

Urban Planning

HISTORICAL CITY EVALUATION IN THE CONTEXT OF MORPHOLOGICAL THEORIES (ISTANBUL, LAST OTTOMAN PERIOD)

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Abstract

Introduction: The historical city core of Istanbul developed under the influence of the religions and cultures that were brought in during the Roman, Byzantine, and Ottoman periods. This study investigates the effect that the 19th-century modernization, urban arrangements, road system changes, and sociocultural textures had on urban morphology on the Historical Peninsula of Istanbul, which had symbolic value. We review the morphology of Istanbul during the 19th century, a historical period when the city was undergoing new development and restructurization. We also develop an analysis methodology in order to examine this process in more detail, by following the methods of the researchers who carried out morphological studies. **Purpose of the study and methods:** In our research, we apply three different urban morphology methods, examining the development of the city, its effects on the urban tissue, and the newly developed and demolished areas. Firstly, we investigate historical plans in line with the Conzenian method and discover the urban tissue typologies of the historical city by using the Caniggia approach. Furthermore, we use the space syntax method developed by Bill Hillier in order to interpret the changes, differences, and similarities in the urban form, and draw axial lines to illustrate the integration of settlements and street systems shaped in the context of the relationship between people and space. **Results:** We discover the effects of development practices on the morphological structure of spaces and show how urban forms and cultures intertwine over time.

Keywords

Urban morphology, urban development, space syntax, urban typology, urban tissue.

Introduction

Cities are structures that live (are born, grow, become damaged, and die, partially or completely). They keep evolving and responding to the development of local geography. It is a fact that most life systems are centered around people. There is much diversity in both the observable general forms (circular, linear, or fractal) that shape the life system structure, and the appearance of the street systems (organic or inorganic) formed by buildings, spaces, and many other features (Courtat et al., 2011).

According to Gauthiez (2004), various methods have been used in the theory and analysis of urban morphology since the end of the 19th century. The contribution and importance (especially in terms of architectural topology) of the Italian urban morphology schools, first that of Saverio Muratori and then of Gianfranco Caniggia, as well as the contribution of the English school founded by M. R. G. Conzen, are well known today. In his works, Saverio Muratori researches various values inherent to urban formation stages: from buildings in historical city centers where the texture was

compact, to the suburban, town, and district scale, where the texture was sensitive to a wide range of solutions. Caniggia tended to emphasize operational aspects by simplifying Muratori's theoretical system. More precisely, by focusing on the typo-morphology of the special architectural entity (which is far from theory), he examined the change of the core elements, such as type, texture, and shape, in the formation of the structure over the course of the historical process. The aim of his studies was to gain an understanding of the above (Cataldi et al., 2002). According to Conzen (1975), who focused on the term «morphogenetic» to describe and explore the living character (physical, social and economic change processes) of settlements such as towns and cities, urban morphology is inherently concerned with distinguishing, characterizing and explaining urban landscapes in accordance with their geographical origins. Based on Whitehand (2001) research, urban morphology can be demonstrated by working with the Conzenian approach of sharp analyses and their effective integration, which can answer and express various questions, such as how

the urban landscape has developed historically and how it is linked to the fabric of urban history. The (Conzenian) theory formulated by Conzen (1960), as well as Conzen's research, shows that identification of urban areas consists of three components (the morphogenetic method, cartographic representation, and terminological sensitivity). Within this hierarchy, there are three components of the urban form, namely the ground plan (streets, parcels, and block plans), the building form (three-dimensional form), and the land use. The Conzen method concerns not only the layout of towns and cities but also their other local combinations of these «three form components», with tiny disaggregated homogeneous cells that combine to form the urban landscape.

