Category’s analysis and operational project capacity method of transformation in design

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Abstract. The method of transformation is attracting widespread interest in fields such contemporary design. However, in theory of design little attention has been paid to a categorical status of the term "transformation". This paper presents the conceptual analysis of transformation based on the theory of form employed in the influential essays by Aristotle and Thomas Aquinas. In the present work the transformation as a method of shaping design has been explored as well as potential application of this term in design has been demonstrated. Keywords: design, form, theory of form, method of shaping design, transformation, criteria of transformation, shaping design, graphic design

Problem

The human spatial area has been transformed a lot due to the tremendous development of modern life. Nowadays the demand for flexible, effective, and alternative solutions concerning the elements of interactivity and/ or games is of great importance. That is why the transformation is thought to be a relevant method in design projects. The commitment of designers in design shaping to human concerns reduces a psychological distance between the consumer and the design product, and thus might contribute to the commercial success of the product. The designer needs special tools for the achieving these goals. However, the transformation in design as a research method remains largely unstudied; there are many vague interpretations of this term in relation to design project (transformation method) as well as design product ("transformers", transformable object, etc.).

Aim

This work aimed to identification of the specifics of the transformation method’s implementation in design products based on preliminary categorical analysis of the "transformation design" concept.

Methodology

Much research in recent years has focused on the specifics of shaping design (see works of D. A. Norman, V. Papanek, V. L. Glazychev, N. A. Koveshnikova, M. S. Kukhta, K. Cantor, S. O. Khan-Magomedov, E. Crenshaw, V. F. Sidorenko, Yu. Bystrov, N. V. Voronov, S. M. Mikhailov, N. P. Garin, V. F. Runge, L. M. Kolmannskij, A. S. Shchipanova, and others).

The rationalist interpretation of the form as an integral entity determined by the specific goal has also been addressed by many works of Aristotle, Thomas Aquinas, J. W. Goethe, and I. Kant [1; 128–131]. In 1964 T. Maldonado developed the classical definition of form further with the introduction of design.
A few works were devoted to the issues of transformation in the design (Z. T. Akilov, G. I. Petushkova, A. A. Pacevičiute, L. S. Shamuhitdinova, S. A. Goncharov, C. B., Zyvyagintsev, V. Semkin and V. F. Sidorenko). The term "transformation" first appeared in the work of the Russian physicist and meteorologist A. D. Michelson in 1865: transformation (trans – through, and formatio – formation of the species) is understood as a change of form, metamorphosis, transformation.

**Discussion. Transformation as a method of design project and as a characteristic of the design product.** In english the word "design" is used extensively, the meaning is strachted, it's too general. Sometimes it results in misunderstanding the the abilities of the profession. We should realise the difference between the designer and others who use projecting as a part of their professional activities. But we also have theoretical definition. Let's remember the defenition given by Tomas Maldonado in 1964. "Industrial design is a creative activity that aims to determine the formal qualities of objects produced by industry. These formal qualities are not only the external features but are principally those structural and functional relationships which convert a system to a coherent unity both from the point of view of the producer and the user" [10]. This definition is really important for all the design types because it defenitly figures out the specific features of design. Well:

1. A designer makes a form, creates the form, using the quotation of russian philisofer Nikolay Berdyaev "creates something new brings into being something that has never existed before".  
2. Designing is the activity that is directed to some certain purpose. Such activity isn't regarded just as creating it has a an aim. The aims are mainly related to the customer's needs [10].  
3. A designer creates the form of the industrial product. I mean the product that is worth to be fully or partly manufactured industrially using the knowledge of specific technologies. Therefore as a result it allows to speed up the prosess and cut the cost. In the middle of the 20th century Tomas Maldonado suggests a concept of democratic design which makes the products available for massmarket customers. These days his idea is becoming much more popular.  
4. Meeting the goal but not coming across the lack of quality. How?  
   - visual characteristics;  
   - structural bonds;  
   - functional bonds.

Transformation is one of the methods of work of the designer with the structural and functional connections.

The term "transformation" had been introduced in a variety of disciplines such as biology, physics, engineering, architecture, linguistics and others. We argue that in design sphere it is characterized by the specific features due to (a) project nature of design activity [1; 8; 15]; b) inclusion in shaping design as the main criterion and the result of design ("shape grammar", Lawson, 2005). The transformation of the object can be designed, modeled, calculated by the designer. The resulted form is supposed to be flexible, variable in terms of functional purpose and, at the same time, being unchanged in their basic characteristics [2; 3; 6; 7]. This aspect is crucial, because this term can also be used in our daily life to refer to the transformed elements in different constructions (for example, furniture). Such products typically associated with modules and can be defined as *constructors*, not the *transformers*. They are differentiated form each other due to the fact that every element of the constructor can be easily removed, whereas the elements of transformers are expected to be undivided.

