

## SPACE SYNTAX METHOD IN CASE OF THE URBAN FRACTURES BETWEEN THE HISTORICAL ARCHITECTURE AND THE SOCIALIST ARCHITECTURE IN THE ROMANIAN CITIES

**Abstract:** *The urban fractures between the historical architecture and the socialist architecture in the Romanian cities is a wide and significant phenomenon especially because the actual planning strategies do not address this problem. There are strategies for the protection of the historical buildings, there are strategies for the development of the socialist buildings, but not for the urban fractures as a whole. The paper presents an advanced digital methodology for the multi-criterial analysis of the urban fractures in order to discover ways of defining and regenerating them. In fact, the brutal interventions which led to the urban fragmentation of the Romanian cities could be researched and solved through computer based methodology.*

**Key words:** *urban fractures, space syntax, architecture, social interaction, cultural identity.*

### 1. INTRODUCTION

1981 Bucharest. 272 074 sum of historic buildings demolished. 2955 families (7278 persons) evacuated. These numbers represent only one statistic of a phenomenon that has generated deep fractures between historical architecture tissue and the socialist architecture.

Marginalization was the political purpose that generated a conflictual urban relation that cannot be exceeded using existing planning tools. Socialist texture was designed assuming total replacement of the historical architecture. Thus, the historical buildings were disconnected from the rest of the city being bordered by screens of socialist architecture.

In the context of research, urban fractures are perceived as a phenomenon belonging to the fragmentation of cities. Their particularity is represented by their specific genesis, burdened by a negative, brutal history. As a consequence, the urban fractures between the historical tissue and the socialist tissue in the Romanian cities bear the imprint of an unnatural overlap, some interventions aimed at annihilation of historical tissue. The result is that of a reminiscent texture, in which the coherence of the paths is lost, the component elements lose their meaning, the discourse is interrupted.

The problem of the urban fractures is amplified by the inefficiency of urban planning tools in their approach. Although their presence in Bucharest and in other 29 Romanian cities [3] is altering the life quality and cultural identity, however no effective urban planning tools that address directly these fractures have been developed. There are methodologies that address the protection and promotion of historical tissues; there are methodologies for the development of the socialist tissues, but not some to address the confluence areas between the two.

Is it possible to conceive a methodology to address these urban fractures? Is it possible to establish a set of intervention criteria that would address directly to the components of urban fractures? If the built elements of these urban fractures are part of the tissues for which

there are working methodologies, the opportunity for development lays on the voids?

In order to develop a framework of analysis dedicated to these fractures, it is necessary to investigate them by objective methods that reveal the real way of functioning. The multi-criteria analysis of urban fractures between historical and socialist tissue will be based on space syntax theory. This socio-spatial theory has been developed based on the paper *The Social Logic of Space* written by Bill Hillier and Julienne Hanson in 1984. The space syntax theory is based on the premise of the direct links between the city's movement flows and the spatial configuration. In essence, the spaces are investigated according to their ability to allow the coherent movement of urban actors, the underlying capacity to generate social interaction.

Through the research paper, it is intended that urban tissue fragments be defined in relation to spatial and social reality. It is not enough to analyze them by classical methods, based on morphological characterizations; to determine the intensity of their dysfunction, the relationship between the receptors and the urban realm elements should be captured. Thus, the spatial syntax method is used in research due to the ability to interpret data from the point of view of social interaction affirmed by many specialized studies. In addition, this method has proven its effectiveness both for the analysis of an existing urban space and for the decision-making process. This argument is also important for the proposed approach

### 2. LITERATURE REVIEW

Urban fragmentation is an intensely studied phenomenon in recent years in capitalist cities or in the global southern and far eastern countries. In the proposed research, urban fractures between historical and socialist architecture will be addressed as the confluence areas of urban fragments in the post-socialist city.

Specific literature captures urban fragmentation as a complex process, tackled on several levels of relevance. Important for the urban fractures are the following directions:

the spatial approach in which the city is perceived as a set of fragments with different spatial characteristics [1].

- the social approach in which fragmentation is addressed in terms of differences in services and quality of life [16] or in terms of social connections between two different urban fragments [20].
- the cultural approach where fragmentation can refer to different urban identities present in the city [15].
- administrative approach where fragmentation is referred as discontinuity and lack of integration of urban policies [17].

Urban fragmentation in post-socialist cities has special features. Compared with the Western European city where economic restructuring and the phenomenon of globalization have led to social segregation [16], in the post-socialist city, the centralized policy and based on uniformization concepts determined the existence of spatial fragmentations between the historical center and the residential districts [19].

