

Review

Toward an Integrative Framework of Urban Morphology: Bridging Typomorphological, Sociological, and Morphogenetic Traditions

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Abstract

This research reexamines key urban morphology traditions to develop a cohesive framework connecting form, process, and structure. Through a selective narrative review of key works from 1960 to 2025, this analysis examines the European typomorphological, Chicago sociological, and morphogenetic approaches using a seven-dimensional analytical matrix that encompasses ontology, scale, mechanism, and social–spatial coupling. The results show that the European school offers static and structural clarity, the Chicago school introduces dynamic processual reasoning, and the morphogenetic approach explains systemic emergence. Their convergence establishes a meta-framework of integrative urban morphology, viewing the city as a complex adaptive system characterized by continuous interactions of continuity, change, material, and social dimensions. This synthesis integrates diverse perspectives, augmenting the significance of morphological analysis in architecture and sociology. The paper thus advances urban theory by demonstrating how conceptual complementarities among traditions strengthen the explanatory and methodological coherence of urban morphology.

Keywords: urban morphology; typomorphology; morphogenesis; socio-spatial structure; integrative framework



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1. Introduction

There has been growing recognition of the importance of studying urban form in recent years [1–3]. Urban morphology is an interdisciplinary field that includes urban sociology, archaeology, architecture, architectural history, geography, history, landscape architecture, and planning. To better understand human settlements, urban morphology undoubtedly necessitates interdisciplinary research [4]. The ability of early scholars in this field to read across disciplines was unrestricted. In the second half of the twentieth century, academic disciplines consolidated their internal frameworks and intensified their research productivity, which reduced settlement knowledge. To address this issue, urban morphology researchers will need to conduct interdisciplinary research.

Despite common challenges, research into urban morphology has advanced in recent years. The field is expanding as a method for studying and transforming urban environments. As a result, understanding the definition of urban morphology is critical for anyone interested in the subject. Researchers in this field employ a range of methods, including GIS mapping, archival document analysis, and on-site observation, among others [5]. Un-

derstanding cities and their evolution is aided by urban morphology and we can expect to see even more advances in our understanding of the built environment as the field grows.

The twentieth century introduced two distinct knowledge-based approaches, which studied city form through architectural and geographical methods, as well as sociological models that examined urban transformation by analyzing social movements and competitive dynamics. The two paths developed independently of each other, resulting in an ongoing knowledge divide between form-based research and process-based research. Static approaches provide complete descriptions of urban structures. Still, they do not demonstrate how these structures evolve, while dynamic approaches explain urban transformations, yet they disregard the physical attributes of constructed environments. The current separation between urban morphology and its underlying principles restricts its ability to explain modern cities.

Among the many disciplines, it can be said that geography and architecture significantly influenced the study of urban form in the twentieth century, which helps us understand the evolution of cities and the decisions made about their design [6]. However, numerous challenges must be overcome to make progress in this field. Some of these issues are poor communication across disciplines, a lack of comparative studies, a lack of links between research and practice, and the influence of a discipline's past on its progress. However, if we can overcome these challenges, the study of urban form can be a valuable tool for understanding the evolution of cities and how they are changing today [6].

Most urban projects rely on analytical studies that incorporate geographical and architectural approaches, and they are limited to the tools of traditional urban morphology schools [7]. This strategy often overlooks other intangible factors that can significantly contribute to the success or failure of urban projects. The social aspect has an undeniable influence on the physical layout of the city [8]. This influence can be understood on two distinct levels: the visible and tangible (explicit), and the hidden and intangible (implicit).

The research combines static and dynamic urban morphology traditions through an integrated framework, illustrating how urban form evolves from development processes and structural elements. The research aims to understand how European and Chicago School, as well as morphogenetic, approaches to urban development can work together to explain how cities evolve.

The main objectives of this research are

- (1) To review the epistemological foundations and methods of major morphological schools;
- (2) To identify the conceptual gaps and overlaps between static, dynamic, and structural reasoning;
- (3) To propose a meta-framework that integrates these approaches; and
- (4) To demonstrate the relevance of interdisciplinarity as a means of advancing urban morphological research.

From this perspective, it is crucial to examine the city's morphology using a more comprehensive approach that integrates both social and physical aspects and the tools that the various schools of thought offer. How can a new approach to urban studies be developed that integrates physical and social form research? Can the outputs of the Urban Sociology School (such as the Chicago School) be used to explain the dynamics of a city in addition to its physical form?

2. Research Design and Methodology

2.1. Research Design

This study employs a selective narrative review to evaluate and integrate key theories in urban morphology. Rather than pursuing exhaustive coverage, the review targets

seminal frameworks that have shaped the discipline, with the aim of revealing conceptual connections among the European typomorphological, Chicago sociological, and morphogenetic traditions. The research prioritizes theoretical integration over empirical testing, combining qualitative historical and typological analysis with interpretive examination of social–spatial processes. Quantitative insights from morphometric analysis, network theory, and structural geography are incorporated where they clarify relationships between morphological tools and theoretical constructs. The overall design, therefore, serves to build an integrated interpretive framework that connects static, dynamic, and structural perspectives on urban form.

2.2. Literature Selection and Scope

The objective of the selection process was to extract both foundational urban morphological principles and contemporary urban development theories from the curated body of literature. The study conducted targeted keyword searches, manual reviews of journal archives, and citation analyses of major theoretical papers to identify relevant publications.

The review emphasized cross-paradigm coverage, encompassing architecture and urban design (typomorphological studies), geography and urban systems (spatial and structural approaches), and sociology (urban ecology and morphogenesis). The process ensured that the literature reflected the full intellectual spectrum of the European, Chicago, and morphogenetic traditions.

The criteria for inclusion were centered around texts that are either paradigm-defining or programmatic, which significantly advanced the comprehension of urban form, process, and structure, while also engaging in interdisciplinary dialogue, either explicitly or implicitly, across the domains of architecture, geography, and sociology: the criteria for exclusion eliminated purely technical applications, duplicative overviews, and non-urban research that did not provide a conceptual contribution (Table 1).

Table 1. Literature Scope and Selection Overview.

Element	Specification	Rationale
Time window	1960–2025	Captures canonical works and contemporary extensions
Disciplines/outlets	Architecture/urban design (Urban Morphology), planning/complexity (Environment & Planning B), geography/urban systems, and allied journals (Land, Cities)	Ensures cross-paradigm coverage
Databases & sources	Publisher sites + journal archives; backward/forward citation tracing from canonical texts	Complements keyword search with lineage mapping
Keywords (indicative)	Typomorphology, plot/parcel system, urban tissue, ilot, Chicago School, invasion–succession, sector model, multiple nuclei, morphogenesis, structural geography, positional structure, anisotropy	Targets each school’s core conceptual language
Inclusion criteria	(i) Paradigm-defining or programmatic texts; (ii) works explicating mechanisms or processes; (iii) contributions linking physical and social dimensions	Prioritizes explanatory and integrative relevance

Table 1. *Cont.*

Element	Specification	Rationale
Exclusion criteria	Purely technical applications without conceptual contribution; duplicate overviews; texts lacking urban form focus	Maintains conceptual signal over methodological repetition
Languages	Primarily English; seminal works in French and Italian when directly relevant	Preserves European school lineage and theoretical origins
Output of screening	Canon of ≈ 70 –80 representative works balanced across schools	Enables comparative analysis without over-extension
Goal	Conceptual integration of static, dynamic, and structural views	Guides synthesis across disciplinary boundaries

To enhance transparency in the literature selection process, a PRISMA-style flow diagram has been added (Figure 1). The diagram summarizes how records were identified, screened, and included following the PRISMA 2020 reporting structure adapted for selective narrative reviews. A total of 480 records were retrieved from Web of Science, Scopus, Google Scholar, and publisher archives, supplemented by 48 additional records identified through citation tracing. After removing 92 duplicates, 388 unique records were screened for relevance to urban morphology and interdisciplinary integration. Of these, 142 full-text articles were assessed for eligibility, and 80 publications met the conceptual and methodological inclusion criteria to form the final synthesis corpus. This process demonstrates a rigorous yet selective approach consistent with the narrative review’s conceptual orientation.

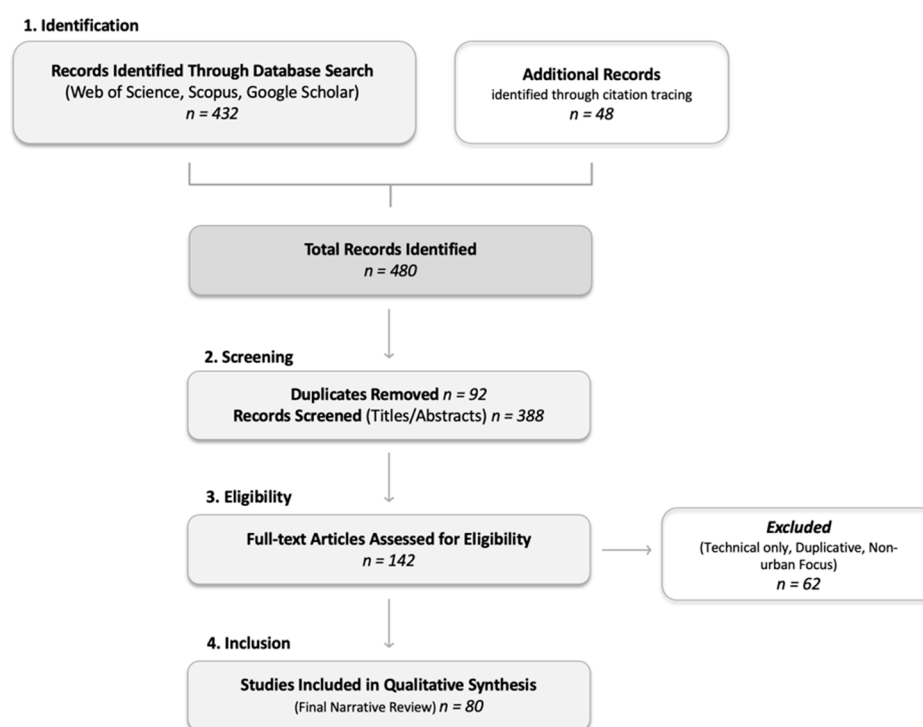


Figure 1. PRISMA-style flow diagram illustrating identification, screening, and inclusion of literature.

2.3. Analytical Framework and Coding Logic

Seven analytical dimensions were chosen to systematically evaluate the different urban morphology traditions found in European and Chicago schools, as well as the morphogenetic approach. The analytical dimensions were created to understand the diverse conceptual, methodological, and disciplinary approaches found in European and Chicago schools of thought, as well as the morphogenetic school of thought.