Transformability as a *characteristic* of design product is manifested in the process of its existence and using, i.e. being asserted a fact concerning external factors and environmental changes. It is important that the movement is a factor of form creating [7]. Object of design is thought to have a variety of functions and could be developed in time and space, due to the activity of the consumer.

One can say about the transformation as a *method* of design project. This means that the designer creates a project focused on the presence of several variants of implementation of the form ("transform"). The parameters of the transform are determined by the specific functional goals. Perception of the form as an integrity supports the project as a whole and saves its compositional and aesthetic characteristics [3; 5; 14].
The advantages and limitations of the products made with the use of method of transformation

1. **Multiple functions.** This quality presupposes the use of the same form in accordance with the different objectives, i.e. the replacement of several products by one’s [14]. It can be straightforward successful only in case, when the functions do not contradict to each other and the resulted form is not destroyed by the additional elements. "Improved versatility for transformable tops is one of the core variables crucial to increasing sustainability in the clothing’s lifecycle. Transformable tops are expected to replace many tops with their changeable design options. Thus, wearers may not need to purchase five different black T-shirts with different necklines but only purchase a single black T-shirt with five transformable necklines" [11, 115-116]. All elements are used on regular basis and are supposed to be balanced and integrated. At the same time, within such products are not allowed to use more than one function simultaneously.

2. **Flexibility.** Transformable design product refers to the needs of the customer in a specific moment of time. "Transformation indicates in general a change of shape, form, or structure without loss of substance. The most important method of transformation is variation" [5, 403].

3. **Economical efficiency** of transformable design product is associated with increasing of its working lifespan and maintaining of its high consumer qualities. This aspect is supposed to be particularly relevant for the design products for kids; these products must be optimized in accordance with the necessity to grow up in children case. "It is shown that higher upfront investment leading to reduced cost for future change is economically justified in certain scenarios. The value of flexibility increases with increased time horizon and increased uncertainty in the market price…” [4].

The use of the method of transformation in design is thought to have several positive consequences. The number of required design products in environmental milieu decreases due to the multifunctional character of the product, which assert a fact of reduction the need for recycling and increases environmental credentials. This method of shaping design might increase the working lifespan of design product and thus might be deal with the improving of its functionality. This shaping design method saves resources and space. "Transformable garments have the potential to lead consumers' natural engagement with sustainable acts by satisfying their various needs and wants… behavior without their awareness" [10].

At the same time the advantages and disadvantages of this approach need to be addressed to. It is thought to be a complexity of the construction as well as redundancy of form; economic failure of the decision making; the impossibility of simultaneous use of multiple functions or conditions of the transformation. "Thus, having many options is not the best solution for transformable garment designs; and when developing transformable tops, designers need to consider how to simplify consumers’ decision making process by understanding how the garments will be used” [11, 121].

Transformation is one of the methods of work of the designer with the structural and functional connections. The idea of "liquid modernity" was introduced in the context of the turn of the 19th-20th centuries by American sociologist Zygmunt Bauman. As he noticed significant social changes he offered the metaphor of civilization conversion from solid to liquid state. To describe modern society he draws a parallel with physical substances: solid subjects (analogy to social patterns and durable social relations) can not only be destroyed but are also able to change their volume; liquids keep volume and thus are easily transformed. That "solidity" of western society traces the roots back to the XVIII century with its rationalistic philosophy and science striving to establish the rational regime of life.

Evolving Bauman's ideas in the context of fast sociocultural changes, we face at the beginning of the XXI century, it's reasonable to describe "solid" thinking people have in the Era of modernism as linear, flat and since a certain moment schematic. The revival of positivistic ideas which is also noticed in liberal education implies mathematization (even arithmetization) of thinking therefore fictitious simplicity of following the algorithms becomes attractive for the majority of people.

**Conclusion**
In this study transformation in design is considered to be a variant of the designer's work with the integral form as a closed, but flexible system. On the one hand, it implies a stable number of the elements of form; on the other, the remarkable variety of the structural connections between them.

The application of the method of transformation in design requires an understanding of the feasibility of combining functions. It provides a significant effect in case of the development of only one function oriented to necessity to grow up in case of children. In this point of view, you must choose the materials which can be used to reduce the risk of physical depreciation of the objects. The method of transformation is relevant for the objects used in small spaces where a single design product can be multifunctional. The number of the options for transformation is thought to be efficiently excellent and sufficient. The algorithm of use of this design product might integrate this number of options in an optimally-effective design shape.

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