International seminar on urban form - ISUF: Conference proceedings PART II

PRAXIS OF URBAN MORFOLOGY

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Belgrade
30th CONFERENCE

CONFERENCE PROCEEDINGS - PART II

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PRAXIS OF URBAN MORPHOLOGY

ISUF Belgrade 30th CONFERENCE

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INTRO

ISUF2023 PRAXIS OF URBAN MORPHOLOGY

Coming from 20 architects, geographers, planers and historians, to more than 600 individual and institutional members across the globe, ISUF presents the important international organization of urban form both for researchers and practitioners. Due to its orientation to both of these fields, ISUF 2023 presents a great opportunity to rethink the praxis, perceived as process by which theory/idea is enacted, embodied and realized.

The theme for ISUF 2023 is drawn from the previous experience and ideas, directed toward systematization and synthesis of intellectual knowledge.

Following this line of reasoning, the Conference tracks are envisioned to confront the topics that are represented as being opposed in order to open up a debate how to transfer ideas to operational knowledge.

A. Good in Planning, Landscapes and Townscapes

A1. Urban planning vs. Urban design

A2. *Fringe growth* vs. *Urban belt*

A3. Prescription vs. Description

B. Culture Space, Common Space and Personalities

B.1. East vs. West

B.2. South vs. North

B.3. Networks vs. Individuals

C. History of Ideas and Challenges

C.1. History vs. Future

C.2. Preservation vs. Transformation

C.3. Pre vs. Post

D. Programming and Rethinking Concepts

D.1. Strategies vs. Measures

D.2. Education vs. Practice

D.3. Quantitative vs. Qualitative research

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The current volume contains full papers collected for the XXX ISUF 2023 Conference. The Organisers are grateful to the Reviewers, Session Chairs, and Colleagues and Volunteers who contributed to the organisation and preparation of this conference. The papers' collection and the review process were supported by the Ex Ordo Conference Management System. These papers represent are product of research and represent the opinions of the authors. It is not meant to represent the position or opinions of the ISUF or its Members, nor the official position of ISUF2023 editors.

REFLECTION ON THE CONFERENCE

In its jubilee year of 215 years, the University of Belgrade and the Faculty of Architecture as its constituent member had an opportunity to host the 30th International Seminar on Urban Form Conference (ISUF2023).

This year's conference titled Praxis of Urban Morphology presented a great opportunity to discuss the process by which this discipline is enacted, embodied, and realized. The ISUF 2023 organization committee's endeavor was to build on the previous experience and ideas, and to direct activities toward systematization and synthesis at an international level, aiming to embody these ideas into operational knowledge. The conference was developed in a manner to provide a framework for reflecting on ISUF community intellectual knowledge coming both from the practical and scientific arenas. As a part of side activities, a special issue of the Serbian Architectural Journal - SAJ titled Regional Perspectives of urban morphology was prepared with the goal to demystify advancements of intellectual thought from all continents. Accordingly, the presentation will cover the main issues raised by scholars and practitioners both in SAJ contributions and during conference with the overall goal to contribute to the advancement of knowledge in this field, moreover to reconsider and critically examine advancements and perspectives on urban morphology.

Decision to focus the ISUF2023 conference on the Praxis of urban morphology and SAJ special issue on Regional perspectives on Urban morphology, hopefully, yet unintentionally achieving a harmonious integration of these two. Consequently, the resulting journal double issue serve as valuable testimony of longlisting engagement within the study of urban form in various contexts reflecting a specific moment in time and various perspectives on urban morphology, while conference reveals state of current topics and research fields within the urban morphology. Thus, the first one looks at the history, while the second reflects on the future

The very conference included total of 227 presentations with 580 authors (220 present on site), with representation of participants from 43 countries. The conference was developed in 4 tracks: A. Good in Planning, Landscapes and Townscapes, B. Culture Space, Common Space and Personalities, C. History of Ideas and Challenges and D. Programming and Rethinking Concepts.

Conference proceedings were developed in two parts - One available in print and online format that has texts recomended by session or conference chairs and the second with other submitted full papers.

Editors

PREFACE

The International Seminar on Urban Form (ISUF) gathered for its 30th conference in the Balkans. There was a long way between Lausanne 1994 and Belgrade 2023 – between an exploratory meeting of about 20 urban morphologists, coming from five countries, in Europe and North America, and a robust conference in Serbia gathering more than 200 morphologists coming from five continents. Throughout this way, together, we have increased our knowledge about the basic elements of urban form, how these are combined generating different patterns, and how these are shaped by different processes and agents over time. We also have a better understanding of how these patterns influence the environmental, social, and economic dimensions of human settlements, and how urban morphology can contribute for addressing some of the main challenges of our times, from climate action to the construction of sustainable cities and communities. In a year of celebration, and in addition to the Belgrade conference, some of us have been reflecting on the past, present and future of ISUF (Oliveira, 2024), while others have been debating the role and contribution of our regional networks (Djokić and Samuels, 2023).

The 'Praxis of Urban Morphology' was the last step of a one-decade path starting with the systematic participation of Serbian researchers in ISUF conferences and journal, leading to the creation of the Serbian Network of Urban Morphology, and including the development of research projects with other networks (Kantarek et al., 2022). The 'Praxis of Urban Morphology' organized by Vladan Djokić, Aleksandra Djordjević, Vladimir Lojanica, Ana Nikezić, Milica Milojević, Aleksandra Milovanović and Mladen Pešić was a remarkable event. Each and every part of it was carefully planned, making evident the commitment of its organizers. The event also represented the return to full face-to-face conferences, after two online conferences, in 2020 and 2021, and the hybrid event held in Lodz and Krakow in 2022. The conference was organized in four main themes: i. the good in planning, landscapes and

townscapes; ii. culture space, common space and personalities; iii. the history of ideas and challenges; and iv. programming and rethinking concepts. Each of these themes was then arranged in three pairs of poles to foster morphological debate. The conference had about 230 presentations, authored by almost 600 researchers (more than 1/3 was present in Belgrade) representing more than 40 countries.