Ontology of form (D1)—the conceptualization of urban form is articulated through static dimensions (as observed in typology and constructed fabric), dynamic aspects (as manifested in social processes), or structural elements (as represented in systemic or relational frameworks);

Epistemic aim (D2)—the inquiry’s objective is to ascertain whether the methodology endeavors to depict, elucidate, or model urban form and its transformation.

Scale of analysis (D3)—the geographic dimension at which the study is conducted, ranging from parcel and block to neighborhood, urban area, or systemic framework.

Mechanisms of change (D4)—the methodologies through which transformation transpires, encompassing typological continuity, social mobility, or morphogenetic emergence.

Tools referenced (D5)—the analytical or representational methodologies utilized, including mapping, morphometrics, or structural modeling.

Social–spatial coupling (D6)—the extent to which physical and social dimensions are interconnected or addressed independently.

Design relevance (D7)—the degree to which theoretical understandings can influence urban planning, design, or policy formulation.

The framework enabled researchers to compare different studies through coding, revealing both commonalities and differences between various traditions. The method employed qualitative interpretive procedures rather than statistical analysis to create a structured reading tool that maintained disciplinary consistency. The coded synthesis revealed how each school bases its approach on particular ontological and methodological beliefs, while offering unique perspectives on urban form, process, and structural relationships.

The summarized outcomes of this analytical coding are presented in Section 5, which provides the empirical foundation for the comparative discussion and the formulation of the Meta-Framework of Integrative Urban Morphology. The research emphasizes theoretical connections over empirical validation. Selection bias and subjectivity were mitigated by the use of defined criteria and a balanced distribution. The findings aim to create a theoretical framework for future empirical research.

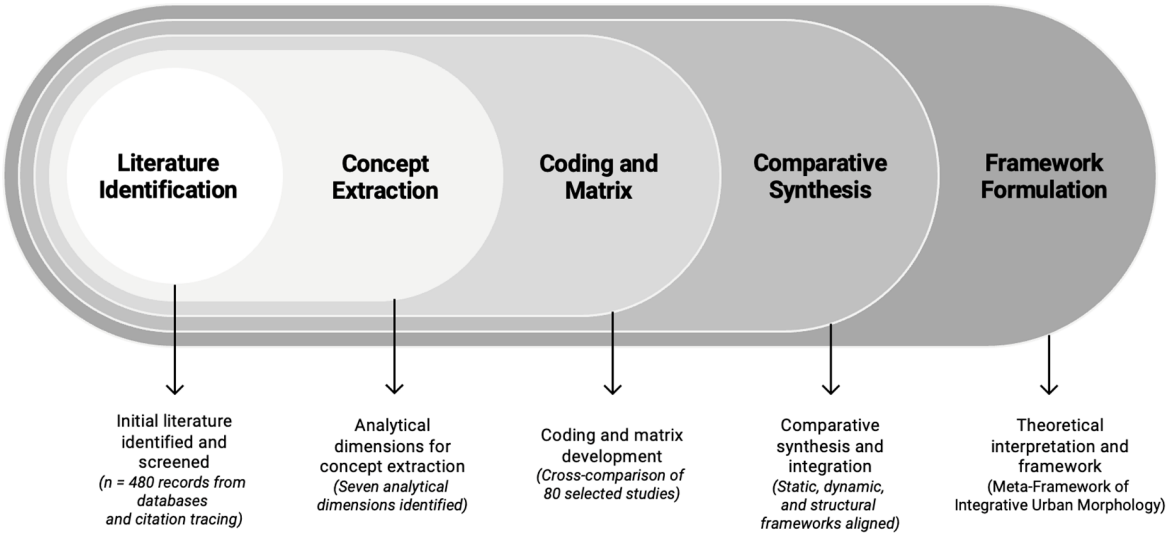
To illustrate how conceptual dimensions were operationalized, Table 2 provides an example of the mapping process linking each analytical concept to representative indicators and data sources. This mapping clarifies how abstract categories such as ontology, mechanisms of change, and social–spatial coupling were coded and interpreted using concrete references extracted from the reviewed literature.

Table 2. Concept, Indicator/Data Source Mapping, and study Analytical Workflow.

Analytical Dimension	Conceptual Focus	Example Indicator	Representative Data Source/Studies
D1. Ontology of Form	Physical, social, or structural conceptualization of urban form	Typological classification; structural schema	Conzen (1960); Muratori (1959); Rossi (1982)
D2. Epistemic Aim	Objective of inquiry (description, explanation, emergence)	Purpose statement; analytical orientation	Whitehand (1987); Moudon (1997)

Table 2. Cont.

Analytical Dimension	Conceptual Focus	Example Indicator	Representative Data Source/Studies
D3. Scale of Analysis	Spatial hierarchy of analysis	Plot, block, neighborhood, systemic scale	Cataldi (2002); Kropf (2018)
D4. Mechanisms of Change	Transformation processes	Accumulation, invasion–succession, positional dynamics	Burgess (1925); Desmarais (1998)
D5. Tools Referenced	Analytical and representational methods	Mapping, typological survey, graph models	Hillier & Hanson (1989); Oliveira (2016)
D6. Social–Spatial Coupling	Integration of social and physical structures	Network density, land-use mix, behavioral indicators	Lefebvre (1991); Panerai et al. (1997)
D7. Design Relevance	Application to planning and design	Design guidelines; spatial policy connection	Trancik (1986); Carmona (2014)
Analytical Workflow for Integrative Urban Morphology			



3. The Urban Morphology in Question

The concept of morphology can be traced back to ancient times, particularly among the Greeks. Two aspects of thought have been developed and form the basis of the Western morphological tradition: the description of the components of form in a whole-part relationship and the idea of evolution, that is, the dynamics of forms [9]. From the beginning, space and time were recognized as two fundamental attributes of morphology, hence the idea of a “chain of being” resulting from the historical approach in the middle of the 18th century which emphasized the sequence of forms across time: past, present and future [10].

The term morphology originates from naturalistic biology and concerns the organic forms and their structure, specifically the architecture of organisms. Later, the concept was introduced in human geography, particularly for explaining historical phenomena [11]. The use of the term morphology in the field of urban studies refers to the science that examines the form of human settlements and the processes of their formation and transformation. This science aims to understand the space occupied by people, the physical structure of the built environment, and its characteristics through the examination of the motivations of formation. The physical analysis of the structural components is often performed at different scales to explore open-to-close ratios and their distribution within the occupied space.

There is abundant literature on urban morphology in architecture and in the planning theory that derives from it. Prior to the 1960s, this tradition was largely prescriptive and utopian in the elaboration of ideal cities, intended to organize human settlement. Howard's garden cities of tomorrow [12], "la Ville Radieuse" The Radiant City. Elements of a Doctrine of Urbanism to be Used as the Basis of Our Machine-age Civilization." proposed by Le Corbusier [13], or the design of Broadacre model designed by Wright "When Democracy Builds" [14] are notable examples. The criticism of the 1960s developed more analytical approaches to the urban form seeking to reconstitute an order underlying what some call "urban disorder" and to maintain the integrity of the urban form [9]. In this last perspective, urban morphology constitutes a field of knowledge essentially concerned with the structure of the urban form [15], and which should contribute to the practice of the design of this form [16].

Larkham argues that understanding the physical complexities of the different scales—buildings, lands, and streets—that make up the structure of cities helps us understand how cities have grown and developed. Qualities of place are often attributed, in considerable measure, to physical characteristics such as size, scale, and the relative relationships between different elements. This knowledge helps us appreciate what is successful or not, and provides structural elements for future forms [16].

The most prominent exponents of the critique of utopian approaches were Lynch [17], Jacobs [18], and Alexander [19], who proposed a more humane approach to urban planning, based on observing what actually works in existing cities as characteristics or physical design. Alexander's work, for example, introduced formal mathematical concepts into the debate over shapes. A series of subsequent works in urban morphology have focused on what works and what is possible to achieve in the field of urban planning [20]. All of these works, and many others [21,22], have relied on "mathematical tools" including graph theory and set theory to produce more refined representations of urban form that can be useful for planning. These led to the development of what has been called "space syntax" [23,24] as models for the formal representation of relationships between forms, based on structural measures, to describe the structure of a city.

Human geography research is also well-established. In the Anglo-Saxon world, they are rooted in the German tradition of "Kulturlandschaft" the cultural landscape inaugurated by the geographer Whitehand [16]. His work provided an explanatory morphology based on the relationships between form, function, and development. Sauer [11] coined the term "landscape morphology" to describe a synthetic approach to form that identifies the structural elements of cultural landscapes and organizes them by development sequences. Conzen [25] views urban landscapes as a mirror that reflects society's functioning. Their material forms reveal the various needs of society and its populations, such as housing, work, transportation, and leisure. When these needs change, the urban landscape changes in turn.

Raymond Ledrut [26], who introduced new registers of form and studied the relationships between form and meaning, social morphology, and semiology, developed a social approach in French-speaking countries. He was led to create an inventory of forms, such as form-scheme, form-object, form-machine, form-quantity, form-sign, aesthetic-mathematical form, form harmony, functional form, symbolic form, while establishing their correspondences with space, which is also defined as space-structure, space-extent, organic-space, cultural space, and specifying that we cannot evoke any social form without questioning space.

A typology of cities, according to Albert Levy, can thus only be integrated into a typology of social forms and "social spaces." It remains to be seen how these forms and spaces interact. There are numerous approaches to dealing with the city and its space: as

an expanse, a population, a work, a symbol. One must attempt to connect these elements and discover their unity [27].

Accordingly, Roncayolo insists that morphology is also social, as it studies the distribution of settlements, the distribution of social groups, and the deployment of their movements. Material forms being social constructions and places of practice, they can only be understood appropriately from transversal and multidisciplinary approaches [28].

A city, according to Park, is “a spatial organization of social groups.” He contends that a city is made up of more than just buildings and people, but also of how space is organized within it. Individual or group positions within the city express this morphology. The spatial organization of the city is the result of self-organizing forces [29]. Urban morphology in Carmona is the study of the relationship between form and urban space, providing information to urban planners and architects to help them become familiar with local patterns of development and the processes by which those patterns are altered [30].

Morphology is the study of the form and structure of entities in its broadest sense. Urban morphology is concerned with the evolution and transformation of cities over time, within the context of urban development. Urban morphologists study the evolution of a city, from its early years to its subsequent transformations. This could include investigating the physical layout of streets and buildings, as well as the social uses of space and the symbolic meaning of urban places. Urban morphologists can gain insight into a city’s current form and potential future development by understanding its historical evolution.

