Multilinear approach to representing the historical evolution of urban design (industrial and post-industrial periods)

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Abstract. The concept of “city design” is revealed as a special type of design and art synthesis of architecture, monumental and decorative art, urban planning and landscape design at the level of individual forms, urban spaces and ensembles, as well as the city as a whole. Using a multilinear approach to presenting the history of design, the authors of this article pay special attention to factors affecting the form-finding in design that actively influence it both at the designing stage and also allow us to consider the evolution of design objects in interrelation with political, economic and cultural events in the world. The main stages of the historical development of the design of the city of the industrial and post-industrial periods are considered on the basis of a multilinear approach in the presentation of the historical process, which meets the new concepts and ideals of the post-industrial society with a holistic picture of the worldview. They show the complexity and multidimensionality of the task of representing the history of city design and the need for special studies of this relatively new phenomenon in the general design and art culture of the XX-XXI centuries.

Keywords: multilinear approach, city design history, urban design, urban design history, design history, city design, urban environment design, architectural and spatial environment of the city, artistic synthesis.

1 Introduction

As an independent area of design and artistic activity, the design of the urban environment was formed relatively recently. This can largely explain the fact that this unique phenomenon, which arose at the intersection of design, architecture and urban planning, has not yet been adequately comprehended by art historians and design theorists, and there are still no major scientific works comprehensively covering issues of history and design theory of the urban environment, revealing its specifics and main stages of development [10].

An analysis of scientific sources shows an increasing interest, on the one hand, to the global history of design [1, 2], and on the other hand, to its individual, local aspects. All this leads to the formation of a new multilinear approach to the history of design, which meets the new representations and ideals of a post-industrial society with a holistic view of the world. Svend Erik Larsen [3], Ton Otto [4], Maya Oppenheimer [5] and others write about the formation of an interdisciplinary history of design in their works, focusing on the historicity, narrative and philosophical aspects of evolutionary processes in design, as well as anthropological [6,7] and national [8] aspects.

There are discussions about the conceptual apparatus in the field of urban design [10, 11], the paradigm of urban design [12], various issues of the interaction of the city and man [13], local topics related to the characteristics of the urban environment in different regions [14], and urban morphology [15]. Articles on the history of urban design are most often devoted to particular aspects or events. The most popular topics are new and landscape urbanism (Karl Kullmann [16], Matthew Heins [17]), urbanism (Katharina Borsi, Tarsha Finney & Pavlos Philippou [18]), and sustainable urbanism (Lars Marcus, Matteo Giusti & Stephan Barthel [19]). Also considered are the current trends in the organization of the urban environment [20, 21] democratization and its impact on the development of city design in the 21st century. [22, 23]. However, a holistic view of the history of city design in the
context of the development of design and artistic culture as a whole is currently lacking. That is why
the object of our study was the history of city design as a complex and multidimensional process of
form and style formation in interaction with other types of design and art culture. The subject of the
research is the key events in the history of city design, including the shaping and artistic styling of
graphic and environmental elements in the design of the urban environment. The purpose of the study
is to identify the main stages in the history of city design as a multidimensional type of design and
artistic activity in the context of the global history of design and artistic culture, taking into account
the modern worldview and the latest forms of representing historical processes. The main objectives of
the study:
1. To reveal the features of a multilinear approach to the history of design as a tool for the systemic
representation of complex multi-aspect processes developing in time.
2. Clarify the concept of city design and identify features of the presentation of its history.
3. To identify the chronology of the design of the city.

2 Methods
The research methodology is based on a systematic and synergetic approach to the study of
phenomena in their relationship, allowing us to consider the theory and history of design in a wide
sociocultural context and hierarchical relationships. The following scientific methods were also used:
- historical-genetic method, which allowed to consider the development of various design lines in
  the relationship between themselves and with other types of design and artistic activities;
- a synthesis of domestic and foreign experience, including a comparative analysis of design
  examples, including various historical and theoretical views on design and stages of its
development, for which methods of synchronous and asynchronous analysis were also used;
- formalization and logical modeling for constructing a conceptual historical-theoretical model of
design evolution.

3 Results and discussions
3.1 Formation of a nonlinear approach
The continued dominance of a linear understanding of history did not allow us to consider historical
processes in their full diversity and complex interaction. As a reaction to this, there is growing interest
in non-linear models of the historical process, which are an understanding of history as a constant
return to the once-tested and established cultural forms at a new level. Today, a nonlinear approach is
being formed, the essence of which is that the general history consists of a number of completely
independent local components (lines of development). Non-linear concepts operate with the integrity,
continuity of the historical process and allow us to consider it as a multicomponent system, taking into
account the relationships between these components, declaring the uniqueness, originality of the
historical process, the multiplicity of models for the development of society. So with this approach, the
history of design begins to include socio-cultural, socio-political or economic events, issues of
national identity, manifested in form finding. The variety of views on the history of design helps its
multi-faceted consideration.