Part of the morphological knowledge produced in the Belgrade conference is now gathered in the proceedings edited by Djokić, Djordjević, Pešić, Milojević and Milovanović. The proceedings are a precious record of one week of morphological debate in a notable city, with a rich urban history and built heritage, and a vibrant urban life. They develop new perspectives about our field of knowledge, how urban morphology can support action on the physical form of human settlements (through

planning, urban design, and architecture), and how morphological insights can consolidate knowledge on the main dimensions of urban life, from social equality and good health to decent work, and to responsive consumption of urban energy, to name just a few policy applications. For all this, the International Seminar on Urban Form is grateful to our Serbian colleagues, preparing both conference and proceedings, and to all participants.

References

Djokić, V. and Samuels, I. (eds) (2023) Regional perspectives on urban morphology – Serbian Architectural Journal (University of Belgrade, Belgrade).

Kantarek, A. A., Kwiatkowski, K., Korbel, W., Djokić, V., Djordjević, A., Niković, A., and Samuels, I. (2021) 'Mapping post-socialist changes in urban tissues: a comparative study of Belgrade and Krakow', Urban Morphology 26, 44-63.

Oliveira, V. (ed.) (2024) ISUF. Urban morphology and human settlements (Springer, Cham).

Vítor Oliveira

President of the International Seminar on Urban Form

CONTENTS

The "Underspaces" within the Contemporary City. A morphological investigation of neglected flyovers in London for assessing residual urban areas

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ABSTRACT

Nowadays, we face a common urban phenomenon referring to seemingly unattractive and obsolete areas beneath elevated transport infrastructures, defined as "residual urban spaces" or "flyovers". These places, created by past urban planning processes, are in a state of decay representing a waste of precious land resources in dense cities like London. Flyovers, physically divide communities and require deep comprehension to define proper requalification strategies aiming to reclaim public areas integrating them into the urban network. This study seeks to investigate the morphological and topological features of neglected flyovers, defining a spatial and visual classification system to fill the void in the understanding of residual spaces. By analysing the impact of undesirable urban places on a neighbourhood scale, this research intends to evaluate requalification strategies that could promote new urban system interconnections and community bounding measures. Conventional morphological analysis alongside space syntax methods and data mapping on a GIS platform are used to measure building forms and fabrics, through figure-ground and urban block analysis. This, in conjunction with an examination of spatial network configurations and visual integration factors. Findings suggest that areas adjacent to the Westway flyovers in London generally lack spatial connectivity and accessibility properties. Additionally, patterns in urban morphology and visual attributes reveal disrupted relationships with the surrounding environment. By strengthening spatial and visual connections, multiple social improvements could be fostered. In conclusion, addressing undesirable urban spaces through analytical approaches and strategic reconfiguration design proposals on their morphological character will contribute to create more sustainable, resilient and liveable cities.

Keywords: Residual spaces, elevated infrastructures, urban morphology, space syntax

INTRODUCTION

Modern cities have undergone continuous growth and evolution processes, particularly starting from the 19th century, when significant emphasis was directed towards advancing high-speed mobility and rapid communication networks. This focus resulted in the establishment of public spaces and infrastructures primarily designed to serve these functions, thereby giving rise to new urban forms and spatial configurations (Robertson, 2007). Within this context, the concept of "*unshaped antispaces*" or "*lost spaces*" (Trancik, 1986, p. 63) has emerged, denoting spatial settings lacking clear

identity or purpose. Therefore, the significance of creating a systematic methodology capable of analytically identifying and classifying residual sites through an evidence-based approach, has gained a certain prominence. This research aims to define a methodological framework for a thorough assessment of residual areas within London, specifically in conjunction with the Westway. More in detail, this analytical approach seeks to scrutinise the seemingly inert character of residual spaces, delving into the spatial structure and visual characteristics involved in the disconnection of areas and communities from the main urban network. By dissecting spatio-configurational and visual factors using a space syntax approach, a quantifiable degree of residuality can be attributed. The outcomes of this analysis could subsequently inform future regeneration plans aimed at effectively reintegrating residual areas into the surrounding urban context. In this regard, this study could potentially offer contribution to design processes by providing on one side, a better understanding of the urban spaces, and on the other hand, proposing an efficient analytical framework to evaluate the impact of the design changes on the "residuality" of public spaces. This approach can foster a sense of cohesion and equity among the communities inhabiting the nearby areas, ultimately serving as a catalyst for beneficial urban transformation processes, enhancing the functionality and liveability of our cities.

Background

In order to explore the concept of "residual space", London has been selected as the main case study city due to its distinct urban characteristics resulting from the modernisation processes that occurred over the past centuries. The layered nature of London's physical environment can be seen as a consequence of advancements in mobility and communication (Trancik, 1986). As the modernising city gradually evolved across time, it experienced transformative spatial changes. In this context, the introduction of the elevated concrete structure commonly referred to as the Westway, occurred between 1964 and 1970, resulting in a significant impact on the entire urban system (Wall, 2011, p. 145). Consequently, the cohesive city layout became fragmented and discontinuous, dividing communities and creating spatial disconnections. Currently, the Westway is considered as one of the major motorways within London, serving to relieve congestion on the city's road system. However, the conditions of the flyover areas have deteriorated over time, left in a state of decay, emptiness and abandonment. This in turn, has gradually contributed to the emergence of a multitude of disregarded areas, giving rise to undesirable informal settings located under the shadow of the Westway, often referred to as "residual" or "left-over spaces" (Wall, 2011, p. 148).

