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GAMERS, POOL AND STRATEGIES OF INFORMATION ARCHITECTURE

GRACZE, PULA I STRATEGIE ARCHITEKTURY INFORMACYJNEJ

S u m m a r y

Play is a human activity which requires the creation of a convention, obeying the rules, and which leads to a result that can be evaluated in the light of established criteria. The rules of games interact with the characteristics of the historical periods in which they arose. The Information Age provides tools that facilitate the formalization of perception and representation. The article analyses the impact of this fact on architectural strategies. It describes the background and nature of information games.

Keywords: information architecture, game, strategy, composition, digital techniques, algorithm

S t r e s z c z e n i e

Gra jest aktywnością ludzką, która wymaga stworzenia konwencji, przestrzegania reguł i która prowadzi do uzyskania wyniku podlegającego ocenie w świetle ustalonych kryteriów. Zasady gier współgrają z charakterystyką epok historycznych w których powstały. Era informacyjna przynosi narzędzia ułatwiające formalizację postrzegania i reprezentacji. Artykuł analizuje wpływ tego faktu na strategie architektoniczne. Opisuje rodowód i charakter gier informacyjnych.

Słowa kluczowe: architektura informacyjna, gra, strategia, kompozycja, techniki cyfrowe, algorytm

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1. Introduction

Can anyone compose a correctly sounding piece of music that matches classical standards?

What we need is two dice, a table of rules, and pre-prepared music themes. Sixteen columns of the table will correspond to consecutive measures of the minuet. The rows numbered 2-12 assign to each measure a phrase, composed in such way that the beginning and ending interact with neighbouring sections. A similar process will generate measures of a trio based on a single throw of a dice. The number of possible outcomes of the algorithmic composition will be:

$$11^{16} \times 6^{16} = 1.3 \times 10^{29}$$

This instruction manual is credited to Mozart, there is however no clear evidence of authorship. The confirmation for this could be the manuscript described by Köchl with the number 516f, which consists of two-bar, permutation-arranged sections. Musikalisches Würfelspiel, a musical dice game, was popular in eighteenth-century music. The first example can be found in Johann Philipp Kirnberger's *Der allezeit fertige Menuetten- und Polonaisencomponist* from 1757. [5, p.36]

Johan Huizinga, as one of the first researchers, became interested in explaining the role of fun and games in the development of civilization and human artistic achievements. He determined that the game is a voluntary activity detached from the utilitarian thread of life which highly engages the participants, taking place in a spacetime set by specific rules [3, p. 13]. He believed that the game contributes to the formation of specific social groups, bound by rules, often resembling a secret convention. Huizinga's interest focused on the constructive function of games, marginalizing gambling and involvement of material resources.

A more complete picture of the human propensity to play can be found in Roger Caillois. The definition of the game was formulated here by specifying criteria: open participation, separation (from a practical stream of life), uncertainty (of the result), unproductiveness (economical), submission to rules and alternative reality, created for the purposes of the convention [1, p. 9]. A wide range of games, which are divided by the author depending on the type of activity undertaken, fit into this formula. The categories highlighted can provide associations related to creative techniques, including architectural techniques. *Alea* – games of chance based on the use of decision-making mechanisms, independent from the participants, create an analogy of aleatoric output. An extreme example can be found in John Cage and in spontaneous architecture created by users, where the only limitation is the shape and size of the lot. *Agôn* – games based on competition, can be associated with a situation where the different positions of the team members or the diverse expectations of the participants require negotiation. A group of imitation games, *mimicry*, is associated directly with artistic situations (theatre, pantomime). The isomorphic, homologous, analogous models used in the visual arts and architecture use strategies of imitating features to embody the idea.

The last category highlighted in Caillois' work – *ilinx*, group activities associated with an effect on the senses, which it unbalances from the natural state (balance, orientation). "Carousel" impressions were sought to be achieved by artists creating while faded: the composers of late Romanticism, painters and poets of the turn of the 20th century. Even though undertaking engineering activity in similar states is morally unacceptable, the chances created are worth noticing, especially virtual and augmented reality for the ilinx-type games.

Architectural fun is associated with taking a significant risk. The failure of the dice minuet deprives the participants of the game of fun, but will not expose them to health risks. Even a purely aesthetic defect in a building lasts for many years, being impossible to repair easily. Does this mean that in the work of building there is no place for coincidence, randomness, play?

