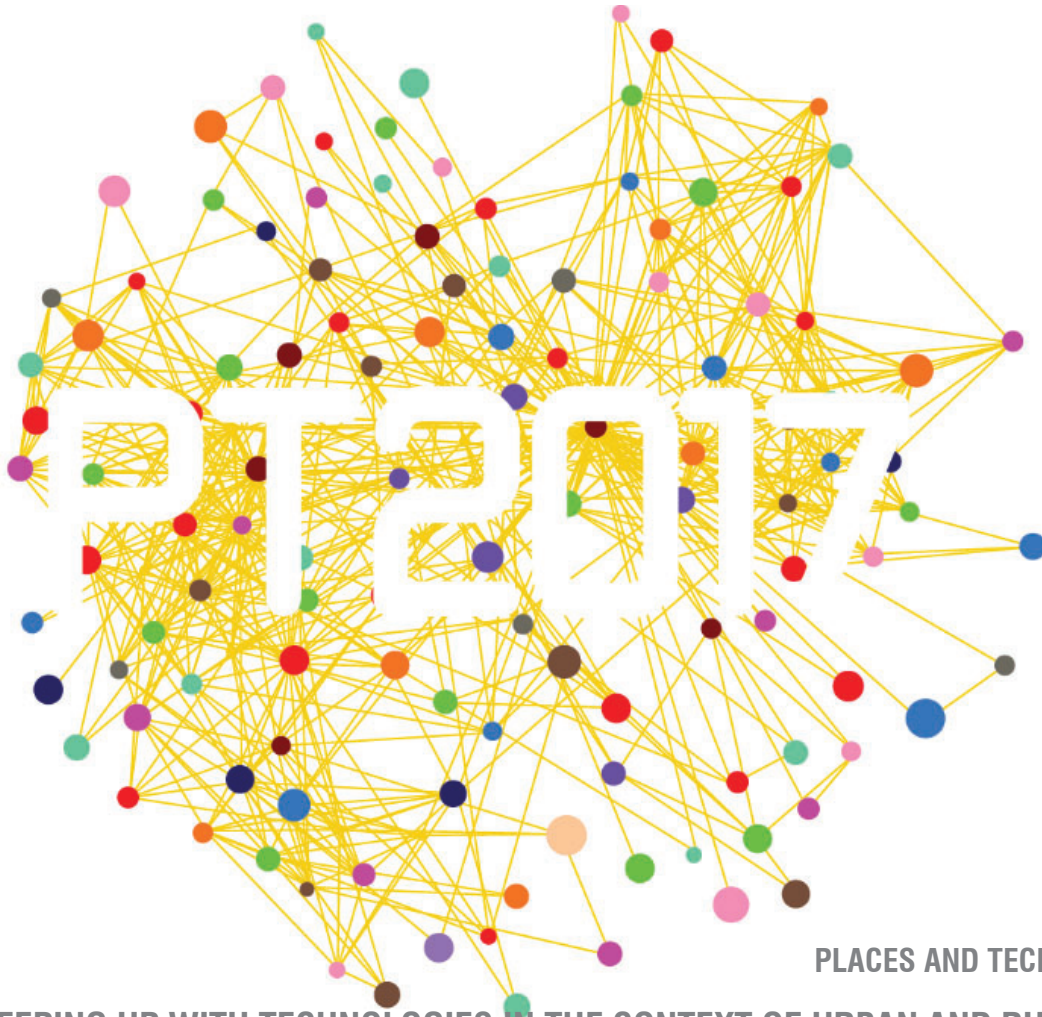


4th International Academic Conference



PLACES AND TECHNOLOGIES 2017
KEEPING UP WITH TECHNOLOGIES IN THE CONTEXT OF URBAN AND RURAL SYNERGY
Book of Conference Proceedings

Sarajevo, Bosnia and Herzegovina, June, 08th - 09th, 2017

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Dženana Bijedić, Aleksandra Krstić-Furundžić, Mevludin Zečević



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USING SPACE SYNTAX MODEL IN TYPO MORPHOLOGICAL STUDIES - UNDERSTANDING THE TRANSFORMATION OF URBAN FORM AND URBAN LIFE OF THE EDGE BLOCKS OF NEW BELGRADE

Aleksandra Đukić

Associate Professor, University of Belgrade Faculty of Architecture, Bulevar kralja Aleksandra 73, Belgrade, Serbia, adjukic@afrodita.rcub.bg.ac.rs