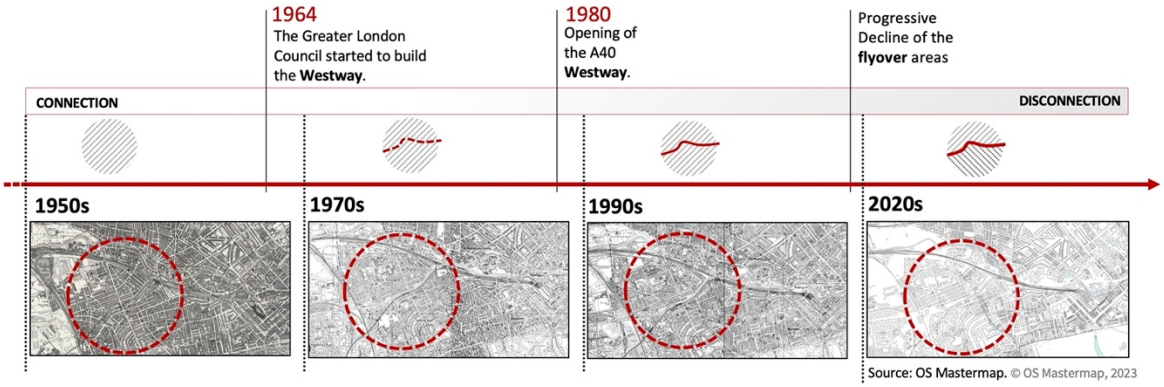

***Figure 1**. Evolution of the spatial urban system from 1950 to 2020. Source: Edina Digimap, OS Mastermap*

Residuality as an outcome of urban transformation

Scholars have coined diverse terminologies to identify overlooked areas, primarily focusing on their physical attributes, functional qualities, and visual appearances. Wall (2011), for instance, describes "*left-over spaces*"(p.148) as distinct informal places disconnected from the broader spatial network, resulting in the creation of "*unattractive isolated islands in the city*" (p.147). Similarly, Gabbianelli (2017) has defined them "*spatial pauses*" (p.19) within the structured contemporary city. Previous study on this phenomenon has also led scholars such as Villagomez (2010) to identify different typologies of residual spaces categorised as "*Spaces between*", "*Spaces around*", "*Rooftops*", "*Wedges*", "*Redundant Infrastructures*", "*Oversized infrastructure",* "*Void spaces*", and "*Spaces below*" (p. 84). Despite a descriptive depiction of these areas, neither of the previous studies have attempted a systematic classification, perhaps due to the complexity in categorising the multifaceted properties behind the concept of residuality. Existing research has primarily concentrated on labelling the specific forms and manifestations of residual settlements, rather than establishing a comprehensive analytical taxonomy comprising diverse factors involved in the emergence of these spaces. Among the early attempts of classifications, Laurìa and Vessella (2021) pinpointed three prominent manifestations of residuality within the urban space, namely "Degradation", "Improper use", and "Absence of people". The proposed classification offers a straightforward baseline framework that primarily emphasises qualitative narrations. However, ulterior complementary analytical data can enhance and further support the examination of this phenomenon, and capture the complexity and multidimensional nature of residual areas. A different theoretical approach in the investigation of public spaces, was adopted by Hillier and Hanson (1984) arguing that the study of syntactic properties of the urban network contribute to interpret and predict the use of a space and the consequent individual experience of an individual in a specific settlement. Starting from this notion, the current paper will attempt to meticulously evaluate residual urban areas looking at their intrinsic characteristics.

Research motivation

This investigation strives to bridge the gap in understanding neglected flyover spaces by adopting a comprehensive analytical, and multidimensional standpoint for evaluating the underlying city morphologies that frequently give rise to residuality conditions. More in detail, the research prompts the fundamental question: *In which way can we systematically classify residual urban spaces beneath elevated transport infrastructures in terms of their spatial and visual attributes, with the aim of enhancing our understanding and informing current and future intervention initiatives?* The paper proposes an evaluation methodology for assessing residual spaces by addressing this central inquiry. Diverse parameters and investigation phases to classify residual sites are established, providing an in-depth framework for exploring this multifaceted concept, while also striving to minimise assumptions and biases. The specific focus lies on three circumscribed flyover sections underneath the *A40 Westway,* a major London highway. More precisely, the first study area is situated near the Westway Roundabout, the second site is adjacent to Portobello Road, and the third is placed along the Grand Union Canal. These areas, each with a radius of 0.5 km, have been identified as ideal case studies, containing several instances of neglected and underutilised urban spaces (see Figure 2). Through the identification and categorisation of residual areas, the study ultimately investigates the connection between spatial and visual factors, and the occurrence of residual sites within defined urban settings. This approach offers strategic insights that could potentially contribute to the regeneration of a wider array of overlooked spaces within modern cities. As a result, this endeavour provides a valuable

avenue for a critical and comprehensive examination of how certain physical spaces influence social structures.