Urban morphology studies have drawn the attention of many researchers, who are interested in analyzing the development of cities in terms of the historical approach. They have expressed their understanding in different ways and from different perspectives. Known as a new and innovative theory that appeared in the quantitative analysis of spatial configuration in the late 20th century, «Space Syntax», developed by Bill Hillier (1984), explores the structure of cities within a morphological approach by attempting to measure spaces. This theory is based on the philosophy of Henri Lefebvre (1901–1991), who argued that spaces are a social entity and that space needs social interpretations of its definition (Lantz, 1991). This study highlights the importance of morphological studies, using the Historical Peninsula of Istanbul as an example. We present a comparative study of different morphological approaches to urban form. The period of world history selected for this study is very interesting and complicated. We look at the Byzantine traces in Istanbul and examine how the city evolved during Turkey's modernization process. We discover both urban specifics and the new conditions created in the city. Within the scope of this study, we analyze the oldest settlement area of Istanbul using different methods in line with urban morphology, specifically the Conzenian and Caniggia theory and the space syntax theory. The changes, differences, and similarities in the urban form are interpreted through GIS and cartographic maps. The aim of the study is to investigate the emergence of urban forms by summarizing the historical periods and to reveal the interactions of urban development with urban textures of spaces.

Methods

The methodology is derived from the examination of three urban morphological approaches. The first stage of our morphological analysis will be based on the Conzenian practice. Afterward, we will employ a typo-morphological analysis based on the Caniggia approach. This will be followed by new research, where we apply space syntax to

examine the changes in the urban morphology of the Historical Peninsula. While explaining the historical development process of the urban form and the results of its spatial internal structure, we investigate the morphological character and emphasize the three types of morphological methods in the analysis of the urban texture.

M. R. G. Conzen (1960) divided (both in his theory and his later works) the historical urban landscape components of the city into three basic forms, which can be described in simple terms as: the nature and intensity of history, the land use, and the built environment. With an integrated approach, this concept emphasizes a hierarchy in which the land use and the building forms are included as parcels within the framework of the city plan. The Conzenian method suggests that these three complexes can be combined at the local level as the smallest cells of the urban landscape to create morphologically homogeneous areas. According to Larkham (1998), urban units create a hierarchy with a combination of these homogeneous cells, which provides a reference for urban landscape changes. As a follower of Muratori's work, Caniggia focuses on the creation of typo-morphology, stating that the city is not a static object but a process. He further develops this idea by studying the historical process of the shaping and transformation of cities. In the historical morphological analysis of the Historical Peninsula of Istanbul, the examination of urban morphological development in the structure of cities through only the Caniggia approach can set the limits, while Conzen's clear definition of the city plan and its elements and development in time as an analytical tool constitutes a starting point for our typo-morphological study. Conzen and other researchers focused their work on the physical form and development of cities. Although the theories proposed by the researchers were relevant to the formation of the city, they did not touch upon the social relations in the urban space. However, philosophers such as David Harvey (born 1935) and Henri Lefebvre (1901–1991) focused on this aspect and developed social cognition theories on urban space, aiming to understand the social meanings of the urban physical form.

Space syntax is a theory that emerged at the University College London between the late 1970s and the early 1980s. It was developed by Hillier and Hanson (1984) to describe and analyze the spatial forms of the built urban environment. The general idea of this method is to divide urban spaces into parts that are the starting points of the human experience, and then turn these parts into maps or graphs and subject them to numerical analysis. Bill Hillier defined space syntax in urban analysis in three ways. Firstly, it is a set of techniques used to examine the spatial textures of buildings and cities. Secondly, it is based on the belief that there is a

mutual relationship between the social structure and the urban space since the latter has a dimension that affects the social structure and even the different layers of this structure. Thirdly, it makes it possible to create a series of theories by trying to «read» a city and its different components by bringing together the social, economic and conceptual relations between the city's physical components (Hillier et al., 2010). Thus, by analyzing the topological relations of these aspects, which can be expressed through the description of space based on human experiences, as well as by applying the network/graph theory, we can divide the urban and architectural spaces into two different entities: «integrated» or «segregated».