3.2 Multilinear presentation of design history
It should be noted that the history of city design was considered by art critics and design theorists for a
long time as a linear evolutionary process. However, in the second half of the 20th century, the so-
called “local design stories” began to take shape, dedicated to its individual areas (design profiles).
First of all, it is architectural and graphic design, the history of fashion and interior. Today, experts
recon more than 30 different specializations in design, and their number is growing, new, sometimes
unexpected directions are opening. On the agenda, they are divided into separate components, for
example, automotive or furniture design in industrial form finding, or visual communications, street
furniture and equipment, color and light environment in the design of the city. At the same time, the
need to assemble these separate lines of design into a single system to form an integral picture of the
history of design with access to a new qualitative level of analysis of local historical processes is becoming increasingly important.

Thus, the variety of design objects that differ in their purpose, constructive and technical solution, manufacturing technologies and materials, with the prevalence of an aesthetic or utilitarian principle, methods of their functional use by a person, cultural and semantic meaning, role and place in the general design and art culture, and a number of other signs that determine the specialization of design activity determines the approach to their presentation. The description of the historical development of design can occur according to one of the signs (a single-line representation of the history of design), as well as in their various combinations or all at once (multilinear representation of the history of design) [9].

Specializations in design have their own unique features, and a detailed examination of each of them shows us the uneven development over time, for example, the history of industrial design has more than 100 years, the history of city design has just crossed the 50-year mark. A professor at the University of Oslo, Kjetill Fallan, in his research also confirms that the history of design has become a complex and extensive discipline, which over the past few decades has developed a wide range of theories and methodologies for analyzing objects [24].

Using a multilinear approach to presenting the history of design, the authors of this article pay special attention to factors affecting the form-finding in design that actively influence it both at the designing stage and also allow us to consider the evolution of design objects in interrelation with political, economic and cultural events in the world [25]:

- line of scientific, technical and technological discoveries;
- the line of development of philosophical views and worldviews;
- the line of development of internal professional theoretical concepts;
- line of socio-economic influences;
- line of socio-political events.

Using a multilinear approach as a means of creating a holistic picture of the history of design, preserving and developing the whole variety of its specializations and directions (lines), considering the latter while in a common relationship, a number of evolutionary lines in design are assembled in six groups [9]:

- factor-forming (a line of technical discoveries, a line of philosophical views, a line of theoretical ideas, a line of economic influences, a line of political events, etc.);
- formative (synthetically layout line, popular line with popular iconic objects, professional line with professional iconic objects, as well as functional, styling and constructive lines);
- specialized (industrial design, graphic design, architectural design, clothing design, phytodesign, landscape design, food design, etc.);
- copyright (personalities, schools, companies and brands);
- art and style (line of functionalism, line of biomorphism, line of organic design, etc.);
- national (Japanese design, Scandinavian design, Russian design, German design, US design, etc.).

This article is devoted to one of these lines - the specialized, or rather, the history of the city’s design in the conditions of a multilinear approach to its presentation.

3.3 The evolution of the concept of "City Design"

**Urban design.** Initially, the term "urban design" was used to refer to industrial design objects intended for the city and its spaces. In this case, the word “design” refers to the industrial methods of manufacturing such objects and their serial production.  

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1It was industrial production that implied design in the middle of the last century. From the definition of design by Thomas Maldonado at the VI Congress of ICSID in 1969: "Design is a creative activity whose purpose is to determine the formal qualities of industrial products." Moreover, the term “design” was considered a professional abbreviation of the term “industrial design".
Sydney University professor John Lang writes in the preface to his book «Urban Design» that the concept of urban design most likely appeared in the 1950s. [12].

Of course, urban public transport, serially created specifically for city streets, filling them with the dynamics of “moving forms” and largely determining their appearance can be considered as one of the first prototypes of urban design [25]. The first type of public transport is considered to be multi-seat passenger horse-drawn carriages - omnibuses, which became widespread in Europe and the USA in the second half of the 19th century. Then trams appeared on various types of traction - animal (konka, 1828), cable car (1873), steam (1880s), pneumatic (end of the 19th century), electric (1881) and gasoline.

**Design of Urban Environment.** A certain climax in the development of urban design was the appearance in the 1950-1970s pedestrian streets in the centers of many European cities. Functionally and informatively saturated pedestrian streets equipped with multi-unit garniture of street furniture and equipment, as well with visual communication systems became the embodiment of the dream of post-war Europe about an ideal city of the twentieth century, the first prototypes of highly comfortable urban spaces [26]. Pedestrian streets were formed as an artistically and stylistically integrated ensemble, using mainly design means for this purpose. Through the means of design, artistic and stylistic integration of heterogeneous architectural objects into a common spatial ensemble was carried out, and its local artistic (“corporate”) style was formed. At this time, the term “urban environment design” is gaining ground, reflecting the essence of the occurring phenomena in the organization of urban spaces and their material content as a uniform environmental complex.