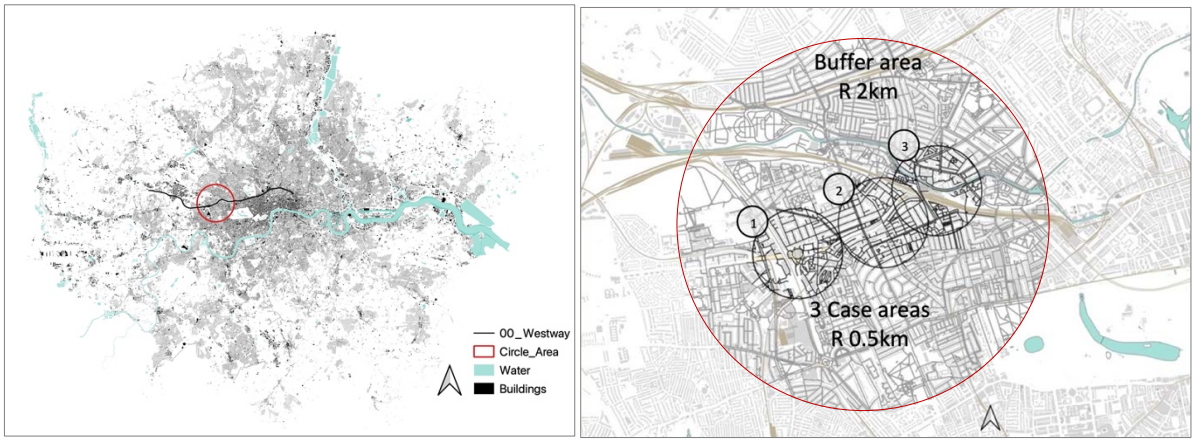

Figure 2. *On the left: Localisation of the case study site within London. On the right: Pedestrian segment model illustrating the pedestrian network within the three selected study areas*

METHODOLOGY

The research provides a holistic comprehension of the concept of "residuality" by examining the topological and morphological dimensions of the site, based on the idea that the configurational properties distinguishing one spatial arrangement from another, may generate specific adverse outcomes, both spatially and socially (Hillier and Hanson, 1984). Therefore, the study combines existing theoretical and methodological approaches related to neglected urban areas, culminating in the formulation of a classification system grounded in spatial and visual data analyses. Concretely, the research objective is achieved by delineating and aggregating spatial variables that elucidate variations in spatial morphologies, inherent topological features of pedestrian networks, and visual properties of the designated spaces. The combination of these factors identifies key causes contributing to the emergence of residual urban settings, which could be directly connected with how individuals might visually and spatially experience these areas, thereby affecting the social dynamics within these spaces. Moreover, the culmination of the process involves the conversion of all variables into a single cumulative average value encompassing all factors, resulting in the formulation of an "*Area Residuality Index*". This unified value facilitates a more effective comparison of measurements across all regions. In this way, the spatial and visual issues (depicted in Figure 3) within each study site are amalgamated to determine whether meaningful outcomes in localisation and distribution patterns of residual spaces are produced.

Classification framework

The classification's objective is to capture a composite picture of residual spaces through the evaluation of their *Intrinsic* characteristics, as introduced by Laurìa and Vessella's study (2021), encapsulating possible causes and factors of "Residuality". The entire analytical process is structured into four distinct stages, or levels of knowledge, each designed to frame the categorisation procedure for identifying the residuality nature of a given area (Figure 3). The initial phase involves evaluating the *Expressions of residuality*, encompassing *Decay (both physical and social), Improper use,* and *Absence of people/Emptiness.* This preliminary assessment relies on a subjective approach grounded

on on-site survey and observational analysis, providing an initial understanding of the overall conditions within the area. Progressing to the second, third, and fourth stages, the research endeavours to identify topological and morphological factors through a series of quantitative spatial and visual graph analyses. The classification system's final stage, which entails outlining the resulting spatial and visual issues stemming from the conducted examinations, ultimately seeks to classify neglected urban spaces. However, it is crucial to highlight that different factors might have diverse degrees of impact on the final output of the Area Residuality Index. Therefore, a weighting system could be developed in future work.

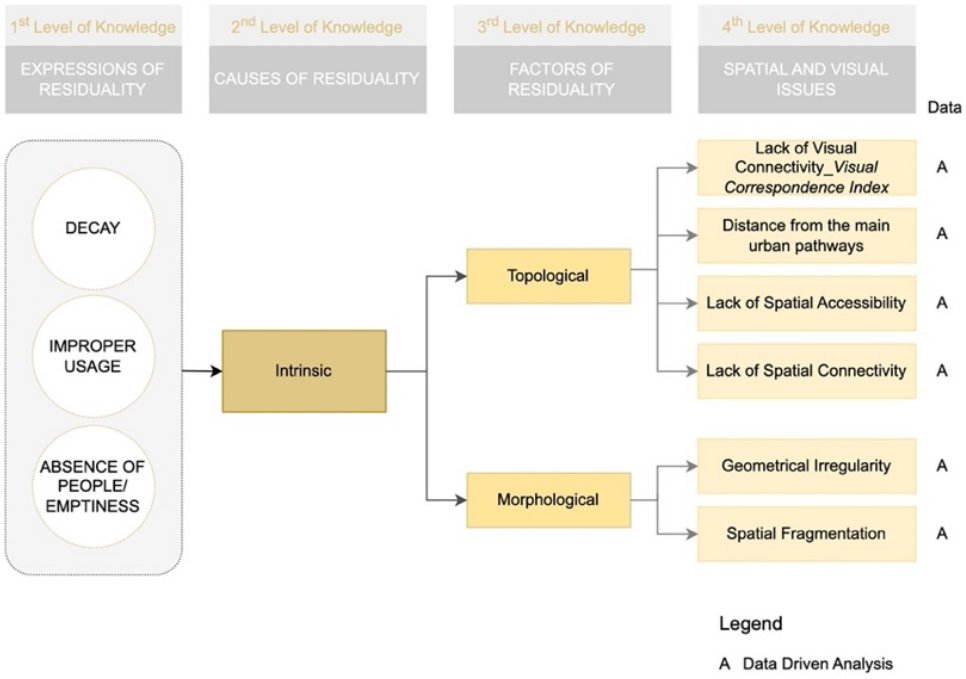

Figure 3. *Classification methodology consisting of four main levels of knowledge, investigating the possible causes and factors of residuality*