Results and Discussion

Historical Peninsula of Istanbul. The multi-layered historical urban evolution of Istanbul has been driven by the city's geography, topographic features, and the trends of different civilizations. Therefore, the Historical Peninsula of Istanbul has been shaped by different urban layers where we can observe examples of different urban forms. The city of Istanbul was a Greek settlement in the 7th century BC and became a Roman colony around 100 BC. Later on, it became the capital of the Byzantine Empire and reflected the original structure of the Roman cities. After the Ottoman conquest, the increasing Muslim community of Istanbul brought their own way of life to the city; therefore, the urban form was reshaped by this sociocultural system. The cosmopolitan nature of the empire is reflected in the city's active growth process during the Ottoman period. Ethnic groups were one of the main sociocultural assets of the city and were allowed to live in all districts during this period. The creation of new districts was based on the «neighborhood» system. A «neighborhood» was the smallest administrative unit of the Ottoman land management system (Celik, 1988). These developments, which reshaped the urban structure of the Historical Peninsula, also brought new land uses. Both the new city plan and the land use transformations directly affected the organic growth of the city, specifically its neighborhoods, religious centers, and squares.

This study focuses on the origins of the old urban transformation in the Ottoman Empire between 1800 and 1900. In a broader context, our research is based on the evaluation of this transformation's impact on the urban form during this period, which is an aspect of studying the Historical Peninsula of Istanbul, the capital city of the Ottoman Empire. In the 19th century, when different regions underwent systemic transformations, the Ottoman city of Istanbul was divided into three main central areas. The «Old City» was the largest area, as well as Istanbul's administrative and commercial center. Galata was a non-Muslim settlement and trade center for foreigners, along with its extension, Pera. Uskudar was the oldest residential area on the Asian

side. Apart from this main center, other prominent areas included Eyüp, which was a sacred settlement for the Muslim communities, and the residential areas on the European side, Kasımpaşa and Beşiktaş. In addition, there were agricultural areas and various villages and settlements scattered along the Bosphorus shores of Istanbul. As we can understand from the above, the urbanization efforts of the Ottoman Empire started in the 19th century. The Ottoman intellectuals who visited European cities during this period became the advocates of designing Istanbul as a European city, influenced by the urban planning movements in Europe (Baysun, 1963). This goal was to be achieved by adhering to specific urban planning guidelines: that is, the «ideal», regular urban fabric with wide roads in a grid plan, surrounded by rectangular or square building plots.

Evaluation of the Developmental Direction.

M. R. G Conzen's morphological approach, which focuses on the historical development of cities, has been one of the most important concepts that explain the concept of the morphological period. Conzen divides the urban environment into three parts: the city plan, the building texture, and the land and building use (Conzen, 1960). These three components of the urban fabric include concepts based on urban development processes. The permanence of these three key factors that make up the urban environment also changes over time. The city plan, or the ground plan, is useful for «reading» the development of the city. Out of the urban form components, it is the most resistant to change.

The Historical Peninsula has different morphological periods. During the Ottoman period, it reached urban prosperity, which is sufficiently documented in cartographic records. The historical data illustrates the division into morphological periods according to historical research. In the 19th century, researchers that worked between the last period of the Ottoman Empire and the early Republican period adopted modern approaches to the urbanization process. At the time, the plans for the changes that would later create the morphological structure of the city in the urban planning aspect also began to emerge. In particular, major fires were common due to the multi-layered urban texture of the Byzantine period and the narrow and unplanned street structure of the city of Istanbul; so, as a result of the planning decisions, the area changed, which led to a great evolution in the urban model (Crane, 1988). These efforts resulted in the first generalized rules for the urban fabric, which had not been present in the urban structures built in the 18th century AD. As mentioned before, Ottoman intellectuals wanted Istanbul to meet the standards of European capitals, such as Paris, Vienna, and London. In an attempt to give a Western image to the Historical Peninsula of Istanbul, the original urban structure of the Ottoman

Empire, with its dead-end streets, public and empty spaces, was rapidly transformed and completely changed.