Aleksandra Đorđević¹¹⁸

Teaching Assistant, University of Belgrade Faculty of Architecture, Bulevar kralja Aleksandra 73, Belgrade, Serbia, aleksandra.dj@arh.bg.ac.rs

Milena Vukmirović

Associate Researcher, University of Belgrade Faculty of Architecture, Bulevar kralja Aleksandra 73, Belgrade, Serbia, milena.vukmirovic.arch@gmail.com

ABSTRACT

The relation of the urban form and urban life is perceived as a critical aspect of the image, quality of place and sustainability in the contemporary globalized world. The focus of the paper is on the typo morphological profile of mega blocks in New Belgrade. Drawing from theoretical thoughts of various scholars of typo morphology and the ideas of the modern movement interpreted through the Serbian planning and design practice, the article raises the questions about the relation of society and space in terms of urban form and urban life. The aim of the paper was developing of a typology that includes the spatial and temporal contextualization, using the space syntax model as an integral part of typo morphological studies in contemporary research practice.

The synthesis of typo morphological research and space syntax model can provide the platform for better understanding of the existing built environment and social processes, but at the same time, could create starting point for further improvement and development of the urban periphery. The results of the paper are in providing appropriate strategies and rules for urban transformation and urban design of mega blocks to secure high quality of urban form and urban life.

Keywords: Typo morphology, urban form, urban life, space syntax, New Belgrade

¹¹⁸ Corresponding author

TOPIC VIII & IX:
**CULTURAL PATTERNS AND SENSITIVITY;
SUSTAINABILITY LESSONS FROM VARNICULAR ARCHITECTURE**



INTRODUCTION

From the early 1960s, due to the various research and design practices of the independent scholars, urban morphology has become an important discipline. Accordingly, in Italy, the new city design theory was developed on the basis of the typo morphological analysis of Italian cities, conducted by Severio Muratori and his successor Gian Franco Cannigia (Muratori, 1959; Gauthier, 2005). At the same time, the French typo morphologists were strongly influenced by the Henri Lefebvre's ideas (e.g. Castex, Depaule, & Peneirai, 1980), while in Anglo-German context, this problem was embedded in the broader city context and was mostly researched by geographers out of which, Conzen certainly stands out (Whitehand, 2001). All of these authors were thinking on similar lines while observing urban morphology as a prerequisite for understanding the city and future interventions in urban space. Along with this, in mid 1980s the theory and method of space syntax was introduced, where it was recognized as a theory of spatial and social systems and method that allows the research of these phenomena (Hillier & Hanson, 1984). Even after two decades, as Whitehand recognizes, typo morphologist have always tended to operate independently from those employing space syntax theory and method (Whitehand, 2001). Following this argument, this paper examines the possibilities of the integration of these two disciplines in order to create a typology which will provide an understanding of the built environment and social processes and additionally provide guidelines for the further design and planning according to social processes and self-organized principles and not oppose them. It is important to stress out that in the context of Serbia, detailed morphological and typological studies were conducted for city squares (Čokić, 2009; Čokić, 2004), city blocks with the focus on the historical part of Belgrade (Niković, 2013) and morphological analysis of New Belgrade in terms of sustainable land use (Gajić, 2015). On the other hand, space syntax is also becoming field of interest for different scholars (e.g. Čukić & Vukmirović, 2012, Vukmirović & Milaković, 2012). Presence and actuality of these two topics in Serbia research practice make our goal of their integration justified, given that the synthesis of typo morphological research and space syntax method can lead to some new conclusions or can raise some new questions.

In this paper, we have selected New Belgrade for our case study since it was planned and built in complex social - political context after the World War II. Looking from today's perspective, New Belgrade is faced with some new political and ideological demands such as the neoliberal ones. Residential blocks are dividing; plans are being developed for single intersections or parts of the blocks, compromising both the idea of modern movement and urban life through the production of disruptive and chaotic built structures. The content of this paper is divided in four sections. After the introduction, section two is explaining which methods and materials will be used to create typology and to integrate different subjects in the study of urban morphology and typology. Section 3 includes a theoretical review of the dilemmas concerning built environment and its spatial temporal aspect. The goal of Section 3 is to create a typology of residential blocks and to provide general understanding and identification of type characteristics and challenges coming with the current changes in urban transformation of New Belgrade edge blocks. In the last

segment we will sum up what has been achieved with this paper and point to possible further research in the field of urban morphology in the city of Belgrade.