This dilemma takes on particular importance when architecture becomes an empirical field. Digital building prototypes accurately represent real spatial situations. They allow experiments to be conducted consistent with empirical theory. Without exposing anybody, the efficiency of variationally multiplied solutions is checked. This process resembles a game more and more…

2. From probability to game theory

The interest of musicians in randomness may be associated with a discussion that was very lively in the eighteenth century and the roots of which date back to the analyses carried out by Fermat and Pascal. These considerations headed toward explaining the principles of games of chance. Combinatorial methods were used and turned out to be efficient in describing isolated phenomena. Modern probability theory, implicating associations with real, multi-element systems present in architecture is a much younger field, derived from Kolmogorov's works, conducted in the nineteen thirties.

Formalization of the rules of composition, without which the dice throw would be pointless, originates in the Greek tradition, during the Middle Ages it was spectacularly manifested in Guido d'Arezzo's didactic practice [7, p.68]. The juxtaposition of the rational (rules, tables of dependencies) and random factors (roll of a dice, picking a card) allowed systems to be built that supported creation, or even autonomous executive apparatus.

Oswald Spengler suggested that the development of civilization depended on the ability to rationally represent reality [8]. Logic games take place in a formalized environment, so they are subordinated to the mathematics of their time. The combinatorics of Fermat and Pascal is used today, at any time when, instead of taking an arbitrary decision, we prefer to roll the dice. Pseudo-random number generators are used to create "irregular" patterns and measure random distances. Randomness is also useful as a mechanism providing parameters that differentiate solutions of complex algorithms (e.g. during the mutation in generative processes).

A truly intriguing prospect for the *game of architecture* was opened by John von Neumann's works. In 1928 he established a minimax algorithm, which was looking for an optimal strategy for minimizing losses in a game with a pool of zero, with perfect information. Further considerations led to the broadening of the analysis with situations involving many players, with incomplete information, creating a base for grasping phenomena actually occurring in the human life environment. Von Neumann, together with economist Oscar Morgenstern attempted to describe them in Theory of Games and Economic Behaviour (1944). Thanks to these concepts, the mathematics of twentieth-century civilization benefited from game theory – in translating complex processes with a systemic nature.

Christopher Alexander decided to use a systemic approach to solve spatial problems. *Pattern Language* published in 1971 contained an algorithm that supported design, which imposes strong associations with von Neumann's concept. We are dealing here with a game

involving many participants and the situation of incomplete information. The author outlines a strategy that does not guarantee objective success, however, can minimize unfavourable events and increase the chance of obtaining the optimum solution. Elements of the strategy are created in the deterministic processes that have an *if then, else*, construction. A holistic approach to the problem requires the assembling of the results in a cascade tree and this is an iterative process. The concept of pattern language and the whole formalization of creative areas had a wide effect in the second half of the twentieth century. In the Polish environment pioneering work in this field was done by Stefan Wrona, who used algorithmic processes to solve problems of urban planning.

3. The playing fields and boards

The playing field for the game of architecture is the three dimensional Euclidean space. The achievements of Pythagoreans assured the Western civilization of the effectiveness of scaling methods. Thanks to them – a 1:1 board was replaced by a synthetic miniature, which we call a project.

We established earlier that a game requires convention. In the world of spatial phenomena this is created by the rules describing the dependences of figures and characteristics of transformations, that is, geometry. With the development of geometry, rules became more complicated, which made the convention more complex. Antique games required the skilful use of commensurate proportions, and the sufficient tool for the realization of strategies was the module. The mediaeval continuation of this concept led to fascinating achievements of Anglo-Saxon optics, which is today called descriptive geometry. Structures made using a ruler and compass allowed the game for the most beautiful, most unique pattern of tracery to be competed in [2].

When projective geometry provided perspective tools, architects started the game of *mimicry*, which proceeded in two directions. On one hand it tried to represent spatial reality on the plane, creating documentation or an illusion sustaining non-existent perspectives. On the other hand it sought to form actual compositions in such way that their perception would be associated with the images consolidated in the recipient's memory.

After the experiences of the Renaissance, there came a time for the application of relational rules of Cartesian mathematics. Entering the area of modern architecture, we joined the recursive game of Le Corbusier, the convention of which broke with the tradition of commensurate proportions.