From these different research perspectives, we understand that urban forms are objects constructed from a hypothesis or a point of view that we can categorizing as following: first, the form as a fabric whose analysis is developed by the three morphological schools, Italian and English as well as the French; second, the form as traced, the study of which was initiated by German geographers; finally, the form as a dynamic genesis introduced by the Chicago School in the 1920s and more recently deepened by structural geography [31]. In the remainder of this study, we will explain, examine, and discuss each of these three approaches to better understand the chronological development of the concept of urban morphology (Figure 2).

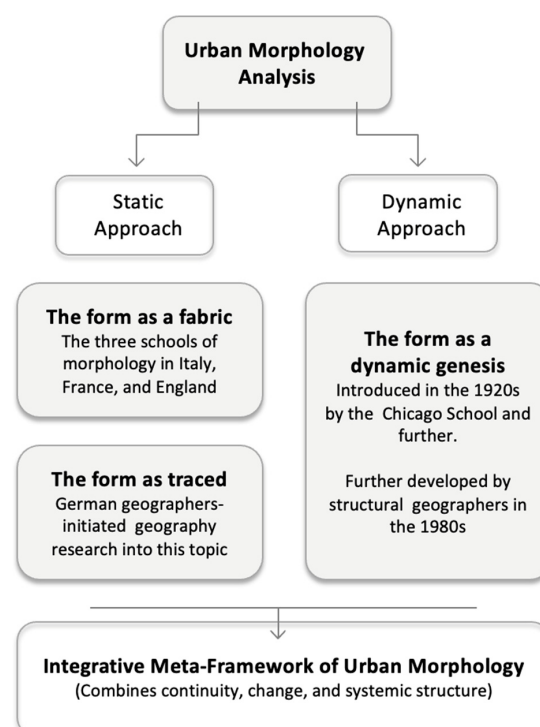


Figure 2. Urban morphology analysis approaches.

4. Models of Urban Morphology

The analysis of quantitative and qualitative outputs of schools of thought concerned with urban morphology is crucial for comprehending the urban fabric. These outputs provide important tools for understanding the physical, social, and economic aspects of urban areas. Together, these approaches provide a comprehensive understanding of the complex nature of urban environments, informing policy decisions related to urban planning and development.

4.1. *The Three Schools of Urban Morphology*

Numerous studies have been conducted on urban morphology. Moudon and many other language researchers divide them into three major schools: British, Italian, and French [32–34]. It is impossible to discuss the various aspects of urban morphology, including geography, architecture, and urban design, without mentioning these schools of thought, which reflect different types of research; thus, such a classification is crucial. The three major schools of urban morphology in Europe have proposed conceptual tools for rationally describing the built environment. They are the University of Birmingham research group, based on Conzen's work; the Italian school, based on the work of Saverio Muratori; and the French school of Versailles, based on the work of Castex and Panerai.

Driven by heritage concerns, the physiological approach initiated by Conzen [35] primarily focused on the study of small towns of medieval origin in England, before expanding to more complex urban forms. The method consists of dividing the entire urban fabric into systems and studying them separately before analyzing their interactions. Four systems are recognized as being relevant: the parcel system, which divides the land into units of land ownership; the street system which allows movement between the plots; the built system, i.e., all buildings regardless of their function or form; and the system of open spaces, space not built and not included in the street system, whether public or private. The plot and road systems form a coupling called the “mode of distribution” of urban space, while the systems of buildings and open spaces form a coupling called the “mode of occupation” of the urban territory. The first occurs in a two-dimensional space while the second requires a three-dimensional representation. At the building level, only large volumetric variations are considered; the detailed analysis of various constructions is not the focus of this type of analysis.

Furthermore, a priority of the analysis is the persistence or lifetime of the elements that are part of each of these systems. In the case of the urban plan, these elements tend to oppose a strong resistance to the changes. For example, there are numerous and ancient networks of paths through the urban area that are still visible in the landscape today. The use of the ground and the uses of the built forms, on the other hand, tend to be much more ephemeral, with the building occupying an intermediate position in its resistance to change. Four distinct processes are considered to study these changes. What Conzen [35] calls “accumulation” refers to the introduction of new urban forms during successive historical periods, which fit into existing fabrics because they meet the needs of the inhabitants. Adaptation, on the other hand, is the way in which old forms are modified while retaining their usefulness when needs have changed. Transformation is a change caused by the existing urban form, while replacement is the substitution of existing forms by others under the pressure of new needs [35].

The study of these change processes affecting the systems identified by morphological analysis results in the production of maps that delimit the “morphological regions” or landscape units of a city, which can be ranked according to their historical origins and types of resistance to change, providing an opportunity to visualize a community's cultural identity. Since Conzen conducted his study of Alnwick [36] and published it in 1960, i.e.,

in the past 60 years, his school of thought has advanced considerably. *Journal of Urban Morphology* is a good starting point.

The British approach is a theory that contends recent urban changes are not entirely new occurrences, but rather the continuation of previous alteration processes. This is the cornerstone of the British strategy. As a result, the British school of thought conducts its research on urban morphology by considering specific study domains and adhering to a predetermined methodology. Meanwhile, it considers the existing circumstances, as well as the process of change [37].

The Italian school of typo-morphology developed during the 1960s from the pioneering work of Saverio Muratori [38] in his study of Venice and Rome. The approach intends to combine the study of urban morphology and that of architectural typology to think in terms of the relationship between the urban form (road network, plots, boundaries, etc.) and the typology; that is, the types of construction (position of the building in the plot, internal distribution, etc.), one type being obtained by the search for co-presence, invariants, on the one hand, and deviations and variations on the other, in the features of the building and the urban form.

Typo-morphology is intended as a response to the crisis of the modern movement in architecture. While the latter disregarded the history of the place, the approach proposed by Muratori is an attempt to reintegrate the history inscribed in the form of the building, in the street and in the plot, within the process of design, an “active history” which, starting from the breakdown of types of urban fabric, is capable of guiding the choices of the present for a long-term project [39]. Going back in time, the “historical parcellography” developed by Muratori is inspired by the descriptive methods of archaeology, applying them to the field of art history, which was traditionally dominated by archival scholarship. It leads its author to describe the typologies of habitat as generators of urban forms and to sketch through this an analysis which reconnects with the tradition of “embellishments” and then “aesthetics of cities” which had dominated the thought of the 19th century. For Muratori, an understanding of history is therefore a prerequisite for the project, and this principle will strongly influence the thinking of his followers: Aldo Rossi, Carlo Aymonino, Vittorio Gregotti, and Gianfranco Caniggia [40].

Other comparative studies [41,42] have emphasized that despite their different epistemological orientations, these schools share a common methodological foundation rooted in the interplay between form, history, and process. Each proposes not only an analytical lens but also an ontological stance toward the city. The British school treats urban form as a historic record of continuity, focusing on processes of accumulation and adaptation. The Italian school regards form as a generative structure that evolves through typological permanence and transformation.

The French school frames the city as a social and perceptual construct, shaped by lived experience and collective memory.

Together, these perspectives produce what Conzen [35] called a “morphological continuum”—a conceptual bridge between the empirical observation of form and the interpretation of its meaning in social and cultural terms.

According to Aldo Rossi, the architecture of the city is essentially its form, which is a summary of the total character of urban objects, including their origins [43]. His criticism of functionalism and organicism is clear, where he asserted “Functionalism and organicism, the two main currents that have penetrated modern architecture, reveal their common roots, the reason for their weakness, and their fundamental ambiguity. . . the urban type is reduced to a simple scheme. . . of thoroughfares, and the architecture is considered to have no autonomous value” [43]. There is a dialectical relationship between the typology of material objects that make up the city and history as a revelation of shared values. Rossi

views the city as a collection of man-made material objects, which are constructed over time. In addition, he views history as the study of the actual formation and structure of urban objects, which is a synthesis of shared values.

The type, according to Muratori, is built from the relationships between the elements of the plot, the street network, and the built and unbuilt fabrics. The type he explains is “something permanent,” a logical principle that exists within and which constitutes the form [38]. Types for Muratori and his followers aid in explaining the continuity of the urban structure, with its permanent characteristics and distinct identities. They transmit shared values over time, shaping and directing the city’s future, and contributing to its evolution. Similarly to Rossi, where the built environment reveals society, the urban form is a result of the history and memory of its inhabitants; each place is unique and has its own identity.

The Italian school of urban morphology examines what is happening by analyzing the types within the city’s tissue. This approach aids in understanding how cities have evolved and changed over time, with special attention paid to different neighborhoods that are evolving differently even though they are participating equally in the growth around them; understanding these differences can also tell us something about why one area may be more prosperous than another—or whether some change has been for the better or for the worse.

The French school of Versailles, led by architect Jean Castex, sociologist Jean-Charles Depaule, and architect-urban planner Philippe Panerai [44], adopted certain theoretical concepts from the Italian school of thought as responses to modernism. Nonetheless, intelligent debate about urban life influenced the development of inventive architecture. It was also linked to the harsh criticism of sociologists such as “Henry Lefebvre.”

The French approach to urban morphology is informed by both sociology and architecture. This two-sided perspective leads to a number of goals, including a strong connection with sociological sciences, an examination of how people and their environments are linked in two ways, and the discovery of a way to discuss design theory in both theoretical and practical terms [37]. This perspective has led to some significant discoveries, including the understanding that cities are not only physical places but also social constructs. This perspective has also highlighted the significance of considering how urban spaces function and appear.

Due to the examination of various models and theories, the French school of thought does not believe in any distinction between “before” and “after.” It considers how an idea affects patterns, types, and forms in relation to one another. The most significant feature is its consideration of theories of urban form creation. Because traditional morphological analysis cannot explain modernism and its new spatial concept, the French school of thought developed its own framework to incorporate observational and perceptual studies [37,45].

Panerai and Castex write in their book *Urban Forms: The Death and Life of the Urban Block* [44], French architects conducted methodological–morphological experiments. Urban planners continued to believe that the magic of planning was based on large scales, and sociologists who sought out city residents and criticized bulldozer restoration swayed numerous political factions. They consider the consequences of this type of refurbishment to be equivalent to dismissal [44]. As a result, it is clear that the impact of French renovations established and clarified a collection of scholarly ideas on the theme of urban form.

Panerai and Castex developed the “Island” concept as a critical component for studying the city of the twenty-first century, because modernism and its new spatial concept cannot be understood through traditional morphological analysis. As a response to Modernism’s negative effects, the concept of “Island” offers an alternative approach to addressing the deficiencies in morphological studies’ third dimension. As a result, the French school

of thought developed its own framework for incorporating perception and observational studies [46,47].