### **3. SPACE SYNTAX METHODOLOGY - CONCEPTS AND MEASUREMENTS**

Apparently the elements of the two tissues are in a real contradiction, exerting permanent pressure on each other. Signs of dysfunction of these types of fractures can be noticed *in situ*. The advanced degree of physical degradation of historical buildings, the presence of abandoned spaces, the streets congested by the parked cars are some of the perceived dysfunctions. But the worst form of dysfunction is the lack of social interaction.

The perpetuation of these dysfunctions actually threatens the elements of historical tissue, risking the loss of the original substance and important fragments of local history. This rupture is generated by the highly contrasting nature of the built elements. However, reality shows that they are juxtaposed and are served by the same infrastructure. Therefore, for research, it is essential to recognize this type of fracture as a stand-alone entity, as systems that have a particular configuration but which must function as a whole.

The proposed method seeks to obtain a strategy of working, analyzing and intervening for these fractures so that it would be possible to resuscitate the areas with historical architecture in order to safeguard the local identity. It is believed that by addressing these fractures as a whole, the space syntax method could be used to reconnect the broken elements with the main streams of the urban movement. Thus, the historical tissue behind the socialist curtains will not only have a residual character but will be reintegrated into the city's life.

The proposed research approach can be described through several stages:

(1) analysis of the urban fractures based on complex research methods - digital and empirical- in order to capture the phenomenon at all relevant levels;

(2) identifying similar urban fractures and urban strategies that have worked for these fractures;

(3) Taking these strategies and adapting them to a model that effectively addresses urban fractures in Bucharest.

These fractures have not been analyzed as such, no direct studies have been applied to address the severity of their dysfunctions. The analysis based on space syntax theory was chosen due to objective, quantitative approach methods and, above all, due to the conceptual combination of spatial configuration and social interaction. The social dimension of the theory is the one that can capture the true nature of the fractures, it can define their specific mode of operation. Practically, even if these fractures are composed of contrasting tissue elements, they may have, over time, formed as stand-alone systems.

Within the spatial syntax theory, the city is perceived as a defined configuration not only in terms of physical connections, but as a way of linking each element with all other elements of the system [2]. Practically, within the spatial syntax theory, the configuration is perceived as the main generator of the movement within the city and, implicitly, as a determinant element of social life. Thus, the elements analyzed in the spatial syntax theory are the street routes, the interstitial spaces underlying the configurations.

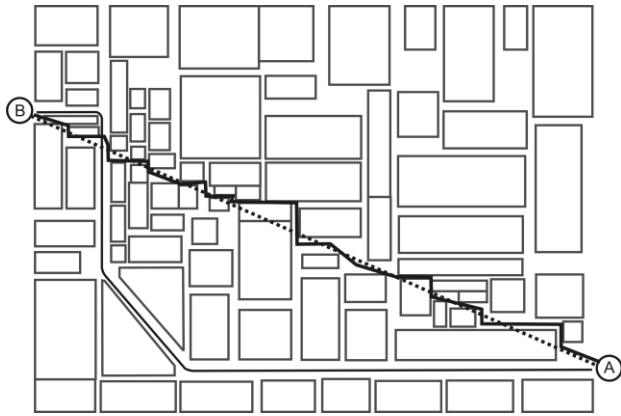
This is important for justifying the chosen method. As discussed above, in urban fractures, the elements of the built-up tissue can not be the subject of regenerative interventions. The historical tissue, essential for the local cultural identity, is protected by its value, while elements of the socialist tissue are useful for the way the city is functioning. Thus, it is the interstitial tissue that can receive the change, the one on which it can intervene.

In space syntax theory this approach of interstitial space analysis is based on the concept of difference. This is perceived as a system in which the meaning of space is not recognized as an intrinsic value but as a result of these differences [10]. The concept of difference is the one that allows reversing the usual approach to cartography representation, proposing a negative approach based on the interstitial spaces.

The originality of the spatial syntax theory is represented by the approach to the notion of distance. This is addressed by three types of values: topological, angular and metric. The introduction of the idea of a topological distance, ie from the perspective of directional turns, introduced new analytical valences that had fundamental effects on the understanding of the notions of proximity. At the scale of city analysis, this vision has allowed descriptions of urban textures from new perspectives and, moreover, has demonstrated clear linkages with social processes taking place within the analyzed areas [18].

The concept of topological distance was supported by empirical demonstrations in which it was shown that most of the people involved in the study chose the method of scrolling the distance between points A and B of an urban sequence not by the shortest way but the one with the less number of turns (Figure 1). The use of this theoretical concept has become the main resource for prediction or anticipation of urban movement patterns,

with particular effects on the definition of proximity, generating new possibilities for analysis [6].