In the era of information architecture, the boards for architectural games have become significantly more complicated, while at the same time achieving a common basis. Messages flowing between the participants are formulated using the digital medium, so they are characterized by modularity, automaticity, and the ability to transcode [4, p. 13]. This entails two consequences that create alternative architectural game environments. The first is a volumetric definition of space, radically divergent from the traditional, geometric formalization. It consists of no points, figures or bodies. There exists a matrix of voxels – building blocks that are actually quanta of information about the space. Similarly to pixels in an image, they record the presence and characteristics of the units that define our environment with a predetermined resolution. The second tendency is powered by the growing importance of virtual reality. An alternative environment may exclude us from real life by taking over our senses

with the apparatus of the interface. We are dealing here with an invention that is the embodiment of the inaccessible ideal of the game world. It meets all the demands of Huizinga and Caillois. It creates conditions for the realization of the game bonding together the features of all the categories into one, circumfluent, deludingly perfect convention.

4. Tactics and strategy

The object of the game, due to the interdisciplinary nature of architecture, can be both strictly specific specialist problems and processes broadly expanding in time and space

Tactical action, aimed at overcoming current barriers are concentrated around: searching for the form, solving functional and technical problems, coordination, and optimization. Information architecture can equip each of these actions in measures which significantly increase the efficiency. Form-shaping activities are gaining support through parametric geometric definitions and parametric transforming processes. In contrast to traditional methods, creating new formations does not require a preliminary definition of the desired result. Through the use of generative methods, we can multiply solutions, make a selection, process the initially chosen prototypes.

The game of getting the most efficient construction and spatial systems takes place in the environment of simulation. Thanks to representative digital models we avoid the need for expensive and dangerous evaluation in nature. The precedent of Bauvais Cathedral is not repeated, because structural analysis and optimization programs opened to architecture the door to empirical laboratory [6, p. 11].

In large teams, performing complex tasks that require specialized knowledge, the game goes on with the determination of hierarchy and subordination of the effect of joint action to resultant of individual expectations at stake. The tactic to achieve this objective could be, in modern practice, BIM model (*Building Information Modeling*). In the case of unique realizations, such as the Guggenheim Museum in Bilbao, the Beijing National Aquatics Centre, or 30 St Mary Axe, it is an individually designed digital environment – a game board for interdisciplinary cooperation. The game does not stop at the design stage. Thanks to building and utility processes encoded in the model it goes on until the physical death of the building.

Tactics are not everything. We would like to take a look at the architectural game in the long run, to assess the impact that will affect us in the future, not as an effect of single operations, but as a result of overall spatial activity. To determine the optimal strategy, successive iterations of the game, the results and their impact on the environment in the light of established criteria have to be simulated. We are dealing here with a game within a game, or rather a game for the score in the game, where the most important condition of success is the possibility of an objective assessment of the result.

Beyond the technical-utilitarian area, where the criteria of correctness can be established relatively easily, architecture contains psychological, cultural or aesthetic elements, which slip by the simple parametrization. However, even here the information environment creates possibilities to construct evaluational tools. To create a strategy of design that would be urban space friendly, a team of researchers from the Bartlett School of Architecture developed the Space Syntax system. By combining the algorithms of integration, selection and distance

depth, it assesses the quality of urban solutions, based on objective, geometrically measured spatial relationships.

George Stiny and James Gips, in their work from 1978, tried to prove that in the field of aesthetics there exist objective, independent from conditions, measures of quality [9]. They analysed aesthetic systems, and established methods of evaluation of artistic solutions. They stated the definition of entropy as an indicator of aesthetic attractiveness and identified the algorithm which measures it.

5. Summary

Following in footsteps of the games of information architecture we can see that the prospect which appears at the end of the road is strikingly similar to the futuristic visions of Lem and Toffler. The world of games came into contact with the real world by the expansion of virtual reality and digital extensions, accessible through mobile telecommunication. Historic architecture was a firm foothold. As the most physical of arts, it did not allow excessive detachment from reality. The digital branch of the art of shaping space, used to build unreal worlds, is much more prone to accepting imaginary conventions. How spectacular are the effects of it can be evaluated after the screening of The Matrix or Inception. It is also worth warning. Exposure to circumfluent, intense projection of artificial reality can sometimes be fatal. William Mitchell wrote about diseases afflicting the mind addicted to digital amplifications. A world overpowered by the plague of artificiality, a world where everything is a game, a world suggestively depicted in Lem's The Futurological Congress, should remain literary fiction…

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