While the previous paragraphs highlight the genealogical roots of each school, contemporary research in urban morphology and complexity theory [48–50] has prompted scholars to reinterpret these traditions in light of systems thinking. The British concern with persistence parallels the notion of path dependency in evolutionary geography. The Italian idea of typological transformation resonates with morphogenetic emergence in complexity science. Meanwhile, the French attention to perception and lived space prefigures embodied cognition and relational spatiality in urban studies.

These linkages reveal that each school operates within a broader epistemic ecosystem, where form, process, and meaning are not isolated but co-evolve. Thus, instead of representing fixed traditions, they can be viewed as interacting subsystems within a meta-framework of urban theory, each contributing unique methodological instruments for multi-scalar analysis (Table 3).

Table 3. Matrix showcasing the differences between the three schools of thought on urban morphology.

Analytical Dimension	British (Conzenian)	Italian (Typo-Morphological)	French (Versailles)	Contemporary Synthesis/Research Implication
Ontological focus	Urban form as historical palimpsest	Urban form as typological system	Urban form as socio-perceptual construct	Integrates material, typological, and experiential dimensions of form
Analytical unit	Plot, street, town plan	Building type, urban fabric	Urban block, lived space	Enables multi-scalar reading from parcel to perceptual field
Mechanism of change	Accumulation, adaptation, transformation, replacement	Typological continuity and mutation	Social practice, perception, and re-appropriation	Supports dynamic modeling of morphological change
Methodological tools	Cartographic analysis, map regression	Typological survey, historical parcellography	Observational and ethnographic analysis	Combines quantitative mapping with qualitative observation
Relation to society	Implicit—form reflects collective history	Mediated—form transmits social values through type	Explicit—form expresses social behavior and representation	Bridges physical and social interpretation of urban space
Design relevance	Conservation and landscape planning	Architectural and urban design guidance	Design as socio-cultural mediation	Expands from descriptive analysis to projective urban design
Key pioneers	Conzen, Whitehand, Larkham	Muratori, Rossi, Caniggia, Aymonino	Castex, Panerai, Depaule, Lefebvre	New synthesis: Oliveira, Moudon, Batty, Portugali
Epistemological contribution	Structural continuity	Historical typology	Socio-spatial experience	Toward integrated morphogenetic theory

Before concluding this section's analysis, we compare each school's Theoretical foundation, Main purpose, Approach, and Early Pioneers using a comparison chart.

The historical trajectory of urban morphology reveals a progressive convergence between social and spatial paradigms. The development of these schools followed a sequence of intellectual stages that brought new research focus points and notable experts (Table 4).

Table 4. Temporal Distribution of Urban Morphology Scholarship.

Period	Focus	Representative Works
1920–1950	Foundations of the Chicago School and ecological models of urban growth	Burgess (1925), Park (1936), Hoyt (1939)
1950–1970	Emergence of European typomorphology and historical-geographical morphology	Muratori (1959), Conzen (1960)
1970–1990	Theoretical consolidation integrating type, structure, and perception	Caniggia & Maffei (1979), Rossi (1982), Panerai (1990), Whitehand (1987)
1990–2025	Methodological expansion and interdisciplinary synthesis	Desmarais (1995), Kropf (2001), Moudon (1997)

The three schools of urban morphology, the contributions of which we have just summarized, without a doubt, constitute essential tools in the training and practice of architects and urban planners (Table 1). Nevertheless, several criticisms have been voiced [46,51]. Such criticisms are based on an outdated conception of the city, described by some as nostalgic, which primarily refers to a dated—and therefore obsolete—functioning and form of the city. For example, spatial continuity, parcel divisions, and streets are not understood in the same way in the old city as they are in the modern one, especially in view of its metropolitan transformation. Such approaches cannot then be suitable for objects as different as the traditional city and the new metropolitan reality, where the connection to transport networks matters more than the contiguity to the built front and where the investment cycles of real estate capital follow, as well as the influence of logic that was not present in the traditional city. Accordingly, some believe that the interest of these morphological analyses is limited to the description of urban forms and cannot be an instrument for their realization, which is part of a context study and not an urban project.

Despite critiques regarding nostalgia or limited applicability to metropolitan conditions, these schools remain indispensable for understanding how form mediates between the physical and social orders of the city. Their theoretical tools have proven adaptable when reinterpreted within contemporary frameworks—such as space syntax, urban resilience studies, and network morphometrics—that continue to rely on foundational notions of type, structure, and spatial persistence.

The British, Italian, and French urban morphology schools have merged to create a new interdisciplinary field of urban form science, which combines geographical knowledge with architectural principles and social scientific theories. The analysis of these traditions shows how urban space combines form with process to create meaning through urban design, which affects and gets affected by morphological theory. Current research trajectories thus advocate a hybrid morphology that bridges typological reasoning with data-driven urban analytics, translating classical theory into actionable knowledge for twenty-first-century urban design and policy, as exemplified in the works of Trancik, Lynch, and Cullen.

The Dialectical Connection Between Urban Design and Urban Morphology

The Urban Design movement emerged in the United States in the 1950s and 1960s, developing at several universities, including M.I.T. and the Harvard Graduate School of Design, following the initial work of influential journalists such as Jane Jacobs, Gordon Cullen, Kevin Lynch, and Christopher Alexander. The expression refers to the process of shaping and planning urban agglomerations of all sizes, carried out from an understanding of the material components of urban space, and taking into account the particular contexts and economic, political, social, technical, and environmental factors.

Preconception precedes construction in the case of design, where urban design encompasses all types of urban design, including architectural and infrastructure design (otherwise associated with architecture and engineering). Urban design is the organization of urban structure, the manipulation of linkages, and the creation of coherent ensembles of buildings and spaces. Analysis and synthesis are both involved in urban design [52]. Urban design, like urban morphology, can operate at various scales, but it is most commonly associated with the scale between architecture (buildings) and town planning (settlements).

Urban design is a discipline that is often misunderstood. Often, it is viewed as merely the practice of designing cities or urban areas. However, urban design is much more than that. It is a complex and multifaceted field that deals with the planning, development, and regeneration of cities and urban areas. At its core, urban design is about creating places that are livable, sustainable, and resilient. It is about creating places that people want to live in and visit. Places that are safe, healthy, and provide opportunities for all. Urban design is a crucial approach for cities to address the numerous challenges they face today. From climate change and the need for more sustainable and resilient cities to the ever-growing problem of urban sprawl, urban design plays a key role in finding solutions [53–55].

When we think of the physical form of a city, we think of urban design—the deliberate planning and creation of buildings and spaces. However, urban design is only one aspect of the broader field of urban morphology, which is concerned with understanding the relationships between city form and function. While urban design focuses on the construction of new structures, urban morphology is more concerned with analysis, examining how existing buildings and spaces interact to form the overall form of a city. Due to this disparity in emphasis, urban morphology and design are often not properly integrated. They are, however, closely related fields, and a better understanding of one can lead to better results in the other.

As a result, the urban fabric functions as a “common ground” for urban morphology and design. In some ways, they are intertwined: morphology may be part of the urban design process, and design may be part of what an urban morphologist infers. To gain a better understanding of urban design, we will examine the work of some of its pioneers.

Roger Trancik [3] recalls in his summary work that urban design offers a method of analyzing the built fabric, divided into three hierarchical levels ranging from the study of figure/background relationships to that of places interpreted by users. Passing through the connections and networks between the constructions and the urban blocks (Figure 3), the combination of the three layers allows for a more refined inventory of the intervention sites [56] (Figure 3).

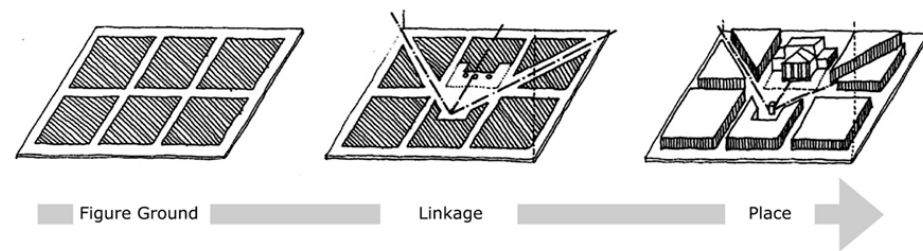


Figure 3. The three levels of urban design analysis. Source: Redeveloped from ref. [56].

Trancik defines figure/ground relationship analysis as “a graphic tool to illustrate empty/full relationships, a two-dimensional abstraction in a plan that specifies the ordering of urban spaces” [3]. Its two fundamental components are buildings (the solids or figures) and open spaces (the voids or backgrounds), the study of which must enable the identification of underutilized spaces in a city plan (finding lost space) and thus serve as a guide for urban design by clarifying what must be made consistent.

For solids, a distinction is made between public monuments or large private buildings, built blocks or urban blocks, and the alignments, or built fronts constituting an edge. For the voids, we find the forecourts facing the monuments, the internal courtyards of the blocks, the networks of streets and squares, the parks and gardens, as well as the linear open spaces. It is also essential to note that the combination of these elements can vary between traditional and modern cities. Trancik provides examples of this with the Giambattista neighborhood in Rome, where the density of solids is significantly greater than that of voids, and the Upper East Side of New York, where the opposite is true (Figure 4).

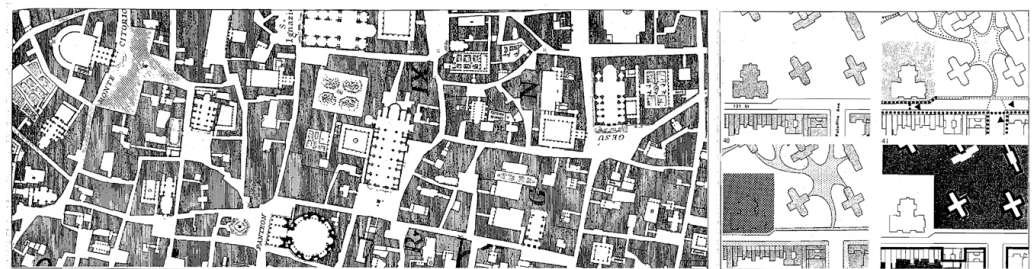


Figure 4. From Noli the figure/ground ratio of the Giambattista district in Rome (left) and the Upper East Side in New York (right). Source: Redeveloped from [56].

Trancik used the comparison between these two situations to distance himself from modern urban planning. According to him, the traditional city’s high density and great variety of solid forms, as well as the irregular outlines of the street network’s voids, increase the possibilities of readability and guarantee an increased urban quality. In contrast, the modern city’s low density and uniformity of solids, as well as vast expanses of poorly differentiated voids, reduce these possibilities and result in an inevitable poverty of urban qualities. In modern planning, figure-ground relationships lose their complexity and move away from the human scale, which is a constraint that should be considered in the urban form design process. Thus, the figure/background analyses proposed by Trancik lead to the recognition of six types of spatial configuration: orthogonal, angular, and curvilinear forms, as well as radio-concentric, axial, and organic forms (Figure 5).