Subsequently, a proposed scale is organised into three residuality tiers, by observing in each site area the presence of instances of "Expressions of Residuality" (the first level of knowledge), indicated in Figure 4. Each tier corresponds to the number of residuality expressions classes identified. A space is deemed to possess low residuality when only one of the three classes occurs, medium when two are observed, and high when all three are detected. Additionally, a severity level is calculated by referring to the count of spatial and visual issues detected within the examined space (fourth level of knowledge). The severity levels are also organised into three tiers, where a count up to two instances of spatial and visual issues denoted the first level of severity, a count up to 4 instances denotes the second level, and higher counts denote the third and last level. Figure 4 depicts how the classification symbol labels change in colour according to their residuality tier (blue for "Low", yellow for "Medium", red for "High") and changing size according to their severity level. These labellers are later used in maps to illustrate the resulting class of residual spaces (see Figure 7).

***Figure 4**. Classification system for assessing Residuality degree and Severity level of an urban area. The colours indicate the residuality degree from low to high. The size of the circle designates the severity level of residuality*

A further quantitative step to characterise residual spaces is proposed as the *"Area Residuality Index",* expressed in percentage. This index is calculated by first determining how many types of visual and spatial issues, out of the list shown in figure 3, are present in each residual space. The final index is then taken as the average count of these issues across the study spaces and normalised as a percentage value. This number quantifies the average severity of "residuality" found within an area of interest, based on the enclosed residual spaces. However, it is crucial to highlight that different issues might have different degrees of importance in determining residuality. Hence, the implementation of a weighting system is recommended in future work, involving the establishment and validation of reasonable weight values.

Spatial network characteristics

This paper employs spatial network analyses based on Space Syntax theories and methods to capture the morphological characteristics of different sections of the Westway flyover. A pedestrian movement model aids in evaluating spatial variables related to the urban network's structure while simultaneously predicting the distribution of people's movement within the city's spatial network (Lerman, Rofé and Omer, 2014). This valuable information unveils the dynamic interplay between the built environment and human behaviour, thereby contributing to potential future design proposals of more pedestrian-friendly, accessible, and inclusive urban spaces. More in detail, the study involves the construction of a segment model and the application of angular segment analysis to examine two key properties of the spatial network. *Integration*, also known as "closeness centrality", measures the

potential-to-movement of a space, indicating the depth value of a space from all other spaces, representing the potential of an area to become a destination within the spatial network (Hillier, 1996). *Choice*, or "angular betweenness centrality", assesses the potential through-movement reflecting how frequently certain paths are most likely to be selected as part of a route between spaces (Hillier, 2012). These properties can be expressed, respectively, through *Connectivity* measuring "normalised angular integration" (NAIN), and through *Accessibility* measuring "normalised angular choice" (NACH) (Hillier, Yang and Turner, 2012; Van Nes and Yamu, 2021).

This methodology step encompasses creating a pedestrian movement modelling with the QGIS platform, covering a 0.5km radius for each of the three study areas situated within a broader buffer area extending up to a 2km radius (as depicted in Figure 2, on the right). Pedestrian movement analysis in the form of angular segment analysis examines the NAIN and NACH values within a local radius of 400m and a global radius of 2000m. Subsequently, the results of the space syntax angular segment analysis are statistically compared across the three study areas using the SPSS Statistics software and the "*pandas*" Python library, leading to the assessment of their spatial properties. Additionally, this phase of investigation includes an exploration of the correlations between the spatial and visual graph analysis data, ultimately defining the Visual Correspondence Index (as discussed in the next section). Through the application of this methodology, it becomes possible to assess the walkability of different areas, gaining an understanding of how spaces are utilised in accordance with pedestrian flows.

Figure 5. *Set of normalised values from the angular segment analysis of the pedestrian segment model: NAIN and NACH global radius 2000 m for each of the three-study sites*

Visual Graph Analysis and Visual Correspondence Index

To understand the visual attributes of the examined urban site, an examination of *Visual Integration* at knee level is conducted. Through the superimposition of knee-level Visual Integration assessments with normalised *Integration* for each of the three case areas, a comparison can be made between the sites' *Visual Integration* level and their corresponding spatial *Connectivity* (see Figure 6). This analytical approach enables a deeper comprehension of the interplay between spatial and visual variables within a designated context, and allows for an investigation of how these factors are related to the

emergence of residual spaces. More specifically, the combination of these values is referred to as the *Visual Correspondence Index*, which serves as a one of the factors used for classifying residual spaces, as shown in the categorisation in Figure 3.

