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## Understanding Spaces of City by Morphological Studies

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### Abstract

City building is not a one-time effort it is rather a process using which the planners, designers create the habitat for humans. The habitat along with its constituents parts namely buildings, streets, gardens, squares etc. constitute an urban form. Urban morphology is an important field of study along with urban typology. Urbanists, planners and geographers have been practicing them in Europe and America. These explain the process of city building, help in preserving the historic urban form for change and continuity, and quantify the qualitative aspects of urban form. There exist two widely accepted and discussed streams of city form analysis these are typology and morphology.

Authors have during their research have identified three basic schools practicing different thoughts that give shape to city urban form from different perspectives. The German-British school pioneered by geographer and planner M R G Conzen is the oldest of all. Conzen migrated to England after the World War II. It is stated that study and analysis of urban landscape is the basis of study of city building process explaining the historicity. The tradition is carried forward by the scholars like Whitehand, Larkham, and Slater under the flagship of Urban Morphology research group, at University of Birmingham. The Italian school led by architect Muratori founded in early 50s. The Italian architects got associated with the thought of city form study on the basis of architectural design theory. This branch of city form study is called as typological study of city form. The works of Cannigia, Maffei, Maretto, etc. have established and carried forward the typological study of cities. The third school known as French school and was founded by architect Philippe Panerai, Jean Castex and sociologist Charles DePaule in late 60s. The theory of design amalgamated with the social theory of human interaction with the built environment. This paper brings out the in-depth method of understanding cities by use of three kinds of methods used in morphological studies. This will help us to know about them in integrated manner and create better understating of city fabric.

**Keywords** – Morphology, Town Plan, English School, Italian School

### Introduction

#### *Definition and the origin of term*

It is important to understand the actual meaning of the term. The term morphology originated during the mid-19th century from Greek word *morphē* meaning 'form' + logy

In latin morphē means form and logos means description<sup>1</sup>. Definition of *morphology* in English:

As noun it means- “*The study of the forms of things, in particular.*”

It has its meaning in biological science as – “*The branch of biology dealing with the form of living organisms, and with relationships between their structures.*”

In *Linguistics* it is “*The study of the forms of words, in particular inflected forms*”

([https://en.wikipedia.org/wiki/Urban\\_morphology](https://en.wikipedia.org/wiki/Urban_morphology))<sup>2</sup>

(<http://www.oxforddictionaries.com/definition/english/morphology>)<sup>3</sup>

Isin Can (2012) cites D K Ching, that form is a three dimensional mass having figure and shape. It has firm boundaries, outlines external and internal structure and unity of the whole. This term morphology was first expressed in the writings of by poet, philosopher Goethe in the year 1790. Though it was first used in bioscience, urban morphology is a 100 year old field of study that has now embodied influences from a multidiscipline<sup>4</sup>. Conzen, Whitehand and other authors have defined it as a study of urban form and urban landscape or townscape<sup>5,6,7</sup> “Urban form is a field that studies the process of city building and its product.”<sup>8</sup>

Isin Can (2012) cites Whitehand that urban morphology is defined as “the organized body of knowledge” and ‘integral part of urban geography”

Urban morphology has been a matter of study by several scholars from different perspective within the realm of their discipline. Scholars from architecture, geography, philosophy, anthropology, history and ethnography have shown interest in the field and it is a well-developed method of understanding urban form <sup>9</sup>.

The term has a universal meaning of understanding a phenomenon along with its constituent. In urban landscape the fundamental constituents like street, plot and buildings. According to Kropf, the cities are examples of organized complexity and stresses on identifying order within the complexity and diversity <sup>10</sup>. Morphology helps in identification of pattern formed by constituents elements that are repeating in built landscape. It is for better comprehension of all such constituent elements that work together to serve the purpose of human habitat and enhancing the culture through change and continuity.