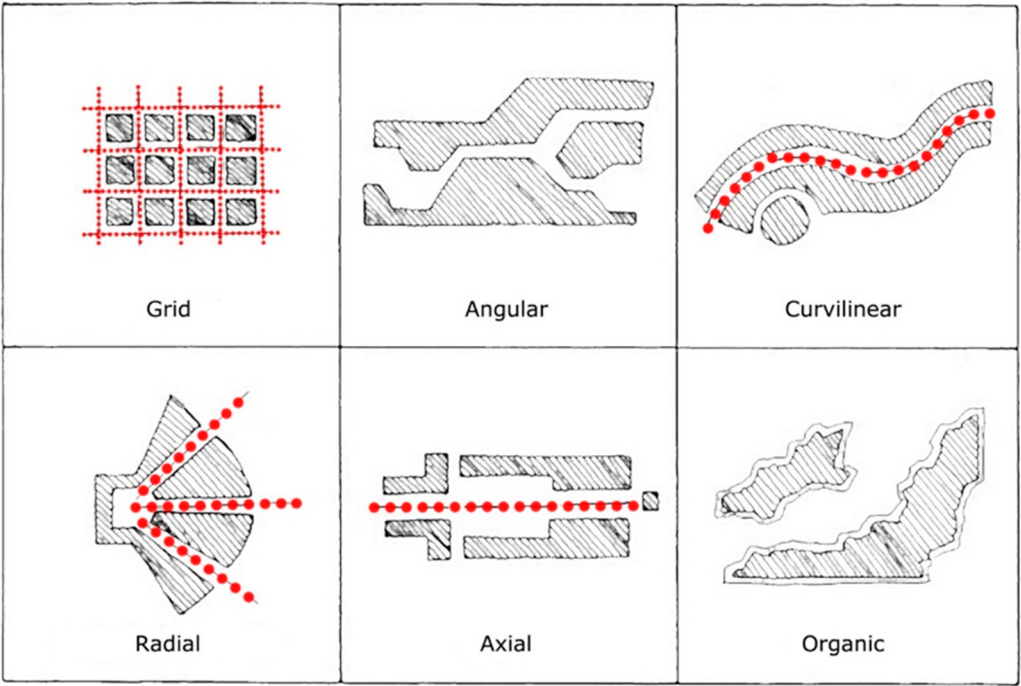


Figure 5. Types of spatial configuration.

The approach developed in urban design at the second level of describing urban forms concerns the connections, which Trancik defines as “the lines of the site, the directional flows of movement, the organizational axes, or the edges delimited by the buildings” Trancik [56]. Connection analysis yields three types of form: compositional form, mega-form, and group form. The first type includes geometric figures created by combining the connecting lines between buildings in any urban environment. The second type is formed by the joining of connective lines between the first type’s forms when networks link them. The third type is formed by connecting lines between large-scale urban areas and consists of evolving organic figures (Figure 6).

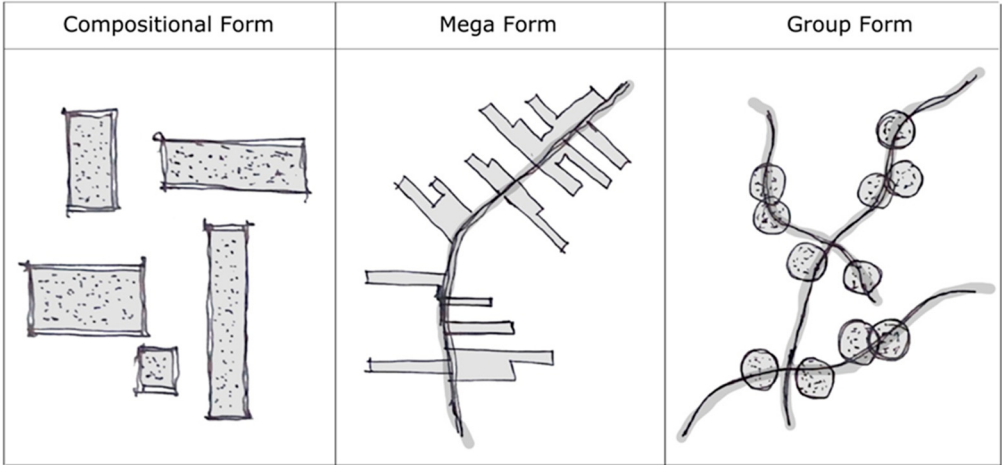


Figure 6. Types of urban fabric connections.

At the third and final level of description, urban design addresses the question of places and their distinguishing characteristics by investigating the social and cultural representations derived from the visual perceptions of city users. At this level, the types of built forms and their modes of spatial distribution—the colors, textures, and volumes of the buildings—are related on the one hand to the tastes of the users, their greater or lesser

familiarity with the places, their frequentation, and their wandering in the city. What is at stake here is urban identity: a cognitive elaboration resulting from users' daily experiences. As a result, the issue is particularly important for urban planning and deserves a little more attention [56]. This theoretical dialogue between urban design and morphological analysis lays the groundwork for understanding urban change as a dynamic and self-organizing process. This perspective is elaborated upon in the following section.

4.2. The Dynamic Approaches to Urban Form

The theoretical approaches presented thus far address the issue of urban forms from a static standpoint, each favoring classification or typology to propose tools for intervention in the built fabric in its own way. They are thus primarily taxonomic and descriptive, even if some are interested in genesis processes but limit their research to history or economic production modes. One particular limitation of this approach is that it does not allow for the prediction of the effects of an intervention on the surrounding territory, assuming that what is desired is a transformation of form rather than a change in function. Another shortcoming is that these approaches frequently fall into the trap of essentialism, attempting to identify those elements that constitute the "essence" of a city and are thus unalterable. Finally, it is worth noting that the majority of these theories are developed from a Eurocentric perspective, making them challenging to apply in non-Western contexts. As a result, theoretical frameworks are required that can account for the dynamic and complex nature of cities, as well as their geographical and cultural specificity.

This section will supplement the existing models by proposing new models of city spatial organization generated by dynamic processes related to individual or group mobility. Both dynamic and explanatory approaches to space occupation will be used for the appropriation and development of these spaces. We begin with the work of the Chicago School, whose authors were among the first in the first half of the twentieth century to develop genesis models. We then turn our attention to more recent theories, such as the structural theory of urban morphogenesis, whose original concepts deepen and enrich the intuitions and hypotheses of previous theories. Understanding these theories allows us to gain a more complete understanding of how cities are organized and evolve over time.

4.2.1. The Chicago School

The Chicago School [57–59] considers the city a human community, where people, institutions, and space are interdependent. The city's social mechanism places people far from their homes. The development of the city's districts, which leads to a configuration, and the complexity of population movements for space occupation are spontaneous, unplanned external processes. Self-organized processes resemble life formation.

No social class or group dominates space layout in the Chicago School's city. The city is organized through self-organizing processes, much like living things, rather than impersonal social forces. Chicago School authors utilize terms from animal and plant ecology. A "super-organism" city considers society and space. It considers the impact of space on individuals and institutions. It involves examining how space and cities influence the formation of social groups. Robert Park, a leader of the Chicago School, suggests that people can affirm and reproduce their lifestyles through urban space. Large cities, with more diverse and segregated populations, exhibit morphological characteristics not found in smaller populations [29,57].

Park says urban planning distinguishes a city from a village or small town. The city isn't buildings and people. It's space-organized, giving the city individual or group positions. In this way, society's morphology depends on individual relationships. We can only understand social ties by studying this type of organization, positional relationships

in the city. Competition regulates positional relationships despite socioeconomic, cultural, project, and action differences. This phenomenon resembles animals and plants fighting for life [60].

Prestigious businesses, political power institutions, and large corporate social centers will occupy the city's most coveted areas and strategic positions, creating urban hubs. Residential habitat distribution appears to be subordinate to land appropriation, but it follows similar laws. Light industries around the central business district often polarize modest residential neighborhoods, attracting workers and new immigrants. Wealthier social strata reside in single-family homes, often located far from central congestion [60,61].

Park calls the city's distinct zones "natural areas" whose borders are "natural limits" because both are the result of a double process of genesis: a self-organized selection process through competition between individuals and groups for the appropriation and occupation of urban space and an integration process motivated by the affirmation of individuals' group membership. No outside actor or planner controls these processes. These processes unfold naturally, creating zones with natural, not artificial, boundaries [60]. The city's space does not match census sectors or legal and political districts. The city's space is the result of self-organizing forces that delimit zones where social groups establish themselves without official limits imposed for specific reasons.

4.2.2. The Relationship of Spatial Organization to the Economy

Park, Burgess, McKenzie, and Wirth describe competition, interaction, and association in terms of money. Land and real estate rent regulate land use competition, as do unequal opportunities for social actors to occupy the most coveted and expensive sites. Urban space competition mirrors animal ecology's "struggle for life." This appropriation appears to be competition- and market-regulated. The "strongest" is the one with a privileged location and the financial capacity to defeat his competitors and retain the coveted location, according to McKenzie's texts [62]. Thus, land prices reflect competition and constraint. Land and building owners no longer invest in maintaining and enhancing a pending real estate heritage, causing physical and social degradation in transition zones around the central core. Groupings are based on economics [63].

Chicago school competition goes beyond market-based competition. Competition means crisis, upheaval, transformation, and mutation, among other things. Dynamic, not linear, leading to a stable equilibrium. This competitive atmosphere will inspire new mobility ideas. The "Agglomeration pulse" enables the spatial study of social changes. This is different from commuting or shopping. Daily, weekly, or seasonal vessel movements demonstrate a stable equilibrium. The Chicago school's mobility concerns urban space appropriation and occupation. Park: "Mobility (...) measures social change and social disorganization, because a social change is always based on a change of position in space and any social change, even that which we describe as progress, involves social disorganization" [11].

Mobility creates urban jobs through individual and group movements towards spatial occupation zones, whose social content it can modify and influence. It shows the city's demographics. Mobility can affect land values and the distribution of activities and residences. "Something's happening" when land values rise or change quickly. These cities are changing. As a result, land prices aren't indicators of a stable, static distribution of activities and people. Dynamic localizations are of interest. Classical economics and the Chicago School differ in their definitions of competition. Dynamic notions of dominance, invasion, and succession that explain city configurations are not based on the simple aggregation of individual behaviors in spatial economics.