The urban structure turned into an orthogonal layout, causing the formation of new settlements and public areas for the rapidly increasing population. During this period, the public spaces that used to be part of the old Roman layout were replaced by the «courtyards», or in other words, new public spaces within the architectural structure of mosques and other complexes. These urban courtyards now constitute the main nodes of the city. In the periods of Islamic rule, the structure of the ancient Roman period, which consists of diagonal, straight streets that open into squares, was replaced by an organic structure. To summarize, radical changes took place within the holistic morphological structure of the city under the influence of different periods and cultures. The shaping of the urban form in the eastern suburbs (the Asian part of the city) began in 1850. The borders of the Istanbul city morphology lie on the port side of the eastern suburbs.

Morphological Forms of Urban Tissues and Urban Blocks — (18th–19th Century). Typomorphological studies focus on the physical and spatial structures of cities and define the urban form by adhering to the detailed classification of the types of buildings and open spaces. Buildings and spaces can be classified depending on the core type of their character. According to (Moudon, 1997), these different types translate into typologies of buildings and the associated open spaces that define the essence of the buildings' fabric. Caniggia, a follower of Muratori, created a method for describing the components and types and how they developed

throughout the historical evolution of the forms. He called this method «procedural typology». Caniggia examines the urban tissue by looking at the relations between the parcels and roads, paths/routes, and focal points created in the city.

In the context of our research, we analyze the six historical morphological settlements that the urban typo-morphology of the city of Istanbul split into at the beginning of the 19th century:

a) The settlement in the historical city center was at the core of Istanbul's history and spread from the center of the Hagia Sophia mosque. During this period, mosques seemed to play a central role, while the rest of the city was restructured around them and divided into a series of segments. The city blocks had irregular geometric shapes and were surrounded by very narrow streets and few green spaces.

b) The Galata settlement was connected to the port, and its urban structure resembled the appearance of the Mediterranean colony cities. Within the urban structure of Pera, the area was divided by the main thoroughfare and the major roads were linked by the square, which connected the thoroughfare to Galata. The urban tissue showed a similar structure: namely the narrow street networks, either regulated or radial. Many streets were randomly connected to the central point.

c) The Uskudar settlement had the main avenue structure parallel to the harbor; the blocks were also shaped parallel to this avenue and then became more scattered when moving inland. The further, inland part of the settlement had developed urban textures consisting of irregular geometric shapes surrounded by narrow streets and few