**Figure 1-** Spatial Accessibility & Human Behaviour, Designing Places for People, Space Syntax - Christchurch, 2013

The notion of angular distance enables spatial analysis based on links made through the most straight lines. Thus, a street will be represented by the straight line joining the farthest two mutually visible points (Figure 2). This principle is the basis for the design of axial maps, these being the main working supports proposed within the method.

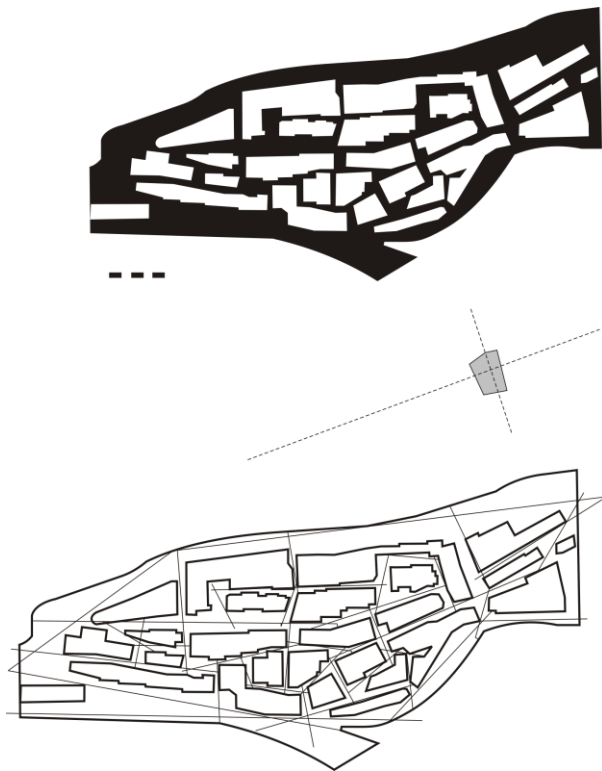
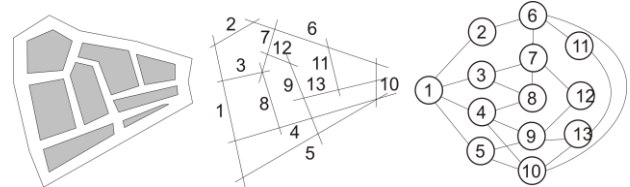


Figure 2 - Axial map conception - from pinterest.com

Another concept of the space syntax theory is co-presence. Thus, in space syntax, co-presence refers to a group of people who do not necessarily know each other but who share the same space. They do not form a community, but they can generate social interaction. The

concept of co-presence thus defined is the fundamental premise for social interaction [11].

As method for analyzing the urban realm, space syntax theory proposes the use of several essential tools: connectivity, depth, choice, local and global integration. The first step for applying the method is to prepare the axial map. This is based on the concept of difference, by separating the built forms from the interstitial space. Subsequently, the axial arrays are conceived as the minimal number of lines generating urban traces in the studied area.



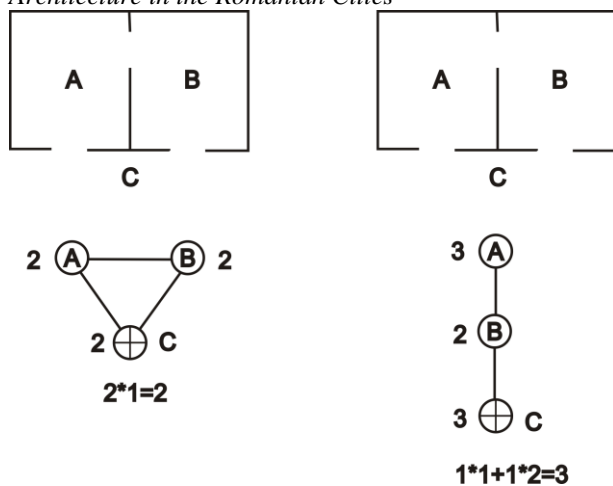
**Figure 3 -** Diagram from Jiang și Claramunt, Integration of Space Syntax into GIS, New Perspectives in Urban Morphology, 2002 - a) conventional map; b) axial map; c) connectivity scheme

The connectivity measure is used to track the number of neighboring axes directly related to a certain space. It is a local measure that specifies the quantity of intersection nodes of an axis (Figure 3). The more connections a relationship has, the more accessible it is and can better support activities of general interest and, consequently, more intense social activities.