METHODOLOGY

In order to achieve the study goal of conducting typo morphological analysis of residential blocks in the New Belgrade, usage of several research methods was necessary. We used the method of critical analysis of theoretical thoughts that can be contributing to the problem of linking the space and time in the built environment such as urban morphology and typology, structuration theory, Lefebvre's thoughts about social space as well as the theory and method of space syntax. This theoretical framework was applied for the formulation of criteria and for the selection of principles and urban patterns, on the basis of which study of New Belgrade will be conducted and on the basis of which typology will be developed. For this purpose, we used morphological analysis to define general values and parameters for the investigation of the case study. The main research material used for case study analysis was General plan from 1950s (Beograd Generalni urbanistički plan 1950), General plan for 2021 (Službeni list grada Beograda, 2003), general state map cad drawings and the site analysis. We used typology as a method for explanation of processes and phenomena by means of studying architectural and social networks and elements. The main study goals are to achieve a high level of understanding of the built environment of New Belgrade edge blocks in order to maintain, improve and guide further development and to investigate the possibilities of space syntax model integration with typo morphological studies.

RESEARCH

Although theoretical approaches of Lefebvre, Giddens and Hillier & Hanson are basically different, the question about the relationship between urban form and urban life is drawing them closer. It may appear that Giddens is more oriented towards the general sociological approach, but we strongly believe that his thinking about structure and action is of great importance for the understanding of urban form and urban life relations. On one side, we have well known Lefebvre's view that "the city is the imprint of the society in space", by which he perceives space as a product of thought and action, but as well as an instrument of control and expression of power (Lefebvre, 1991). On the other hand, Hillier & Hanson are going one step further, since they use space syntax for the explanation of relations between society and space in specific environment, taking the architecture and the built environment as their starting ground (Hillier & Hanson, 1984) or the boundaries as we may call them. They use space syntax as a method that, as Hillier suggests, accepts the city as it seems - as a network of spaces open to the successive acts of construction (Hillier, 2008). Beside how the space is structured, the leading questions in their research are concerning the functioning of the city, the way how we understand it and how city is part of the society, concerning its impacts and effects such as social segregation or economic deprivation (Stonor, 2014). In addition to previous theoretical grounds, structuration theory implies the duality of structure, where a moment of production of the action is considered to be



TOPIC VIII & IX:

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a moment of its reproduction as well (Giddens, 1984). We find this argument very important while attempting to link space syntax to typo morphological research, since Giddens suggests that due to the routinization, paths and society remain the way they are through their own reproduction, while the zoning of space and time is done in relation to them. Space syntax could allow us to understand the processes of routinization and to, as Hillier suggests besides understanding the cities, understand ourselves as well (Westin, 2011).

Selection and description of Criteria

Having in mind Lefebvre's critic of the architecture and urbanism of modern movement that produced homogenization, fragmentation and hierarchization (Lefebvre, 2009), three criteria are defined in a way which includes physical characteristics of complex city network and single block, as well as functional characteristics in connection to the urban life: criteria of diversity in urban form, criteria of block integration and criteria of quality of public realm. Diversity of urban form is perceived as an important part of the city life. Repetitive character of housing forms could have impact on the character and ambience of the city space, and, as Adams notices, lack of *genius loci* and lack of identification with buildings (Adams, 2009). Diversity will be observed through principles of alternation of horizontal and vertical masses, various numbers of floors and various number of different housing form types. Criterion of Integration includes spatial arrangement and configuration of streets, blocks and buildings. As Jenks and Jones emphasize, the configuration of network in terms of block size, location and connectivity can affect the way how city is functioning (Jenks & Jones, 2010). In addition, connectivity and permeability, as Cowan claims, determine the nature and the extent of routes which could further influence on how lively and well used the space is (Cowan, 1997). Integration will be investigated through the principles of fragmentation and division of space, both on the macro and micro level. We will attempt to investigate it using space syntax step depth for analysis of block integration in network of New Belgrade and connectivity and visibility for the integration on the city block level. In relation to the issue of integration, Hillier explains that the analysis of the minimum number of turnovers receives 60 to 80% overlap between the spatial values and the observed trends, and these maps are the basis for a large number of studies (Hillier, 2008). Third criterion refers to the quality of public realm. Adams explains that high quality of public realm attracts people, activities, enhances economic performances, fosters pride of community and increases the potential of social inclusion and cultural activities (Adams, 2009). Indirectly, pride of community could have impact on the reduction of vandalism and environment protection. Selected principles include presence of local public facilities and services (school, health centres, kindergartens, universities, cultural centres, etc.), gathering spaces, recreational and green areas. Based on the analysis of the most essential characteristics of the city blocks in New Belgrade, it is concluded that typology could be created based on the three above mentioned criteria, where each of them has two possibilities: Criterion of Diversity of urban form (heterogeneous or homogenous urban form), Criterion of Integration (high or low level of integration in New Belgrade matrix and low inner integration) and Criterion of quality of public realm (high or low level of public realm).