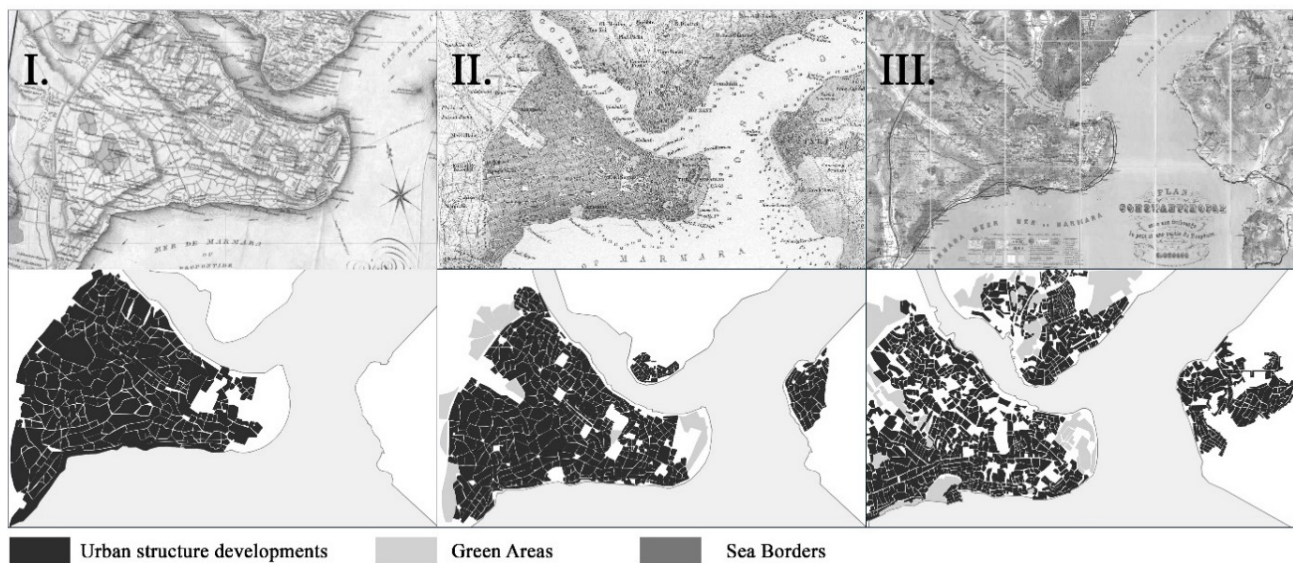


Figure 1. Morphological development analysis with the help of maps

I. Morphology of the urban structure, based on Kauffer and Joseph de Hammer's map of 1813

II. Morphology of the urban structure, based on Barry Lawrence Ruderman's map of 1855

III. Morphology of the urban structure, based on Carl Stolpe's map of 1882–1900

green areas. However, the street flow structure changed direction frequently depending on the topography.

d) The Eyüp settlements were characterized by low density and irregular development plots scattered through the terrain. The typical narrow

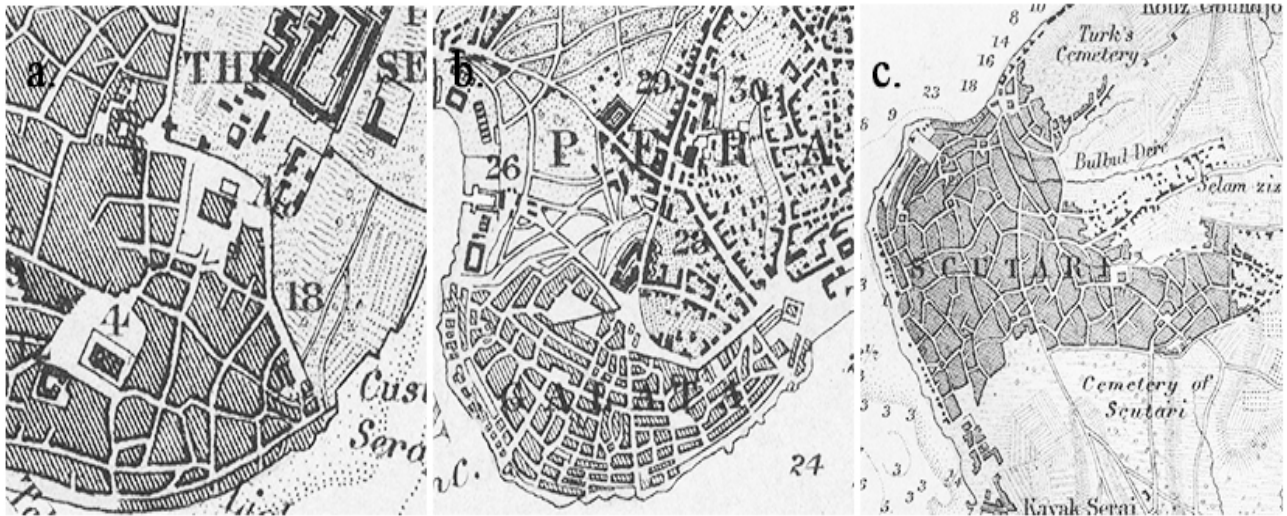


Figure 2. Typo-morphological types of Istanbul's three main central regions, based on François Kauffer's map (1751–1801)