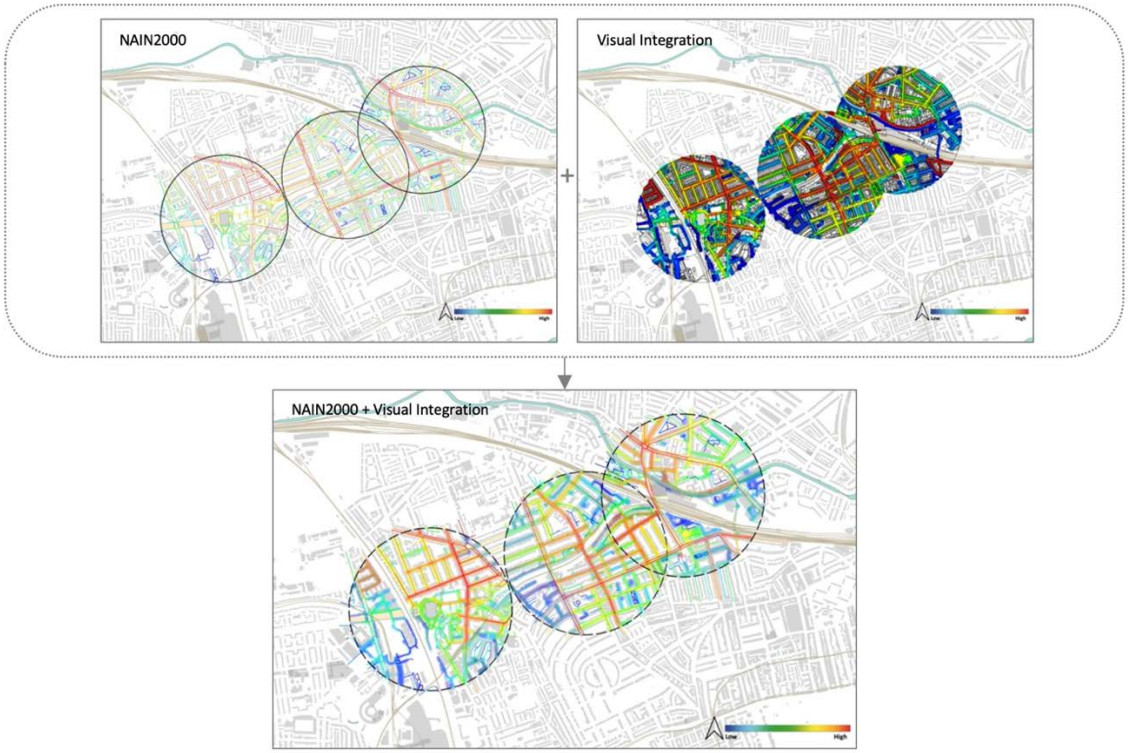

Figure 6. *Superimposition of normalised Integration (NAIN2000) and Visual Integration analysis composing the Index of Visual Correspondence*

RESULTS AND DISCUSSIONS

The investigation of residuality levels around London's A40 Westway, within the three selected study areas, has yielded distinct outcomes concerning specific spatial and visual factors associated with diverse scenarios examined in the current study. The following sections will focus particularly on the significant results emerging from the relationship between spatial attributes, visual characteristics, and existence of residual spaces.

Classification outcomes

The developed classification system unveils that the majority of residual spaces along the Westway flyover exhibit a predominantly medium or high degree of residuality. This is due to the occurrence of various forms of residuality – "Decay" (physical and social), "Improper use", and "Absence of people/emptiness" – in combination, rather than in isolation (see Figure 7). Moreover, a substantial number of these places were classified with a Severity Level 2 or Level 3, indicating the presence of multiple spatial and visual issues across the study locations. Following this process an average of Residuality Index was calculated for each of the three study areas and expressed in percentage, as illustrated in Table 1. The highest rates are detected particularly in Area 1 and Area 3. These sites also exhibit lower values of spatial *Connectivity* and *Accessibility* in comparison with Area 2, demonstrating

at the same time, reduced Visual integration at knee level. This supports the connection between spatial-visual factors and the occurrence of residuality conditions.

Figure 7. *Map of residual spaces classified according to their residuality degree and severity level*

Table 1. *Table showing measures of Residuality Index calculated as weighted value of all the spatial/visual factors detected for each of the three study areas*

	Area 1	Area 2	Area 3
Residuality Index per Area % (Average across residual spaces within areas)	**62%**	**54%**	**72%**

Intertwining spatial system properties and residuality levels

The spatial *Connectivity (Angular Segment Analysis Integration measure)* and *Accessibility* (Angular Segment Analysis Choice measure) values calculated using a pedestrian model, demonstrate that the selected residual areas in all three sites exhibit a noticeable deficiency in terms of spatial properties (see Figure 8). While this aspect may appear inconsistent and inconclusive on a singular basis, it determines a positive relationship and correspondence when considering the overall perspective, which encompasses the combined group of residual sites on one side, and the surrounding areas of all three locations on the other. The research findings reveal that configurational properties play a crucial role in the occurrence of neglected spaces. In this regard, the data visualisation in Figure 8-9 illustrates that the spatial logic of the urban system encourages clustering of residuality patterns in areas demonstrating primarily lack of connectivity at the pedestrian level. This in turn, fosters the isolation and exclusion of these places from the surrounding broader urban network and from the effective functioning social structure of a space, defining underused areas that divide instead of unifying communities. Specifically, the study results indicate that in terms of *Connectivity* (normalised angular integration or NAIN), the values associated with the identified residual areas are lower than those pertaining to the surrounding regions, both at the local (400m) and global (2000m) scales, thereby substantiating the assumption that residual areas lack certain spatial properties. However, when examining the Accessibility (normalised angular choice or NACH) no conclusive effect can be determined in all study areas. Additional data is required for investigating the potential relationship between lack of accessibility and presence of residual spaces.

