious polytheism as a specific parable for issues related to seeking absolute truth, it can be stated that with regard to seeking truth in architecture such a concept is doomed to failure. Although the very word ‘truth’ already contains certain uniqueness, unquestionability, its existence a priori assumes the existence of another truth, untrue from the point of view of the first. In today’s world, there is no single and proper way of designing. The truth of architecture is the truth of the people who create it – designers, contractors and users. Lying is believing that its shape is of no major significance and that there is no harm in mediocrity. The designers should be aware of the power of the tools they have – resources, competences and personal skills. But they should also ask themselves again and again: how to use them properly?

“True tradition is the result of constant growth; its quality must be dynamic, not static, to serve as an inexhaustible stimulus to man.”¹³

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¹² Z. Baumann, S. Obirek, *O Bogu i człowieku. Rozmowy*, Wydawnictwo Literackie, Kraków 2013.

¹³ W. Gropius, *op. cit.*, p. 67.