URBAN BLOCKS / FORM BASED CLASSIFICATION

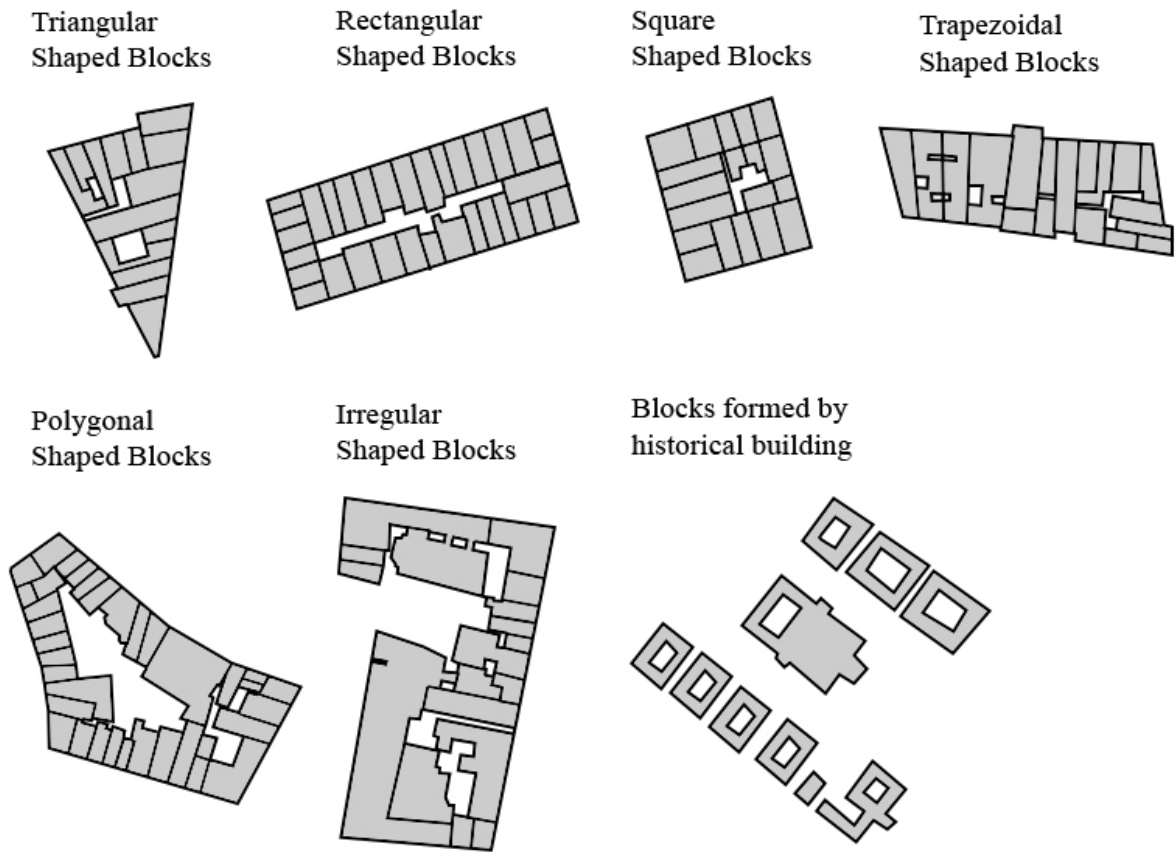


Figure 3. Typo-morphological types of Istanbul's three areas, excluding the main centers, based on François Kauffer's map (1751–1801)

street network was perpendicular to the Golden Horn.

e) The tissue was developing irregularly due to preexisting empty plots or agricultural plots, and thus parcels were arranged at random: sometimes radially and sometimes linearly.