4.2.3. The Models Developed by the Chicago School

The early 20th-century Chicago School developed spatial models. These models were created to study North American cities, but they are also useful for understanding other large cities, especially those with high immigration rates. Ernest Burgess proposed a concentric model for Chicago in 1925. (Figure 7).

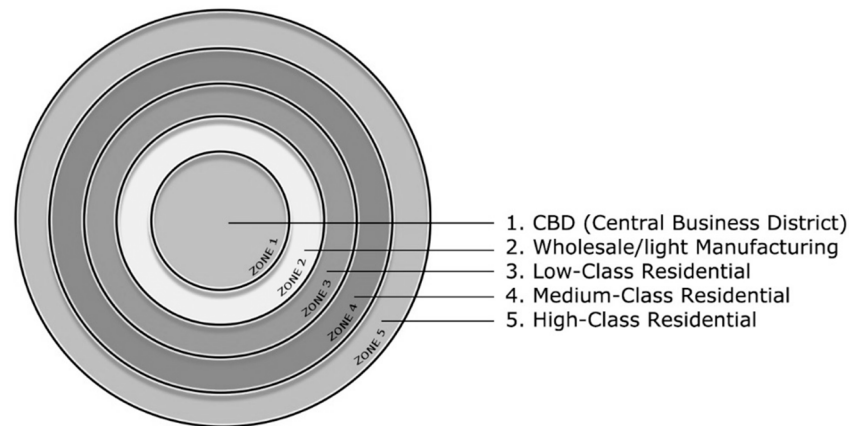


Figure 7. The concentric Burgess models. Source: Redeveloped from [57].

Most roads converge in Zone 1, Chicago's CBD. It includes the Town Hall, public administration, department stores, luxury hotels, theaters, performance halls, skyscrapers, and corporate and bank headquarters. 500,000 people worked there in the first half of the 20th century.

Zone 2 is a densely built, deteriorating area with poorly maintained buildings. The wealthy abandoned this area of quality buildings long ago. Land values no longer rise. Speculators often invest in plots of land and buildings, so their prices can fluctuate or drop suddenly. The whole sector is socially unstable because industries and labor are being replaced by marginalized people living in decrepit housing. This is Hobohemia, the "tramp" district near the Loop. Here, newcomers settle, and ethnic diversity is highest. There's Little Italy, the Jewish Quarter, Chinatown, the Greek Quarter, the Polish Quarter, and "Bronzeville," the Black Metropolis, on Chicago's South Side.

Zone 3 is continually being built and has a population with modest incomes, but a better family and community structure. Workers who left Zone 2 slums have moved into newer apartment buildings or small houses where they are sometimes owners or tenants. Zone 4 comprises luxury houses and apartments. Shopping areas, hotels, villas, and mansions abound. This is where the wealthy live and embrace the American individualistic lifestyle. There are many parks and green spaces. Zone 5 includes rural suburbs, where small estates are far from the business center and attract middle-class workers who commute daily.

Such concentric zoning translates city growth stages and refers to a plant ecology model. In nature, resistant species are the first to colonize bare earth. New plants gradually replace the original inhabitants. There are dominance and succession phases. The same is true for urban growth: Burgess' model shows a succession of occupation patterns. Zone 2 initially attracted a wealthy population, but over time, it became home to dilapidated luxury buildings. Later, these buildings became apartments, and urban parks were subdivided to house the poor and migrants.

Let's keep two ideas in mind: on the one hand, there is competition between social groups in the city for land use, and on the other hand, social belonging is reflected spatially; neighborhoods are not only distinguished by their distance from the center, but also by

their occupations, which affect the social composition of the residents. Dynamically, the Burgess model has

- i. An attractiveness of the center. This attractiveness is due to most jobs being performed in the city center and the value of having a short commute to work.
- ii. A process known as “invasion”, which occurs as a result of this attractiveness. It is an agglomeration effect centered on the appealing center.
- iii. The aspect of “resistance on the spot” is a reaction to social group competition. This opposition is manifested by the assertion that individuals are members of a group. Members of groups tend to prefer residing together and would rather have members of other groups reside elsewhere.
- iv. Resistance on the spot has two outcomes: if it fails, it leads to position abandonment and repression in the periphery (groups abandoning neighborhoods); if it succeeds, it manifests as adaptation on the spot and position consolidation (formation of quarters: the Greek Quarter, Bronzeville, Chinatown, etc.).
- v. The various concentric zones are formed as a result of a dynamic sequence of invasion, resistance, abandonment, and adaptation.

In this model, the city expands outward from the center, growing uniformly in all directions at the same rate, forming an isotropic model. In developing areas, people move to the border. Certain activities and social groups significantly influence the city’s evolution. Natural factors affect city growth. Lake Michigan limits Chicago’s growth to the north, west, and south. Lakeshore areas are densely developed.

In (1939) Homer Hoyt added transportation disruptions to the Burgess model. This “sector” model describes growth and transformation by adding divergent rays, axes, or sectors. The concentric model ignored the structuring effects of transport routes on neighboring areas, with places near routes being more attractive. Hoyt adds permanence and local specialization to the previous model, allowing neighborhoods along radial roads to develop more quickly. This creates a city model organized by direction (Figure 8).

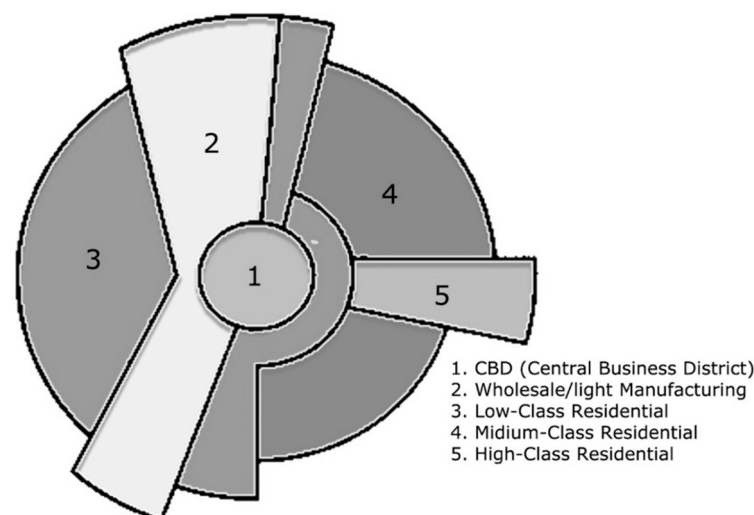


Figure 8. Hoyt’s sector model. Source: Redeveloped from [57].

Zone 1 is a business center, Zone 2 comprises wholesale businesses and industries, Zone 3 is a working-class area, Zone 4 is a middle-class neighborhood, and Zone 5 is a wealthy district. Zone 5 no longer sits on the city’s outskirts, but instead enters along an attractive axis. In Chicago, this attractive axis is the waterfront property to the east of downtown, known as the “Magnificent Mile” (as well as the Gold Coast residential area to the north), home to many of the city’s landmark commercial buildings: the Wrigley Building,

Tribune Tower, the Chicago Water Tower, and the Allerton, Drake, and Intercontinental Hotels. Zone 2, including industrial and wholesale areas, is affected.

Hoyt's model features both center and radial path attractiveness, following the same dynamic sequence as Burgess' model of "invasion, resistance, abandonment, and adaptation." It responds to social group competition. If the resistance fails, it leads to periphery repression or local adaptation. Therefore, Hoyt's model assumes the same dynamic processes that shape the city. This model is more refined than Burgess's because it introduces axes to organize and structure space. From this sectoral model, urban growth factors follow:

- i. Attractive high-rent areas contribute to a city's growth.
- ii. During growth, sectors can widen and lengthen.
- iii. When a high-rent class moves into an area, they stay for a long time.
- iv. High-rent neighborhoods are moving outward. These sectors don't invade others. They fill empty spaces.
- v. When a high-rent class leaves, a low-rent class moves in.
- vi. High-rent areas tend to develop along the most efficient transportation routes, often leading to affluent suburbs, shopping centers, or natural parks.

As a result, Hoyt's model complements Burgess's model. A combination of the two models, where a spatial division is made into concentric rings, can be very useful. Within these rings, a differentiation by sector appears. However, the Chicago school of thought proposed a third model. This is known as the "multiple nuclei" model. Hoyt's model suggested that a city can have multiple attractive places connected by transportation axes (Figure 8). In this sense, Harris and Ullman proposed a polycentric city scheme in 1945. With the multi-kernel model, the scheme introduced by Burgess and perfected by Hoyt becomes more complicated. The existence of three factors contributes to the development of independent centers:

- i. Agglomeration economies, or the clustering of similar and complementary activities in the same industry.
- ii. The distance between wealthy or affluent and underprivileged neighborhoods.
- iii. Competition for land use, certain activities, or certain social groups not having the means to afford more advantageous locations (Figure 9).

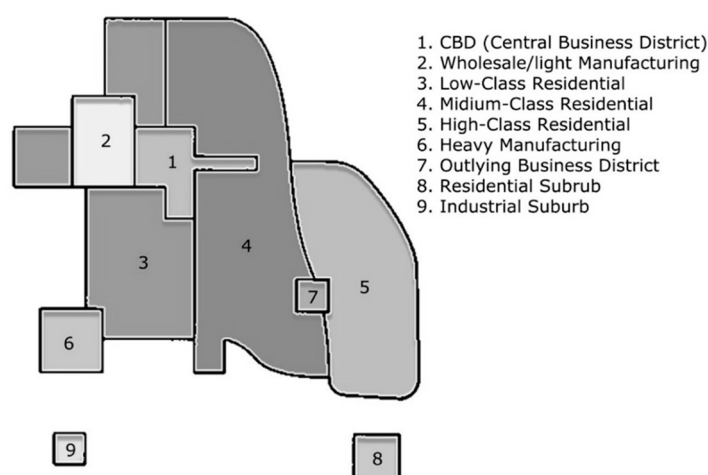


Figure 9. The multiple nuclei model of Harris and Ullman. Source: Redeveloped from [57].

In Harris and Ullman's model, there are several appealing centers: well-defined places as well as specific axes aligned with transport routes, resulting in greater sector differentiation. However, the same dynamic processes are always at work: the invasion-resistance-abandonment-adaptation sequence.

The three Chicago school models generate the city's abstract spatial structure. In these models, urbanites' mobility isn't random. It follows privileged directions: centripetal, from periphery to center (invasion), and centrifugal, from center to periphery (succession). Collective representations of group membership and rejection govern cultural and social grouping. Due to their mobility, ethnic communities and social groups expand within the city. Spatial positions determine the existence of social groups. They can assert themselves and rearrange because they're stable [57,60,62].