Depth is defined as the smallest number of steps required to move from one space to another (Figure 4). In this case, the steps are syntactically understood from the point of view of connectivity. Thus, a space A bound to space B and C is at the same depth - at one step. If space A communicates with space C only through space B, space A is at a depth of two syntactic steps. Thus, the method proposes that by measuring the depth as the distance of the different points in relation to each other within the system.

The choice measures the extent to which a space controls the access to the immediate neighboring axes. Thus, from the perspective of choice, each axis will be measured by the number of connections of each node with other nodes in the system. Choice will measure how many times a certain space has to be crossed to reach different destinations.

Integration is the variable used to measure how a space is connected to other neighboring spaces. This is the key parameter that leads to an understanding of the relationship between users and space. All experimental observations have shown that most integrated streets are occupied by most people. Practically, in urban areas well-integrated routes will lead to high accessibility and significant human presence. Equally, the most segregated spaces lead to a lack of social interaction and, implicitly, an increase in malfunction.



**Figure 4.** Diagram from Tim Stonor, Spatial Layout Efficiency, National Capital Planning Commission on spatial layout efficiency presentation, 2013 - the relation between depth and connectivity

Measurement of these variables can be done through dedicated software programs. For the research will be used depthmapX software designed by UCL Bartlett. Through the program, each measure will be expressed graphically and numerically, which will allow interpretation of the data. An important advantage of this method is that the program can measure not only the existing values of the analyzed areas but also the effects that a certain direction of intervention can have. Thus, in the case of the decision to change certain connections, transforming a configuration, the new data is introduced into the model in order to determine the proposed intervention efficiency.

#### 4. SPACE SYNTAX THEORY APPLICATIONS FOR URBAN FRACTURES OF THE ROMANIAN CITIES

Space syntax theory applications are multiple, with a wide array of academic articles and studies available. For the purpose of the research, several directions were retained. A first set concerns research in historical sites, the second set focuses on analyzes combining space syntax with notions of land use, functions and poles of attraction, and the third set of studies focusing on the combination of the method with the notion of place.

Using space syntax within historical sites allows access to particular information about the true nature of the site. Starting from the main premise of the space syntax theory, the ability of the method to reveal information on the social life of the place based on the spatial configuration, it has been demonstrated that, by applying in historical studies, information beyond the usual narrative functional spectrum can be revealed [5].

The space syntax theory allows the understanding of the urban configuration through comparative analysis of different time sequences of the studied areas [9]. Griffith [5] identified four categories of historical studies based on space syntax theory: history as a background or context - an approach centered on providing the necessary information about a case study where the

history of the place is not the main subject of the work [5]; history as syntactic of the growth process - approach focused on the evolution of the place [7]; history as a morphological syntactic - which brings to the fore the transformations suffered by a spatial configuration and the effects generated on the potential of social interaction [12], [13], [14] spatial history of localization - research focused on how the social phenomenon is organized in time and space, going beyond morphology, wishing to explain the socio-economic or cultural aspects of a settlement [8].

Among the above-mentioned typologies, one that best serves the purpose of research uses history as a morphological syntactic. Historical studies focused on morphology in the context of space syntax theory focus on understanding the changes brought about by certain transforming moments that have left traces in the urban form. Such studies are approached temporally reversed, the zero moment being the contemporary reality [5] which gradually reveals the previous moments. These characteristics fit into the analysis of urban fractures between historical tissue and socialist tissue through the approach of transforming moments - the brutal demolition and reconfiguration interventions. A set of specific studies addressed the issue of adapting historical centers to the modern urban reality [5].

Another peculiarity of space syntax theory studies focused on the understanding of morphological syntactic through local history is the orientation towards the future. Most applications of this kind focus on regeneration policies or intervention directions [5]. This is the second important argument supporting the choice of this approach in the proposed research, taking into account the stated intention to present proposals for intervention as well.

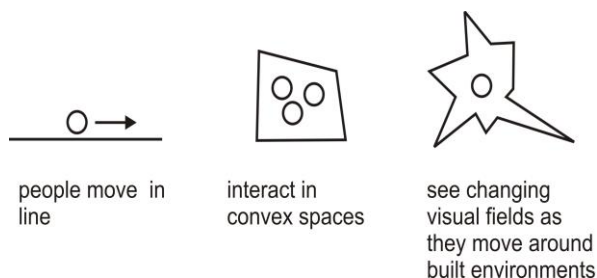
Another important step for the application of the space syntax method proposes overlapping a layered approach with notions related to the general development of the studied elements. Overlapping information takes into account predominant functions, land use and attraction poles. Numerous studies have been conducted over time that have taken into account the predominant functions of the studied areas, revealing quantifiable links between them and the integration factor revealed for the street structure through the space syntax method. It can be appreciated that a high integration factor overlaps with popular urban activities - trade, public catering. Reciprocity is valid: a low integration factor overlaps with the lack of economic activity or even a poor level of development (abandoned spaces, physical degradation of buildings).