f) The parcels of different types, textures, and sizes that emerged along the harbor were also divided into different areas. The Beşiktaş development was the internal north extension of the original fractal form and laid parallel to the port lines. The existence of irregular empty parcels in the area led to the creation of an organic structure, corresponding to the fractally arranged settlement parcels.

g) Settlements that reflected the historical characteristics of Byzantium were located closer to the city walls. The parcels developed from outside the walls towards the city. The city's defining old narrow streets and remaining parcels had various irregular geometric shapes. The empty back side of the city walls had parcels that were used for agricultural purposes. The agricultural blocks also had irregular geometric shapes and were surrounded by very narrow streets that had a radial structure and spread out towards the walls, as they were meant to provide access to the interior of the city.

The tissue, which depends on the characteristics of the streets and blocks in general, as well as on the character it creates, can be defined within a block or a land plot, unlike other parcels and street structures. According to Kropf (1996), street/block patterns' characteristics are elements that will persist over time in identifying these textures. Moreover, they tend to preserve historical evidence and are suitable for historical interpretation.

The urban issue in Istanbul varied, in line with the modernization movements that started in the 19th century. The triangular and trapezoidal form of

the blocks, derived from the organic and radial street systems, along with some fractal system features, directly affected the different shapes of the urban blocks; sometimes, rectangular blocks were formed. Thus, the parcel structures shaped by blocks have had a positive impact on the city's «readability», providing today's researchers with opportunities for interpretation. The religious buildings in the old city center in particular have created individual parcels, while also affecting the formation of the geometric shape of the blocks (reference or corresponding axis) located in their immediate surroundings.

Sociological Development of the Historical Peninsula of Istanbul. The space syntax theory, which is used to investigate the relationships between society and space, provides a method for discovering facts about the spatial position of buildings and settlements and for gaining an understanding that human beings are part of the spatial configuration. This can be achieved not only by revealing differences in the morphological structures of the man-made space model but also by defining the differences in the relationships between different constituent elements and events. Thus, space becomes a strong determining factor and a powerful tool for creating spatial exploration through the transfer of these differences and culture to building forms and settlement forms (Hillier, 1996). Space plays an instrumental role in organic settlements. What shapes the structure of space is human movement. The types of settlements where land is used extensively show different characteristics than cities that are shaped by buildings of symbolic importance, where space is more organized and less used. Both of these spatial structures have been shaped in the city of Istanbul, due to its historical background as a blend of many different cultures. During the Byzantine period, the symbolic city structure was dominant and was



Figure 4. Classification of block types on the Historical Peninsula (1887–1891)

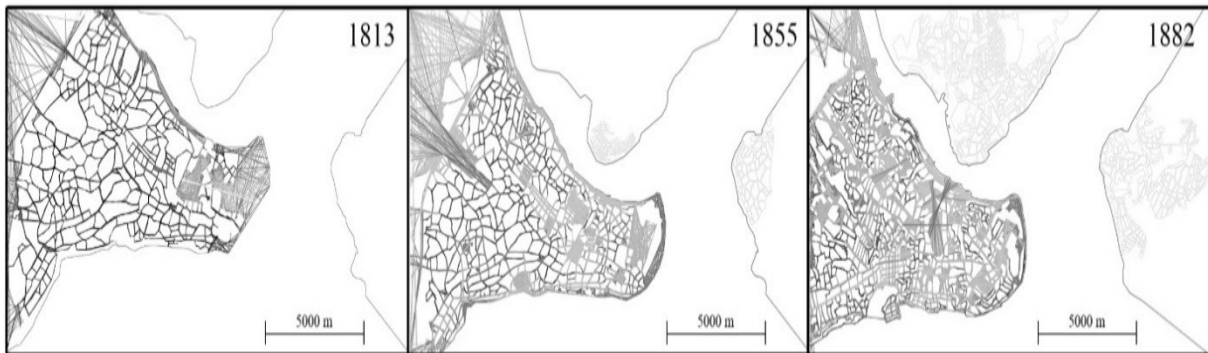


Figure 5. Axial maps of the Historical Peninsula between 1813 and 1882. The lines are shaded in gray-scale, corresponding to the integration of the city. The most integrated spaces are shown in dark gray and most segregated spaces are shown in light gray