City building is not a one-time effort it is rather a process using which the planners, designers create the habitat for humans. The habitat along with its constituent parts namely buildings, streets, gardens, squares etc. constitute an urban form. Urban morphology is an important field of study along with urban typology. Urbanists, planners and geographers have been practicing them in Europe and America. These explain the process of city building, help in preserving the historic urban form for change and continuity, quantify the qualitative aspects of urban form. Urban morphology is known as a field of study that deals with the process of city making <sup>4</sup>. There exist two widely accepted and discussed streams of city form analysis these are typology and morphology.

The typologists namely Cannigia, Maffei, Muratori etc. have studied the city as framework of buildings and open spaces. The morphologist like Conzen, Whitehand on the other hand, suggest that study of city form is concerned with generative causes and its distinct characteristics of the cells it is made of. Traditionally, urbanists have applied the morphological study to the core analysis of historic fabric of the cities. Its application to the study of new urbanized world cities is a challenge.

Many scholars across Europe and America have undertaken study of morphology as a tool to understand the historical urban fabric of the city. Some of them are Sweden-Abdellah Abarkan, 2009, Bernard Gauthiez 2004; Germany-Abdellah Abarkan 2003, Heinz Heineberg 2006; US - M P Conzen 2001, Italy-Maria G Corsini 1997, Nicola Marzot 2002; Brazil – Costa et al 2014; France – M Darin 1998; Australia - Arnis Siksna 2006; Turkey – A S Kubat 1999; Britain – J W R Whitehand 2001; Canada - Jason Gilliland et al 2005; Spain – J V Ibarz 1997; South Korea - Kwang-Joong Kim 2012; Ireland - Loughlin Kealy et al 2007; Poland - Mariusz Kulesza 2014 (Abdellah Abarkan, 2009).

## **Various Approaches**

### ***Architectural approach***

This approach primarily considers building and fundamental unit and is called as typological process. Type is known as repetitive production of a particular idea/ form. The historical period are manifested in the transformation of built form.

In Isin Can (2012) words *“this typological process is related to with human interaction with its environment, and it is about phylogenesis, which is history and evolution types”*. Muratori and G Cannigia were the pioneers of this approach. They identified building types, tissue, urban organism, and territories in terms of typology <sup>1</sup>. The approach had building as a primary focus that constituted the overall built fabric of town. The building form depends on local building tradition materials and cultural values and thus has deep relation with the overall urban morphology of city. Citing Marzot, the pioneers defined the typology in terms of building types, tissue, urban organism and territories.

### ***Philosophical approach***

Scholars like Lefebvre, Foucault, Giddens and David Harvey are pioneers of social and philosophical theories of space. In Isin Can's words *“compared to other approaches these philosophers stress the importance of urban space in terms of its production processes, power relations, regulations, institution shaping that space, and the society.”* Such theorist have argued on how and why of society's effort of producing any space.

### ***Urban design approach***

Urban design approach focuses in the urban study from different perspective. Public realm is their prime concern. The pioneers are concerned with the quality of public space, its use and practices by people. They explore how a designed space can be accepted by the people. They are talking about urban space beyond buildings. Parrallely when Schulte was working on geographical approach, Camillo Sitte in 1889 was pioneer of artistic city planning principles. This approach is carried forward by architects, urban designers, and urbanists. By 1960s Kevin Lynch, Alexandr William White in 1980 contributed in the field. Lynch characterized city with path, edge, node, districts, and landmarks. (Lynch, Image of city) Whereas alexander in pattern language deconstructed the urban system to understand the urban system as a whole <sup>1</sup>.

**Space Syntax**

This is based on theory of social logic of space. It was developed in 1970s as an analytical tool for analysis of urban spaces. It understands the mutual relationship between spaces and movement pattern. It is presented in the form of axial lines and convex spaces. It deeply investigates society – space relationship analytically <sup>11</sup>. This theory has now proved highly influential and scholars are now studying urban morphology with the help of this method. Kubat, Jiang, Peponis, are some of the researcher contributing on various aspects of morphology. Moudon in her paper titled 'Changing morphology of suburban neighbourhoods has illustrated as to how morphological studies can be applied to urban planning. The higher density as a planning component support non pedestrian movement <sup>4</sup>.