Many global cities have been studied using these three models (Paris, Rome, Montreal) [62,64,65]. They're also used together to analyze complementary aspects of the city. In this case, concentric zoning areas help to understand the distribution of people based on family status statistics. At the same time, sectors seem better suited to the distribution of groups by socioeconomic level and the multiple nuclei at the spatialization of ethnic communities. They remain interesting despite theoretical limits that make new models of morphogenesis possible.

4.3. *New Model of Morphogenesis*

In the past 30 years, research on complex systems has deepened the Chicago school's hypothesis of self-organized genesis processes. According to Dauphiné [66], there are three types of complexity in urban studies: (1) structural complexity, which characterizes the emergence of spatial structures from the interactions of multiple social agents, (2) level complexity, linked to the interweaving of different scales or levels of organization, and (3) dynamic complexity, involving non-linear evolution processes that lead to unpredictability of the system's future effects, even when the factors are simple. A city can respond to all three types of complexity simultaneously [66].

Thus, researchers have applied Ilya Prigogine's theory [67] of dissipative structures to demonstrate that self-organized nonlinear dynamics govern the evolution of city systems. Others have used Mandelbrot [68] fractal geometry to model the fragmentation of fabrics and the interlocking of scales (fractal "self-similarity", urban fabric that looks similar at different scales) in the city. Others have relied on physicist Hermann Haken's synergetics [69] to reconstruct how multiple levels of organization influence the city, from the individual decisions of social agents to those of entities and collectives that govern us [70]. All these works are part of a vast scientific program that Alain Boutot referred to as a "morphological revolution" [71]. The same applies to the theory of urban morphogenesis developed by Desmarais and Ritchot [31].

4.3.1. *The Theory of Urban Morphogenesis*

The concepts of urban morphogenesis originated from Gilles Ritchot's [72,73] structural geography, which Desmarais [62] showed could be enriched by morpho-dynamic models developed by mathematicians of morphological structures like René Thom and Jean Petitot [74,75]. This theory explains how the complexity of city fabrics (architectural forms, parcels, islets, road networks, neighborhoods) is organized by simpler hidden forms (spatial structures) generated by self-organized dynamics. As previously stated, the theory incorporates three types of complexity: structural complexity (the study of interactions between social actors for the appropriation and occupation of urban space); level complexity (the analysis of three spatial layers superimposed in the genesis of forms); and dynamic complexity (the study of three types of self-organized processes that occur over time) (anthropological, political and economic).

Desmarais and Ritchot [31] define urban form generation as a "morphogenetic pathway" that spans levels ranging from the deepest to the most visible. They are as follows:

- i. The investment of anthropological values in very particular organizing centers, which they call “vacuums.”
- ii. Flows or trajectories of political control of settlement mobility appropriating spaces around vacuums.
- iii. Conflicting settlement mobility trajectories create hidden structural positions.
- iv. The diversified valuation of these positions by the situation rent.
- v. The construction of concrete forms of spatial occupation is stimulated by rent.
- vi. The profitability of concrete forms through economic activities.

This global process comprises three hierarchical layers of spatiality, where deep vacuums are created by anthropological investment; hidden forms or positional structures emerge from political appropriation; and economic occupation dynamics determine the surface layer of concrete forms.

The concept of “vacuum” was introduced to address the origin of cities and their first “ecumene’s”, or areas of permanent inhabitation. This concept designates a semiotic-dynamic structuring void. On the one hand, vacuums are invested with anthropological values that make them attractive by conditioning a temporary gathering of the concerned populations within their neighborhood. On the other hand, they are subject to a ban on permanent residence, which restricts the dispersal of these populations outside their neighborhood and their relocation to a distant location.

The symbolic values spatialized by vacuums correspond to deep meanings, called “unconscious codes” that include sacred and profane, salvation or fall, sovereignty, strength, fecundity as described by Claude Lévi-Strauss [76], interoceptive semes identified by Algirdas Julien Greimas [77], or subjective pregnancies noted by René Thom [75,78]. It is for these reasons that vacuums become gathering places for society’s founding rituals. The ban on permanent residence forces the populations to leave the vacuums and return to their homes, which is repulsive.

The Lavinium, or the Celtic sanctuary of Lendit at the origins of Rome and Paris, the dance square in the center of the Bororo village in the Amazon, or the one far from the Melanesian villages in the Vanuatu archipelago, the Buddhist stupa, or the Sumerian ziggurat are all examples of vacuums analyzed by Desmarais [79–81]. The values and duration of the prohibition change over time and space, but these two conditions must be met for a vacuum to exist. Partial lifting of the ban may allow certain groups of actors—priests, warrior kings, or high figures in society—to reside inside a vacuum permanently, thus the construction of a temple, palace, citadel, or set of prestigious monuments whose architectural characteristics symbolize the values invested in the place, while a total lifting of the forbidden would abolish any singularity of the place.

Deep spatial structuring is followed by dynamic spatial appropriation in which political control of settlement mobility intervenes. For the founders of the Chicago School, qualitative changes in spatial appropriation and occupation shaped the city. This hypothesis can be deepened by Desmarais and Ritchot’s [31] concept of “political control of establishment mobility.” This concept accounts not only for the movement needed to change locations, but also for the political balance of power involved. If a social actor controls his movement towards a place of establishment, his trajectory is “endoregulated.” If another actor or an unfavorable context constrains his movement, his trajectory is “exoregulated.” “Exoregulated” describes its trajectory. The political modality of power that controls displacements for space appropriation and occupation is not only economic, as seen with the Chicago School’s notion of competition. Controlling establishment mobility can also impact other areas, such as property law.

By crossing “endoregulated” and “exoregulated” qualities with the two directions mobility trajectories can take in a city (polarizing or centripetal flows from the periphery to

the center and diffusing or centrifugal flows from the center to the periphery), we identify four classes of mobility leading to as many positions in the urban space: the gathering which brings together the polarizing “endoregulated” trajectories; the dispersion which brings together the diffusing endo (Table 5).

Table 5. Structural positions and trajectories. Source: Redeveloped from [31].

Directionality	Regulation	
-	Exoregulation	Endoregulation
Polarization	Gathering	Concentration
Diffusion	Evasion	Dispersion

The four classes of establishment mobility correspond to as many sequences that are articulated between them according to a cyclical dynamic: the evasion of social actors from the center who control their mobility towards the periphery conditions the subsequent gathering of other endoregulated actors in this center, which is accompanied by a rise in land and property values that forces the poorer actors who have remained ostracized to the periphery. When these trajectories intersect in the city, conflicts and competitions for the appropriation and occupation of positions emerge, resulting in differentiation and complex spatial structuring over time.

4.3.2. The Structuring of Space

We have already mentioned that the three models proposed by the Chicago School for reconstructing city internal structures are based on the same hidden representation of space: an “isotropic” space with attributes that are identical in all directions. This model, however, raises two major concerns:

- i. They are contradicted by the agglomeration of built fabrics, population, and activities that “are not distributed homogeneously, but vary by relative position” [82,83].
- ii. They only consider centripetal and centrifugal space appropriation and occupation flows, not settlement mobility. This leads to a static conception that cannot formalize the evolution and historical transformation of specific entities.

Defined by differentiated structural positions and generated by the four classes of trajectories recognized by urban morphogenesis, an “anisotropic” representation of space is recommended. This method seems essential “to understand spatial structures.” Because, to develop “an evolutionary theory, it is necessary to conceive of a relative space, which is defined by these positions and these flows” [82].

The anisotropic space model by Desmarais and Ritchot [24] reconstructs how “morphogenetic gradients” structure the space of cities in qualitatively distinct positions. High-value gradients, or “ridge lines,” created by “endoregulated” flows intersect low-value depressions, or “thalweg lines.” The spatial structures are an “axiological relief” of polarities. The superposition of two ridge lines locates a massif of very high value where “endoregulated” gathering is present; the crossing of two thalweg lines corresponds to a basin of very low value where “exoregulated” concentration is present; the superposition of a ridge line and a thalweg line result in a collar effect, a “threshold” of mean value where gathering, and concentration are co-present with equal intensity (Figure 10). This threshold configuration model has been used to model the growth of Paris, Rome, and Montreal.



Figure 10. Threshold configuration. Source [64].

To demonstrate the cross-cultural applicability of the morphogenetic model, a concise example from non-Western cultures is provided. In the case of Seoul, South Korea, the city's expansion since the 1960s shows how traditional spatial hierarchies have coexisted with rapid economic and infrastructural transformation [84]. Historic districts such as Bukchon and Jongno exhibit high-value “ridge” positions concentrated around Confucian academies and palatial compounds, while peripheral manufacturing belts along the Han River correspond to low-value “thalweg” zones shaped by exoregulated industrial settlement during the post-war period. Subsequent redevelopment projects in Gangnam reveal the formation of new “threshold” configurations where commercial concentration and residential dispersion coexist within a dense transport network [85]. This spatial pattern mirrors the positional logic proposed in morphogenetic theory, confirming that the structural mechanisms of gathering, concentration, and diffusion are not limited to European or North American cities but can be observed in rapidly urbanizing Asian contexts.

To conclude the morphogenesis school review, consider a few benchmarks for better understanding the relationship between the concrete forms that comprise urban landscapes and the hidden forms that structure them. The following list shows some examples of relationships between different neighborhood units and the structural positions generated by the trajectories:

- i. Monumental forms with sought-after architecture, sumptuous urban squares, temples, institutional buildings, luxury apartment towers, and expansive urban parks serve as gathering places (R).
- ii. Working-class suburbs and neighborhoods, low-rent complexes (HLM foothills), and informal housing neighborhoods (wilderness suburbs) are concentrations (C).
- iii. The city is organized structurally by a threshold configuration where (R/C) positions overlap. High-value buildings and low-value suburbs rub shoulders.
- iv. The city's influence on villages externalizes (C/D) positions. In each, an institutional building (such as a church, town hall, or post office) stands out from the surrounding craft houses, shops, and workshops.
- v. The countryside is typical of dispersed positions (D) that are dependent on the city, as livestock and agriculture have low demographic densities.
- vi. The sprawl of suburbs, often far from dense agglomeration, projects concrete urban forms (E/D) onto rural areas.
- vii. Affluent suburbs as well as luxurious resort fronts materialize escapes (E).
- viii. Bourgeois and select neighborhoods combine positions of escape and positions of assembly (R/E).

- ix. Artisan, commercial, or middle-class neighborhoods combine escape and concentration (E/C).
- x. Certain public squares or monumental voids materialize vacuums that give rise to gatherings followed by dispersals (R/D).