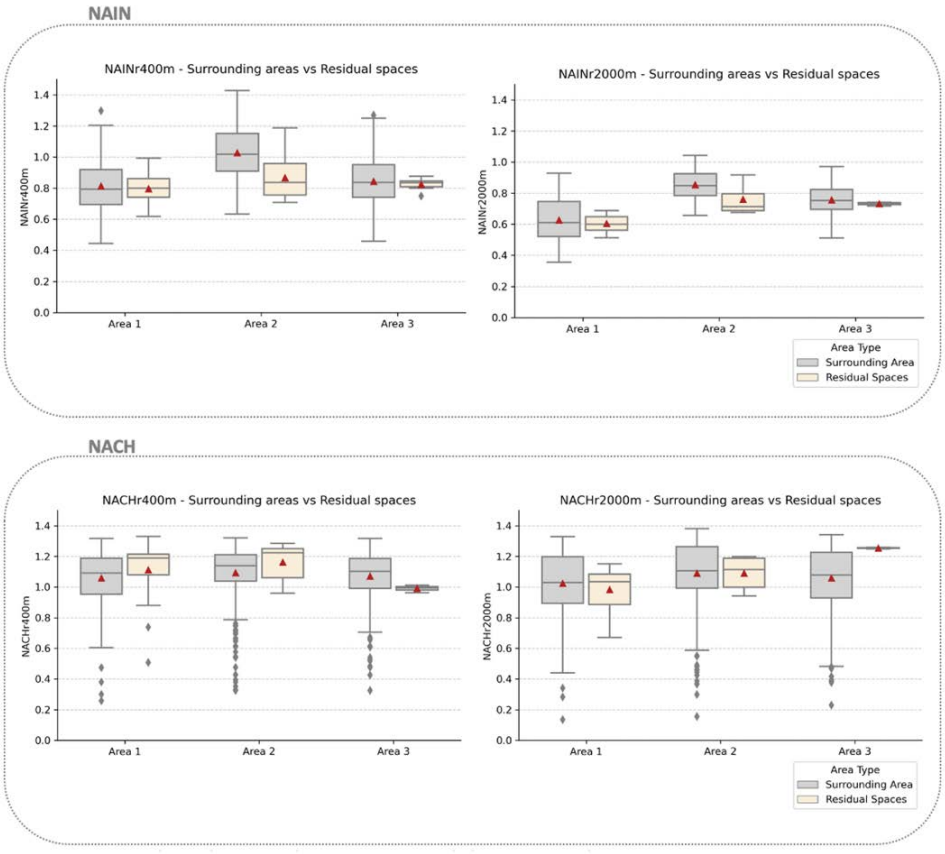

Figure 8. *Visualisation data: Comparison of NAIN and NACH among the three study sites – Residual spaces vs surrounding areas*

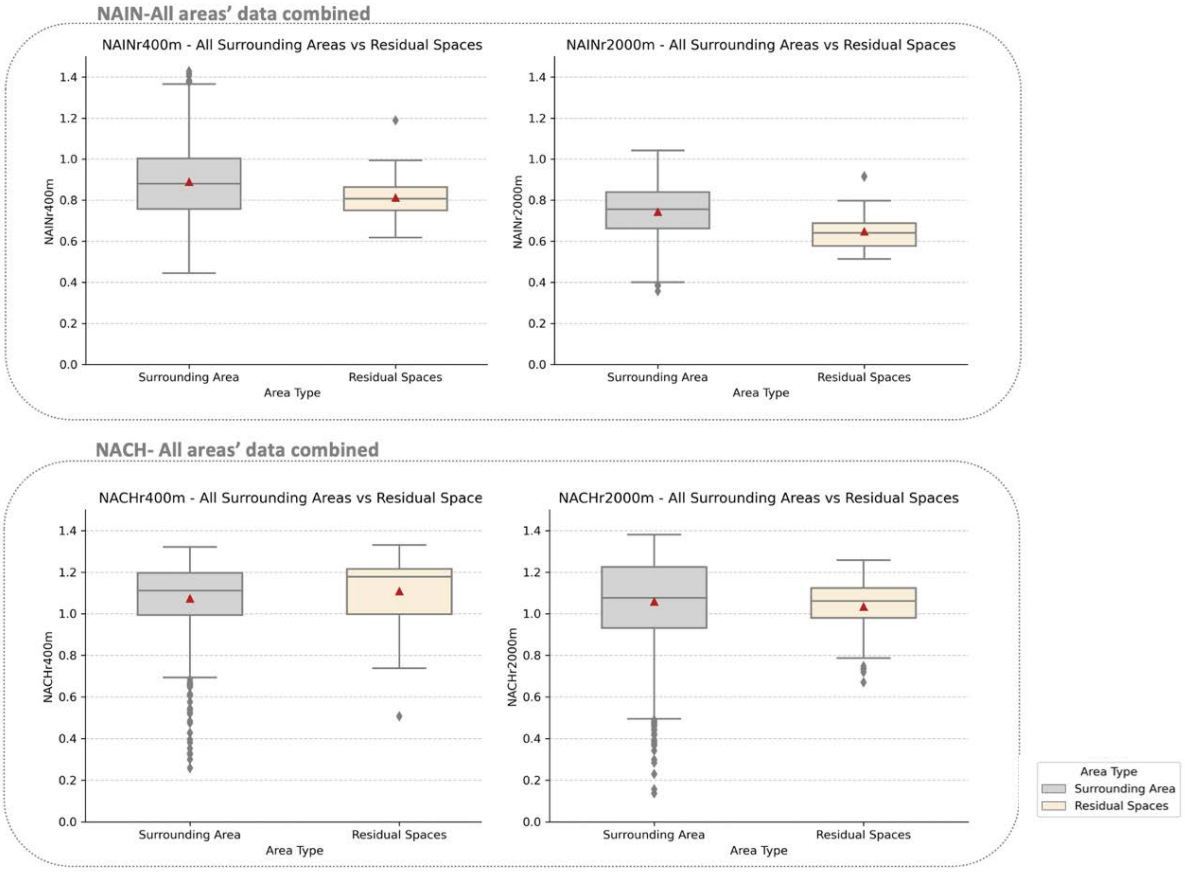

Figure 9. *Visualisation data: Comparison of NAIN and NACH of all areas' data values combined – All residual spaces vs all surrounding areas*