**Figure 1: Genealogy of study in Urban Morphology (Source: Sima & Zhang, 2009)**

**Figure 2: Morphological and typo-morphological (Source: Sima & Zhang, 2009)**

**Formation of International Seminar on Urban Form (ISUF)**

ISUF was created to provide a common platform for the practitioners and researchers concerned with the urban form – morphology. The movement gained momentum after the Second World War. Architecture, archaeology, geography, history, planning, urban design, spatial analysis, space syntax and conservation and heritage studies considered the study of urban form in their respective disciplines. ISUF shares the methods, ideas, and research findings that are concerned with the urban form. In 1994 around 20 architects, geographers, planners and historians, representing four different language areas came together on a common platform and founded International Seminar on Urban Form (ISUF), which is now spread to 50 countries <sup>12</sup>.

**The three schools**

Moudon during her research has identified three basic schools practicing different thoughts that give shape to city urban form from different perspectives.

- The German-British school Pioneered by geographer and planner M R G Conzen to be the oldest of all. Conzen migrated to England after the World War II. It is stated that study and analysis of urban landscape is the basis of study of city building process explaining the historicity. The tradition is carried forward by the leaders like Whitehand, Larkham, Slater under the flagship of Urban Morphology research group, at University of Birmingham.
- The Italian school led by architect Muratori founded in early 50s. The Italian architects got associated with the thought of city form study on the basis of architectural design theory. This branch of city form study is called as typological study of city form. The works of Cannigia, Maffei, Mareto, etc. have established and carried forward the typological study of cities.
- The third school known as French school founded by architect Philippe Panerai Jean Castex and sociologist Charles Depaule in late 60s. These theories of design amalgamated with the social theory of human interaction with the built environment. Over a period of time the morphological analytical study is adopted by other school in France <sup>4</sup>.

**Elements of morphological studies of city**

Moudon (1997) has identified basic types of morphological elements in suburban landscape. These are plan units. Conzen has identified them to be composition of streets, property subdivision, and building type. These basic elemental unit are testimony of the radical changes the city building process has undergone along with the life style, economic power status etc.

**Plot**

Like Cannigia, Conzen has divided the plot in different parts. The plot head is the front part and the rear court. The unbuilt area within the plot is not merely a left over space but the space in front and rear are left as per norms with the defined zoning patterns. This type of massing derives the uniform character to the area. The open areas besides building have numerous functions like, garden, court, rear /side garden, garage open circulation and open storage. The open space around may have physical and non-physical boundary. This identifies and defines the control and ownership over the space. The physical boundary may be in the form of fences, boundary wall, hedge, tree lining. Plots are thus the place of coexistence of built form and open space in its varied form and functions. This coexistence is provides open are suitable status.

**Plot series**

Plot series is an aggregate of plots surrounded by network of streets. It is a part of plot pattern<sup>10</sup>. However as per Cannigia and Maffei the street /tissue is a route with series of plots on either side. Thus plot and plot series form basic elemental unit of urban morphology. The route thus gives access to all plots and olds them together.

**Street**

Plot is a composition of built and open space. Whereas the street is a composition of one or two plot series with a public space. It is a designed space between the plot series. Therefor an urban tissue is a composition of all such elements put together in a hierarchy. Cannigia and Maffei have further that the city is a composition of the simple tissue making a complex tissue.