**The concept of "city design".** The modern theory and design methodology put forward new principles and methods for organizing the spatial environment of the city, responding to the ongoing changes in society and its scientific and technological development. One of them is the principle of “ergocentrism” as the doctrine of form finding in a post-industrial society, reflecting the specifics of its modern development and logically continuing the ideas of anthropocentrism, to which mankind periodically refers to in the history of its development [10]. On its basis, a new alternative approach to the organization of the spatial structure of the city is formulated, based on the general scientific method of induction and taking its roots in constitutionalism (environmental approach) in the second half of the twentieth century. Outgoing “from a person”, taking into account its psychophysiological, sociocultural, artistic and aesthetic features and needs, reflecting the current trends of a post-industrial society, it can significantly complement the traditional urban development approach based on the general scientific method of deduction.

In modern conditions, design in the city dramatically expands its object and subject areas, not limited to the design of individual objects and subject complexes (urban design), environmental objects and urban spaces (urban environment design). It becomes appropriate here to talk about the "design of the city" as an independent form of design and art activity – a special kind of design and art synthesis of industrial and graphic design, architecture, monumental and decorative art, urban planning and landscape design [10]. Moreover, this design and artistic synthesis takes place at various levels of the spatial organization of the city and its subject content:

- separate, architectural, sculptural and industrial forms (elements and subject complexes, including visual communication systems, outdoor furniture and equipment, colorographic and supergraphic compositions, and other elements forming the urban planning ground);

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2 The word "omnibus" was first used in 1826 in France (in the city of Nantes). Moreover, the multi-seat passenger crews themselves were launched in Paris as early as 1662 under Louis XIV [10].

3 The concept of “ergocentrism” was introduced by professor Sergey Mikhailov in 2011 in his dissertation “Design of a modern city: the complex organization of the subject-space environment (theoretical and methodological concept)” and was periodically covered in scientific publications [10, 26].
- urban spaces and ensembles (the spatial environment of pedestrian zones, streets, boulevards, embankments, city squares and other open spaces of the city);
- city or major urban ensemble (urban structures, master plans and planning schemes).

3.3 The main stages in the historical development of the design of the city of industrial and post-industrial periods

Active development of the design of the city as an independent type of construction and artistic activity took place in the industrial period (1900—2000) under the influence of socio-economic, socio-political, historical-cultural and artistic-aesthetic factors.

The study identified six main stages in the historical development of city design.

Stage 1 (from the 1820s). Formation of multi-subject complexes in urban spaces. To a certain extent, the starting point in the design history of the city of the industrial period can be considered the emergence of urban public transport, created in series and specially for city streets, introducing the dynamics of “moving forms” into the static architecture of the city. Together with passenger carriages and wagons moving along the streets, public transport brought static forms to the urban environment - stopping pavilions, which can also be attributed to the first prototypes of urban design. Among them are well-known pavilion complexes for the city railway in Vienna (Otto Wagner, 1899) and Paris metro stations (Hector Guimard, 1900). These transport pavilions, as well as the British red mailboxes-columns (“Pillar to Post”, 1874) and London telephone booths (Giles Scott, the 1920s and others), solved in a single artistic-style key, became the prototype of using corporate identity method in city architecture and design. These objects were originally conceived as a series of multi-subject elements, solved in a single large-scale, constructive, technological and artistic-style key in the framework of the "modern" style. The philosophy of the Art Nouveau style implied a certain complexity, the unity of the art-style decision of the group of objects and the context in which they were placed. One of the leading methods of design - the corporate identity method, which russian professor V. Glazychev generally identified with the concept of design, was born in the bosom of the "modern" style. And the representative of Art Nouveau (Jugendstil) Peter Behrens is considered the forefather of this method when, as the artistic director of AEG (1907-1909), he developed a unified style concept for its products and graphic advertising posters.

Stage 2 (1918—1930s). The formation of an integrated urban development approach in the organization of the spatial environment of the city. The “Lenin Plan of Monumental Propaganda” of 1919, which covered many cities of Soviet Russia, the large-scale thematic decoration of city ensembles for the celebration of the first anniversaries of the October Revolution in Petrograd and other cities is characterized by an active search by artists and architects in the field of interaction of various types of art, new non-traditional forms of artistic synthesis: architecture and words, architecture and visual arts, etc. In the 1920s, the ASNOVA Group put forward the idea of creating a new color look for Moscow by painting buildings throughout the city, which then found continuation in Moscow's “planned painting” projects (Malyarstroy Trust, 1929). Thus, a new approach to the coloristics of the city as a complex sign system was designated. Moreover, when performing these projects, the language of planning schemes was used, optimal when demonstrating a general conceptual solution.