Correspondence of visual and spatial characteristics

All three areas exhibit relatively limited visibility at a knee level. This aspect is related to the fact that numerous sections of the Westway flyover are physically and visually inaccessible due to the presence of physical structures, such as buildings, fences or structural elements of the motorway itself (refer to Figure 6). Interestingly, these areas geographically correspond to the locations where residual spaces have been mostly identified. Hence, the observation reinforces the notion that a lack of adequate visual factors is associated with the presence of neglected urban spaces. Linking this aspect with the pedestrian accessibility and connectivity of each space, there is a strong suggestion of a connection between visual and spatial scenarios. Specifically, by performing a correlation analysis between the mean values of the Visual Integration analysis at knee-level with normalised *Integration* (*NAINr2000) and Choice (NACHr2000),* from the angular segment analysis of the pedestrian model, the outcomes indicate a substantial Pearson's correlation coefficient between NAIN2000 and Visual Integration measures in Area1 (R=0.368, and correspondent R^2=0.135). This is the area in which the largest number of residual spaces have been identified, as well as the highest degree of residuality and severity level. Lower positive correlation coefficients are found in Area 2 (R=0.266, R^2=0.07) and Area 3 (R= 0.185, R^2=0.03). The assessed R^2 values constitute the *Visual Correspondence Index,* which

establishes connections between spatial and visual variables, serving as one of the metrics used for classifying residual spaces, as shown in Figure 2.

CONCLUSIONS

This study sheds light on the spatiality of a specific region of London, emphasising informal residual settlements generated beneath the Westway flyover. The evidence from the analyses suggests that residual areas represent spatially disadvantaged places. However, the resultant classification of the identified residual areas should not be perceived as fixed from the outset, given the perpetual evolution of cities. Ongoing transformations may potentially impact the outcomes of this categorisation over time. Instead, the primary contribution of this work lies in the formulation of a methodological framework aimed at comprehensively interpreting and classifying residual areas, offering significant insights into potential regeneration processes seeking to enhance the condition of these places. The research has introduced and applied a novel systematic methodology for identifying and classifying residual spaces, relying on their *Intrinsic* characteristics. The employed analytical framework is built upon a set of initial assumptions, including the notion that spatial and visual variables have the capacity to capture the fundamental attributes of residual urban spaces. Specifically, the study has relied on both street and building datasets, along with data collected by observation methods, which, combined have facilitated a comprehensive investigation of the multidimensional concept of residual spaces. The applied approach also enables direct comparisons between study areas, through a proposed *Area Residuality Index*, created by aggregating factors that capture visual and spatial issues in the residual spaces of each area. Specifically, this study intends to facilitate a deeper understanding of residual urban spaces, thereby potentially promoting more comprehensive design processes. At the same time, it offers a valuable analytical approach and methodological framework for assessing the potential impact of proposed design interventions on the overall “residuality” conditions of the public space. Additionally, the established classification serves as a structured Residuality Assessment Process, designed with the purpose of having broader applicability across various urban scenarios worldwide. Upcoming studies might explore further aspects pertaining to the concept of residuality, such as use-related, semantic, and perceptual attributes. Ultimately, the research has raised awareness about these urban sites with the aim to embark on transformative interventions that could strategically enhance the liveability and functionality of these places, as well as support inclusivity among the local communities.

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REFERENCES

Azhar, J. and Gjerde, M. (2016) 'Re-thinking the role of urban in-between spaces', in. *Fifty years later: Revisiting the role of architectural science in design and practice: 50th International Conference of the Architectural Science Association*, pp. 279–288.

Della Spina, L. *et al.* (2017) 'An integrated assessment approach as a decision support system for urban planning and urban regeneration policies', *Buildings*, 7(4), p. 85.

Gabbianelli, A. (2017) *SPAZI RESIDUALI. La vegetazione nei processi di rigenerazione urbana*. 1st edn. Gorizia: Gotoeco.

Hillier, B. (1996) *Space is the machine: A configurational theory of architecture*. 1st edn. New York ; Cambridge University Press.

Hillier, B. (2012) 'Studying cities to learn about minds: Some possible implications of space syntax for spatial cognition', *Environment and Planning B: Planning and Design*, 39(1), pp. 12–32.

Hillier, B. and Hanson, J. (1984) *The Social Logic of Space*. 1st edn. Cambridge University Press. Available at: https://doi.org/10.1017/CBO9780511597237.

Hillier, B., Yang, T. and Turner, A. (2012) 'Normalising least angle choice in Depthmap and how it opens up new perspectives on the global and local analysis of city space', *Journal of Space syntax*, 3(2), pp. 155–193.

Laurìa, A. and Vessella, L. (2021) *Small Forgotten Places in the Hearth of Cities: On the residuality of public spaces in historical contexts: Florence as a case study*. Firenze University Press.

Lerman, Y., Rofé, Y. and Omer, I. (2014) 'Using Space Syntax to Model Pedestrian Movement in Urban Transportation Planning', *Geographical Analysis*, 46(4), pp. 392–410. Available at: https://doi.org/10.1111/gean.12063.

Robertson, S. (2007) 'Visions of urban mobility: the Westway, London, England', *Cultural geographies*, 14(1), pp. 74–91.

Trancik, R. (1986) 'What is lost space?', in M. Carmona and S. Tiesdell (eds) *Urban Design Reader*. 1st edn. Routledge, pp. 66–72. Available at: https://doi.org/10.4324/9780080468129-13.

Van Nes, A. and Yamu, C. (2021) *Introduction to space syntax in urban studies*. Springer Nature.

Villagomez, E. (2010) 'Claiming residual spaces in the heterogeneous city', in *Insurgent public space: Guerrilla urbanism and the remaking of contemporary cities*. Routledge New York, pp. 81–96.

Wall, E. (2011) 'Infrastructural form, interstitial spaces and informal acts', *Infrastructural urbanism: Addressing the inbetween*, pp. 145–157.

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