These are only a few examples among many. At this level of concrete form diversity, the conceptual tools developed by urban morphogenesis theory can be used in conjunction with those proposed by the theories of urban morphology presented in this chapter. Thus, description and explanation can complement one another and serve as guides for the urban project (Figure 11).

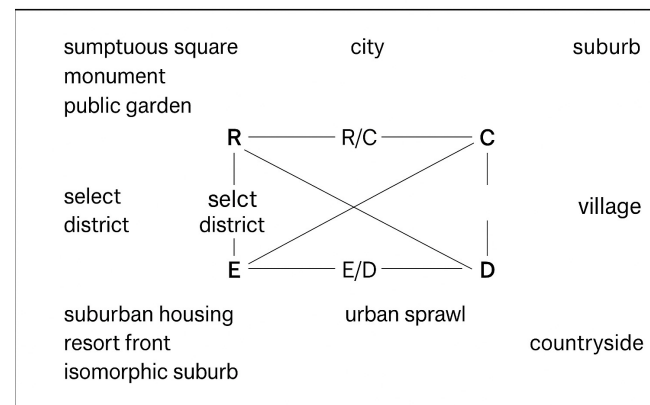


Figure 11. The relationship between concrete forms and abstract forms. Source [31].

5. Results and Discussion

5.1. Comparative Coding Outcomes

The comparative analysis of the literature identified distinct yet complementary aspects of the three principal urban morphology schools. Each tradition prioritizes a specific dimension of urban knowledge, while their integrative perspectives enhance the comprehension of urban evolution through the interplay of form, process, and structure.

The European school analyzes the city through its physical form and typological consistency. It highlights how urban elements construct the foundational framework of settlements. A static–structural perspective defines this school and aims to describe and classify the enduring nature of urban form. Its methodologies—cartography, typological mapping, and morphological diagrams—emphasize the significance of spatial structure in defining urban identity.

The Chicago school bases its analysis on the active and ongoing nature of urban development processes. The system explains how social and economic factors, such as movement patterns, competition for resources, and social divisions, shape the way people organize themselves in space. The research now investigates processes by using empirical mapping, observational studies, and statistical data evaluation methods. The research shows how urban design patterns reveal the social transformations that affect metropolitan areas.

The Morphogenetic approach introduces a structural and generative logic to urban morphology. It conceptualizes the city as a complex adaptive system, where spatial configurations emerge from recurrent positional mechanisms—such as concentration, dispersion, or equilibrium (R, C, D, E). Its epistemic goal is emergence and structural coherence, utilizing tools such as structural geometry, graph models, and field theory to explain how urban systems self-organize over time.

The coding process revealed that these traditions shared seven common analytical categories, which were consistently present throughout their content. The European tra-

dition bases its approach on physical form and typology, but the Chicago school focuses on social processes, and the morphogenetic approach defines structural rules that govern both. The framework connects three scales with multiple dimensions to establish relationships between descriptive elements, explanatory factors, and emergent patterns in urban morphology.

The synthesis of these coded dimensions is summarized in Table 6, which highlights how each school contributes uniquely to understanding the city's spatial and social evolution, while also revealing opportunities for conceptual integration.

Table 6. Comparative Coding Results across Morphological Traditions.

Dimension	European School	Chicago School	Morphogenetic Approach
D1 Ontology of form	Static–Structural	Dynamic	Structural–Generative
D2 Epistemic aim	Description/Typology	Explanation/Process	Emergence/Structure
D3 Scale	Plot–Block–Îlot	Neighborhood–City	City–System
D4 Mechanisms	Historical transformation	Invasion–Succession	Positional thresholds (R, C, D, E)
D5 Tools (referenced)	Cartography, typological diagrams	Empirical mapping, statistics	Graphs, structural geometry
D6 Social–spatial coupling	Weak/Implicit	Strong/Explicit	Formalized (structural)
D7 Design relevance	High (urban fabric)	Medium (policy, zoning)	Moderate (structural modeling)

5.2. Toward an Integrative Framework of Complementarity

The three schools of thought employ different methods to study knowledge, but they share common elements that form a unified framework for analyzing urban development patterns. The three traditions present distinct perspectives about urban development through their analysis of city form, construction methods, and architectural design principles.

The European school contributes analytical rigor in reading form and spatial continuity, defining urban fabric through typological and morphological logic. Its descriptive precision gains explanatory strength when interpreted through the Chicago school, whose models of socio-spatial mobility and competition expose the dynamics underlying urban change. Conversely, the Chicago perspective acquires spatial depth when informed by morphogenetic theory, which embeds social processes within structural relations and positional thresholds. The Morphogenetic approach, while conceptually rich, attains greater concreteness and design applicability when anchored in the tangible frameworks of European urban morphology.

These relationships are reciprocal and generative, not merely additive. Their synthesis forms the basis of a Meta-Framework of Integrative Urban Morphology, where:

Static form represents the enduring spatial and typological order of the city.

The dynamic process reflects the socio-economic forces driving transformation.

Structural emergence explains the systemic organization that allows for the coexistence of stability and change.

The framework shows urban morphology as a structured method which connects built environment components to social progress and architectural transformations. The city functions as a complex adaptive system because its permanent shape is constantly shaped by social activities and organized systems (Table 7).

Table 7. Complementarity and Integrative Gains among Morphological Traditions.

Criterion	If the School Excels at ...	... But Is Limited by ...	Then Complement with ...	Expected Integrative Gain
Static clarity vs. dynamics	Typological and fabric description (European)	Weakness in explaining mobility and process	Chicago mechanisms	Processual explanation of patterned change
Dynamics vs. anisotropy	Socio-spatial mobility and competition (Chicago)	Isotropic assumptions; weak attention to form	Morphogenetic positional structure + European descriptors	Directionally constrained and fabric-aware interpretation
Structure vs. concreteness	Positional thresholds and systemic logic (Morphogene- sis)	Abstractness; low design specificity	European typology	Contextual and design- relevant structural guidance

This integrative framework of complementarity demonstrates that the traditions function as mutually reinforcing paradigms rather than separate schools. Their convergence enables urban morphology to move beyond isolated description or theory toward an interdisciplinary and systemic understanding of how cities endure, transform, and evolve.

Building on the comparative synthesis presented in Table 7, a theoretical model of implementation is proposed to guide how the Integrative Framework of Complementarity can inform urban planning and design practice. The model translates the triadic synthesis of static, dynamic, and structural reasoning into three interlinked operational stages: (1) diagnostic analysis, (2) strategic synthesis, and (3) design translation.

In the diagnostic stage, the static dimension derived from European typomorphology is used to map and classify the existing urban fabric—plots, blocks, and spatial hierarchies—forming a morphological baseline. The dynamic stage applies Chicago School principles to identify socio-economic and mobility processes shaping urban transformation, using indicators such as density gradients, land-use competition, and social segregation. The structural stage, inspired by morphogenetic theory, models the interrelations among these elements through positional and systemic analysis, revealing the spatial logic of concentration, diffusion, and threshold effects.

The synthesis of these stages generates actionable insights for planning: preservation and adaptive reuse in areas of morphological persistence; design interventions targeting areas of dynamic transition; and structural coordination of growth corridors and thresholds to balance socio-spatial equity. At the policy level, the framework can be operationalized through three complementary instruments: (a) typological mapping for heritage and form-based codes; (b) socio-spatial diagnostics to guide zoning and regeneration strategies; and (c) structural modeling tools such as network and morphometric simulations to anticipate systemic impacts. This multi-scalar model demonstrates how integrative urban morphology

can evolve from an analytical framework into a strategic planning tool that bridges physical design, spatial governance, and social adaptability.

5.3. *Interdisciplinary and Theoretical Contribution*

The proposed Integrative Framework of Urban Morphology underscores the interdisciplinary nature of the field and its relevance across multiple domains of knowledge. For architects, it redefines typology as a dynamic construct, linking spatial form to adaptability and urban process. For geographers, it expands spatial metrics into systemic and relational meaning, positioning the city within broader networks of interaction. For sociologists, it anchors abstract models of social organization in the material and morphological reality of the urban fabric. Urban morphology thus emerges as an epistemological meeting ground between design thinking, spatial analysis, and social interpretation.

The study's theoretical contribution lies in three major advances. First, it reframes the European, Chicago, and Morphogenetic traditions as complementary paradigms that, when combined, articulate the multidimensional complexity of urban form and transformation. Second, it introduces a transparent, coding-based comparative method capable of synthesizing theoretical traditions through structured interpretation, rather than relying on quantitative metrics. Third, it formulates a meta-framework that integrates static, dynamic, and structural reasoning—providing a transferable model for future interdisciplinary research in urban morphology, planning, and design.

The research makes three essential theoretical contributions to the field. First, the framework presents the European, Chicago, and Morphogenetic traditions as separate yet interconnected approaches that together explain how cities develop and change across multiple dimensions. Second, the method provides a clear coding system that enables researchers to combine different theoretical approaches through systematic analysis, rather than relying on numerical evaluation. Third, it creates a meta-framework that unites static and dynamic and structural reasoning methods to establish a research model that can be applied to future studies of urban morphology, planning, and design.

The research achieves its primary objective by developing a unified conceptual framework that illustrates the impact of building designs on urban growth and architectural design systems. The research synthesis establishes a solid theoretical foundation for the field by connecting theoretical frameworks and research methods, which will guide future studies on cities as complex adaptive systems.

6. Conclusions

This study revisited and integrated European typomorphology with Chicago socio-spatial analysis and morphogenetic structural theory to develop an extensive interpretive framework that explains the development of urban form. The research employed a selective narrative review of essential and modern studies from 1920 to 2025, along with a structured coding system across seven analytical categories, to identify the core differences between these approaches while highlighting their shared elements. The research shows that the European school effectively explains how the city maintains its physical structure and architectural design.

The Chicago school develops a social and functional analysis of urban change through its study of mobility and functional evolution. The morphogenetic perspective explains the development of urban configuration through its analysis of structural and systemic processes that create urban forms through relational and positional interactions. The three approaches demonstrate how cities function as adaptive systems that integrate permanent infrastructure with active operational systems to create new organizational structures.

The study's meta-framework of integrative urban morphology advances both theory and practice. The framework establishes a conceptual framework that enables researchers to unite architectural typology with geographical modeling and sociological interpretation through a methodological framework that links qualitative analysis to quantitative methods. The integrated perspective demonstrates that combining historical research with spatial analysis and systemic evaluation yields the most effective method for analyzing contemporary urban development.

Future research should implement this framework by integrating typological mapping with morphometric modeling and network analysis to examine urban adaptation to sustainability challenges, governance needs, and social and spatial stability. The integrated method will convert urban form into an operational design system that serves dual purposes for urban planning and policy development.

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