Forming of Types and Typo morphological analysis

Based on the three proposed criteria, there is possibility to create eight types of the residential blocks in New Belgrade. Proposed typology possess specific limitations in terms of the fulfilment of all the principles within criteria, but further increase in number of criteria would lead to a greater number of types, which is not feasible if we have in mind that there are forty-two housing blocks in total. Despite the stated limitations, chosen criteria could show us the most important characteristics of residential blocks, and help us understand their differences and complexity which require different approach in design practice which currently implies densification which treats blocks equally. Typology of New Belgrade residential blocks was developed on the basis of analysis of the principles and patterns of all the blocks, except the ones with specialized functions. For each block, we have analysed block shape and dimensions, block area, area under built structures, occupation index, number of floors, the presence of dominant structures and gathering places, a number of different urban form types, public facilities and year that block was built. Besides these physical and functional characteristics, we analysed step depth (the shortest path with the least number of turnovers), connectivity and visibility in each of the blocks.

The overall analysis was necessary for creating parameters for the qualitative principles such as connectivity, visibility and step depth that could be grasped and evaluated only through comparative analysis between all of the residential blocks in New Belgrade. After the morphological analysis was conducted, we determined the values of the criteria and did the survey based on previously defined types. In the context of the diversity criterion, we have determined that a heterogeneous urban form implies minimum three different numbers of floors and minimum three different housing types. As we previously stated, criterion of integration was researched through the space syntax. We determined variations through the number of cases in which it was possible to reach observed block from other ones

with less than six turns. Accordingly, low integration in city level was perceived for the results ranging from 0 to 25 in total of 42 cases, while high integration was counted as such for all the values over 26 (presented in figure 1 as yellow, orange and red lines). Additionally, while analysing integration through connectivity on the block level, we considered cases as high connectivity ones when there were minimum three streets around the blocks that had feature of the medium, higher or very high level of connectivity - more than twelve connections (presented in figure 1 as yellow, orange and red lines).

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 SUSTAINABILITY LESSONS FROM VARNICULAR ARCHITECTURE**

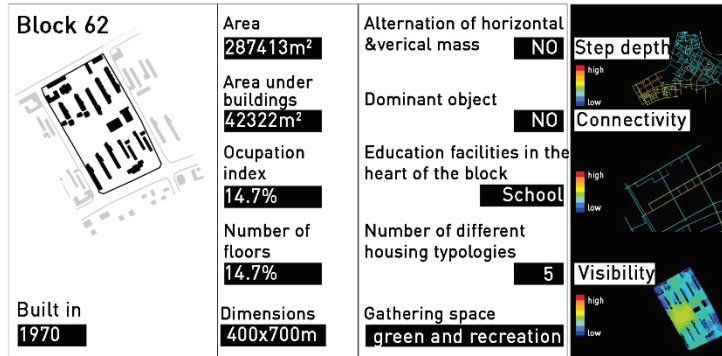


Figure 36 Segment of the Typo morphological analysis – Example block 62

Table 12 Types distribution

Type	Name of the block	Total No.
Type 1: Heterogeneity / high quality public realm/high integration	38; 37; 21; 11c; 33; 28; 29	7
Type 2: Heterogeneity / high quality public realm/low integration	45; 70	2
Type 3: Heterogeneity / low quality public realm/high integration	19; 11a; 2; 8a; 9a; 19a; 31; 30; 11b	8
Type 4: Heterogeneity / low quality public realm/low integration	/	0
Type 5: Homogeneity / high quality public realm/high integration	67; 7; 7a; 8; 34; 23; 22, 1	9
Type 6: Homogeneity / high quality public realm/low integration	61; 62; 63; 64	4
Type 7: Homogeneity / low quality public realm/high integration	39; 12; 24; 25; 4; 3; 26; 70a; 32	9
Type 8: Homogeneity / low quality public realm/low integration	71, 72, 44	3

For the criterion of public realm, we considered cases as high level ones when there was at least one public facility and two gathering places in the block perimeter. As a result of parameters determination and according to all criteria, we can conclude that only seven types can be recognized (Table 1). The types 1, 3, 5 and 7 are the most common ones, while others are appearing to a much lesser extent (Type 2, 6, 8) or not present at all (Type 4). When we analyse the spatial distribution of types, we can conclude that types are unevenly distributed and that only type 2, type 6 and type 8 blocks are spatially linked (Figure 2). In the following part of this paper, we will observe transformations of edge blocks in space and specific characteristics in relation to the previously defined types.