The notion of land use has proved to be useful in the research because it can reveal the economic development of the studied areas in relation to the rest of the city. Applying this concept together with the space syntax can reveal correlations between built density, population density, land value, and spatial coherence measured by overlapping local integration with global integration. Such notions help to understand the level of participation of the fragment studied in the economic life of the urban ensemble, and it is necessary to establish whether spatial rupture has repercussions on general development.



Poles of attraction will be another direction of analysis. Thus, for the analysis of the areas, the information obtained by means of the space syntax will overlap with the network of the main traffic junctions. Previous studies have also taken into account potential attractions - shopping, restaurants, and institutions.

The notion of place acquires new valences within the space syntax theory. The public meeting places of people within cities have long been approached independently of the movement schemes. In the analysis based on space syntax, movement is the main factor determining the life of the city. Thus, it is important to correlate the notion of place with the structure of the movement flows; the movement is the heart of the place [10]. The space syntax theory defines three types of spaces related to the movement: the axis describing the way we are circulating, the convex space defining the nature of the places we encounter and the isovist that represents the way we experience the space (Figure 5) [9].



**Figure 5** - The relation between movement, space and interaction - Hillier, 2007

Starting from these theoretical premise, the analysis of urban space can be approached so as to highlight places capable of taking over or sustaining social interaction, which is considered important for understanding the specific mode of functioning of urban fractures between historical and socialist tissue. Practically, the interventions that led to these fractures did not take into account the capacity of the urban form to generate social interaction, but this can be proposed as a future direction of intervention.

Following the multi-criteria analysis, after the objective definition of the socio-spatial characteristics of urban fractures between the historical and socialist architecture, the process of identifying similar urban fractures in Western European cities will begin. Even though the capitalist countries did not had the same tumultuous stories, aggressive attitudes to modernize the fabric by replacing the existing built-up fund with a more efficient one were often reported by the literature. The voids defined as the residual space between planned and spontaneous spaces within these cities seems to have similar characteristics to the voids between traditional and socialist tissue.

Berlin's history has led to a deep fragmentation of the city that, with the demolition of the East-West separation wall, is looking for solutions to define a coherent identity.

An extensive study on the history of Berlin with spatial syntax digital technology was conducted by Desyllas [4]. Although focused on urban economics, the

study follows the city's evolution since 1650s focusing on the effects of division imposed by the wall as well as those brought by the reunification after its demolition. Interesting is how the author succeeds in highlighting the way the city's interest centers moved with the degree of integration of the street routes. Thus, if before the building of wall the city center was towards the center of gravity of the locality, perfectly superimposing with the heart of the social, cultural and economic activity, after the construction of the wall the whole configuration was mutilated. As a result, the two areas of Berlin, West and East were re-analyzed and areas with different integration values emerged. The former city center was completely segregated by raising the wall, which led to new integration values for other areas of the street tram. Practically new centers of activity have been formed: in West Berlin the morphological reality has naturally led to the location of new business districts; In East Berlin, due to the imposition of functions, a permanent rupture was created between the natural flow of movement and the points of attraction built by political command.

## 5. CONCLUSION

Due to its specific orientation between the spatial morphology and social interaction, the space syntax advanced digital methodology is an optimal research tool for the urban fractures between the historical architecture and the socialist architecture in the romanian cities.

The urban fractures are defined as specific fragments composed of the limit elements of the two types of urban fabrics. the space syntax focus on the diffrence, the interstitial remanent space is the first focus point. Voids seen as places of social interaction opportunities represent a key decision for the research strategy.

The multiple applications of the space syntax theory will permit defining a multi-criteria analysis for the urban fractures. Understanding the historical evolution of these fragments, revealing the fragments conexions to the city realm, analysing the movement flows and places interaction possibilities will be essential for the research.

All digital information obtained with space syntax digital technique should be overlapped with usual research instruments for a complex and cross-structured analysis.

Beside its proven efficiency in research, the space syntax theory is a succesfull design method. In fact, the main trigger for the research is finding intervention solutions for the urban fractures between the historical architecture and the socialist architecture in the Romanian cities. In conclusion, the method could be the optimal answer not only for the analyse and definition of the urban fractures but also for the regeneration and their reconection to the cities life.

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