represented by the main axis, connecting the main forms that were considered symbols, as well as by the specific geometry. Although the city retained its symbolic structure under Islamic rule after the Ottoman conquest, the ceremonial functions of the main streets lost their importance due to the lack of geometry, as compared to the Byzantine period. However, the 19th-century renovation movement, which preserved Istanbul's character as the capital of the empire, caused the main streets to gain more importance. Other results of the renovation included the establishment of new settlements, the construction of new transportation routes, and the creation of new monuments. As such, the city still remains symbolic, although this depends on where the Islamic lifestyle is particularly evident (Kubat, 1999). The basic theoretical argument of space syntax is based on analyzing the spatial structures of settlements to find out which information can be revealed about the respective social norms; therefore, we have been able to use this method to explore the nature of Istanbul's morphological structure and the spatial and social relationships within its historical areas. Layout plans are represented by axial maps, which are very useful for seeing and experiencing a city and analyzing the patterns of its settlements syntactically. Thanks to these maps, the axial connections are accessible on a global scale, and it is possible to obtain a visible and accessible axial line. The size of a settlement's open-space structure is measured by the number of axial lines. In this context, we adopted the space syntax method in order to understand the spatial relationships within the Historical Peninsula and to read the city objectively.

Integrated axial line sets can be obtained with axial line maps. The spatial structure size values depend on the percentage of selected areas and the size of residential areas. The data obtained through space integration shows how many paths

and turns one must take to go from a specific area to all other areas within the settlement system. Any additions or deletions within the settlement can also be deduced from the information obtained from this data. Moreover, integration data helps identify the area's most integrated and most segregated parts. In this context, we compared three axial maps from 1813 to 1882 through syntactic evaluation to define the changes during the 19th-century modernization of the Historical Peninsula (Figure 5). An examination of the space syntax data revealed that the lowest integration value appeared in 1813. Towards the middle of the 19th century, the city structure condensed towards the inner Old City, and the number of streets increased. Moreover, the street systems that emerged due to the interventions into the urban structure created new squares, which made the city less homogeneous. Although the average percentage of integration has increased over time, it can still be said that, since the street systems are geometrically irregular, the overall integration of the city has not developed and the city has become more segregated. There is another reason why the city is now less integrated: during the modernization efforts, the grid street system was deployed only in certain parts of the city, while the other settlements were allowed to develop organically.

Conclusions

The theories and applications of urban morphology allow researchers to express their understanding in different ways and from different perspectives by synthesizing comparative morphological studies. Their research covers the fields of geography, architecture, archeology, history, science, and philosophy, all of which are seeing extensive interdisciplinary discussion. In this study, we examined the methods of researchers working on urban morphology, particularly with the aim to discover the forms of cities. We focused specifically on the Conzenian approach, the process typology

approach, and the Space Syntax theory, which was recently developed by Bill Hillier. In this context, we attempted to discover the morphological structure that 19th-century innovations brought to the historical city of Istanbul, by using historical maps. In general, there were two types of urban morphological changes on the Historical Peninsula of Istanbul. At first, during the Roman and Byzantine periods, the city had a symbolic morphological structure with regular geometry, followed by settlements with more irregular structures, which were formed under the influence of Islam after the Ottoman conquest. In the

19th century, the Ottoman Empire was influenced by the Western city culture; that was when European city arrangements were introduced to the parts of the city affected by fire or to the very sophisticated districts like Galata. However, the Conzenian and Caniggia theories reaffirm that Western-style radial arrangements are not a suitable solution for every neighborhood of a city like Istanbul. One of the most important factors affecting the structure of cities is time. Specifically, human contributions and street systems are the most effective and permanent factors in determining these changes.

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