Figure 2 Spatial distribution of types

Analysis of the transformation of the edge block

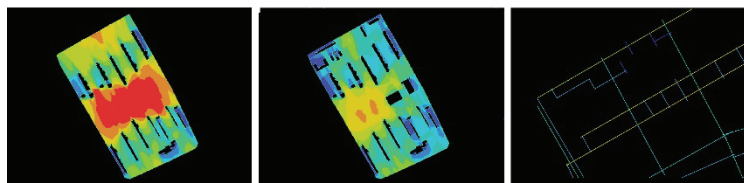


Figure 3 From the left: Block 62 before densification, Block after densification and Connectivity diagram

After the overall typo morphological analysis we focused on the edge blocks (71, 72, 61, 62, 63, 64, 37, 34, 4). Following the example of block 62 we can notice that due to the spatial arrangement of the urban form in these blocks, transformation is happening both on the narrower block sides situated on the better connected streets, and on the central area where the value index of the connectivity and visibility is the highest (Figure 3). On the other hand, as a result of low level of integration at the macro level and block size (400x700m), the blocks are functioning and developing as a separate entities in contrast to New Belgrade, creating a linear centre among each other in the core of the blocks. On a positive note, high rise buildings and high quality of urban realm do not allow densification between the buildings. Through the analysis, we recognized that all of the blocks classified under the type 8 were built after 1985, when the ideas of Modern movement as well as the power of the socialist government system were losing its influence over urban development in Belgrade. These blocks can be perceived as blocks on the “edge”, both in the spatial disposition within the structure of New Belgrade and in its architectural design with no public facilities or public spaces, thus producing place with low quality of urban form and urban life.

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CONCLUSIONS**



Typology allows us to look at the certain rules and ways in which the transformation and densification is going on and to adopt appropriate strategies in the field of planning in order to enable high quality urban form and urban life. Our main conclusions about the possibilities of integration of space syntax model in typo morphological and understanding the transformation of urban form and urban life of the edge blocks of New Belgrade research are presented in three main statements.

1. *Space syntax allows the analysis of integration between urban form and urban life and not just the physical closeness of the elements within the structure.* When we analyse the spatial distribution of types, we can conclude that, the quality of urban form and urban life is related to the quality of integration in the network and connectivity on the block level, while position determines the possibility and exposure to the transformation.

2. *Space syntax, visibility and connectivity analysis allow understanding of the existing built environment, transformation and indirect exposure to the transformation.* These analyses enable the understanding of the phenomenon of densification of edge blocks. In relation to this, we have identified that the most number of edge blocks are exposed to densification both on the sides and in the central part of the block due to lack of public content (type 6), while the rest of the edge blocks are barely at all exposed to transformation (types 5 and 8).

3. *Space syntax is a relatively simple tool for visualization and monitoring of the effects of each spatial transformation, understandable to different groups of stakeholders involved in the process of urban transformation.* The space syntax analysis allows understanding and visualization of the changes that densification may produce to a street network or block visibility and permeability. This is a very significant fact, both for the analysis of the already undergone transformation and for the decisions that can be taken in the future.

In terms of future strategies and rules for urban transformation, we have to take into account all criteria: diversity, integration and quality of public realm. From the analysis, we can conclude that there is interdependence between the quality of the public realm and integration. The integration brings high quality of pedestrian network, which must not be interrupted in the process of planning of new spaces because of its importance, both on the block level and on the level of New Belgrade. On the other side, high quality of urban realm does not allow densification between the buildings. Accordingly, urban transformation and design of new residential blocks on the edge have to provide high quality of public realm through local public facilities, services and activities in order to stop unplanned and uncontrolled densification. Additionally, heterogeneity in urban design has impact on the character and ambience of the city space and thus has impact on the quality of urban form and urban life and has to be considered as the integral part of urban design.

The paper concludes that above mentioned possibilities of the space syntax application in typo morphological researches are of great importance for urban design. In this process, further research and continued detailed elaboration of these issues through the series of analysis on site, are necessary for establishing planning control over new construction and increasing the quality of urban form and urban life.

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TOPIC VIII & IX:

**CULTURAL PATTERNS AND SENSITIVITY;
SUSTAINABILITY LESSONS FROM VARNICULAR ARCHITECTURE**

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