Stage 3 (since the 1950s). Formation of “ergonomic design” and “corporate identity” methods in urban design. In European cities, in the conditions of post-war reconstruction, pedestrian streets are widely spread, in the formation of which design tools were actively used. The design of pedestrian streets brought with it new typological series of subject forms in the urban environment (street furniture, visual communications, super-graphics and street art), as well as own design methods. In the second half of the 20th century in the architectural and artistic organization of the city ensemble a new professional approach began to take shape, focused on industrial design methods - “ergonomic design”
and “corporate identity”. Pedestrian streets are one of the culmination points in the design history of the city of the industrial period [10].

**Stage 4 (since the 1960s). Homocentrism and the Environmental Approach in the Architecture and Design of the City.** The environmental approach is a humanistic movement aimed at “humanizing” all material, technical, organizational and activity parameters of life support systems. It arose as a reaction to the alienation of a person in the city, the facelessness of mass standard housing, environmental damage. In the environmental approach, based on the scenario-based principle of organizing the spatial environment, along with revealing the uniqueness of a place (the spirit of a place), a person - a consumer of this environment, an active participant in its formation (the principle of participation) is of great importance. Under the conditions of a developed construction industry, interest in the improvement and organization of the environment of buildings, the integrated use of architecture, monumental and decorative art, and urban design is growing sharply. The main semantic load is transferred from the skeleton layer of the city, its planning structure and architecture - to the surface layer, formed mainly by graphic and design objects, to that part of the urban landscape that has received the definition of “near perception zone” or “Urban Parterre” [10].

**Stage 5 (1970—1990). Formation of urban development programs for the organization of the spatial domain of the city.** In the late 1970s and early 1980s, general schemes of artistic and decorative design and monumental propaganda, projects of complex architectural and artistic design of the city were spreading in our country. Their authors by the artistic, monumental and decorative design of the city understood the solution of a whole range of issues aimed at increasing the ideological, architectural, artistic, as well as functional and utilitarian content of the spatial environment using a wide arsenal of means of monumental and decorative art, architecture, landscaping and urban design. Such projects were presented in the form of a hierarchical system of interconnected architectural and planning elements to be designed (nodes, connections, zones) highlighted on the general master plan of the city. For them, the principles and nomenclature of means and design elements were determined. The final system was the result of a series of analytical schemes compiled on the basis of extensive pre-project studies.

**Stage 6 (since the 2000s). The concept of ergocentrism as a doctrine of the formation of post-industrial design.** At this stage in the development of city design, the concept of “ergocentrism” (ergonomics + centrism) is advanced as the doctrine of the formation of post-industrial design [26]. Within the framework of this concept, an “inductive model” of the organization of the spatial structure of the city and its subject content is formed, going from private (person) to the general (city) and to “design space”. Distinctive features of the latter are multifunctionality, high level of mobility and variability; compactness and proportionality to the person; high level of comfort (physiological, emotional, aesthetic) and technical equipment, and, consequently, interactivity and intelligence, able to respond to various types of consumers and adapt to changing situations.

**4 Conclusions**

City design as a special type of design and art synthesis of design, architecture, monumental and decorative, urban planning and landscape art includes a number of levels of organization of the spatial environment of the city: the level of individual forms, urban spaces and ensembles, the city as a whole. Its historical development must be considered as a complex multilinear development process, thereby meeting new ideas and ideals of a post-industrial society with an integral picture of worldview, a number of interconnected subsystems (street furniture and equipment, visual communications, graphic environment, color-lighting environment, etc.)

The study identified six main stages in the historical development of city design.
- stage 1 (from the 1820s) – formation of multi-subject complexes in urban spaces.
- stage 2 (1918–1930s) – formation of an integrated urban development approach in the organization of the spatial environment of the city.
- stage 3 (since the 1950s) – formation of “ergonomic design” and “corporate identity” methods in urban design.
- stage 4 (since the 1960s) – homocentrism and the environmental approach in the architecture and design of the city.
- stage 5 (1970–1990) – formation of urban development programs for the organization of the spatial domain of the city.
- stage 6 (since the 2000s) – concept of ergocentrism as a doctrine of the formation of post-industrial design.

The revealed main stages of the historical development of the city design of the industrial and post-industrial periods show the complexity and multidimensionality of the task of representing the history of city design and the need for special studies of this relatively new phenomenon in the general design and art culture of the XX-XXI centuries.

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