Within the scope of this paper, the architectural and geographical dimensions of urban morphology will be discussed in detail as methodology for analysis urban form. Even while exploring contribution by various researchers and scholars around the world only these two dimensions will be dealt with. Urban morphology is a well-established field of study in geography, architecture in European countries, US, Australia, China and Japan Navter cites McLouhglin's definition as "*study of urban morphology as a way of introducing the element of forming planning processes by removing that element from the realm of arbitrariness*"<sup>9</sup>. Mainly the study of urban morphology has remained concerned with historic towns and cities. Although morphological analysis of towns and cities help in preparing conservation plans of historic towns yet researchers have indulged in cities that are not as historic as other European cites. The works of M P Conzen (son of legendary geographer M R G Conzen) Moudon in US, Paul Sanders, Arnis Siksna in Australia, Pierre Gauthier and Jason Gilliland in Canada is exemplary. The countries and their cities do not have age old historicity like their European counterpart still study of urban morphology has been applied to the cites that have been master planned in US, Australia, Canada.

*"They are now emerging as a bonafide field of study which serves to*

*(1) describe and explain principles of city building; and*

*(2) provide guidance in preserving and developing historic landscapes*"<sup>8</sup>.

According to Moudon the application of morphological methods not only help to describe and explain the designed and planned formal characteristics of the suburban environments but also throw light on impact of urban form on behavior of user.

This also highlights importance of functional dimension and performance of the built environment which have not got appropriate level of importance in planning besides allowing measuring the quantitative aspects of urban form. According to Moudon two distinct practitioners have worked in the field of morphology one type call themselves typologists like Muratori, Cannigia, and Maffei as they are concerned with the study of building and cells as part of city building. Other call themselves morphologists like MRTG Conzen, M P Conzen, J W R Whitehand etc. as they are concerned with the characterics group that make up the city whole<sup>8</sup>.

Urban morphology is to do with a particular form, shape, or structure spaces or places. It is also concerned with the nature and scale of physical aspects of spaces and interrelationship between them. Moudon calls it an urban study of city as human habitat<sup>1</sup>. In presence of several definitions in the realm of various field of knowledge urban morphology can be firmly defined as study of urban form. Any urban form comprise of building, streets, open spaces, roads and squares.

The topography, climate, and natural material available from what comes under the geographical aspects city building whereas socioeconomic, political, cultural and religious practices are man-made aspects of city building. Author further deliberates and affirms that urban morphology is "*related to the history of city, spatial relations, social relations, economic relations, culture, traditions, various factors shaping that form, and its rural/ urban landscape*" he adds further that "*it is about people, institutions, regualtions, and management*"<sup>1</sup>.)

Every analysis has various levels and scales of application. Morphological analysis brings buildings and its plot and plot w.r.t street, block and city at larger level of focus.

Moudon (1997) explains three principles or levels of analysis and says that building along with their open spaces, plots of lots and streets form the basic element that comprise urban form. It is equally interesting to understand the city at various levels of resolution i.e region, city, street, block, plot and building. The third principle as proposed by Moudon is the historicity. She claims that a city is best understood form historical perspective. Thus, the from, resolution and time are basic principles of urban morphological research. These will be applied to the study of the city of Gurgaon in context. According to Monajita it has remained an area of major research thrust and remained concerned within the field of urban geography during first three decades of 20<sup>th</sup> century. Although less was discussed during 1930-50. And came to lime light after efforts by M R G conzen during 1960s. According to Comert within the professional ambit of Architecture and Geography three distinct school of studies worked on urban morphological studies<sup>13</sup>.

Mainly the urban morphology is subject matter of five discipline; architecture, geography, philosophy, urban design and science. It was geography that started dealing with it. The urban geography deals with study of towns and settlements.

### **The geographical approach and The English school**

Morphological studies have been an important field of study in German –speaking countries. Later its influence spread to the English speaking countries also. Even in US the field of study is well established. Citing Whitehand Isin Can states that its basic fundamentals are based on German morphogenetic approach. “*The approach traces the evolution of forms in terms of underlying process*”<sup>1</sup>.

Though it is known as English school but it has its origin in the German and German speaking countries have adopted this method of study very much. It is the oldest of the three school and was established at the end of nineteenth century. Briefly the geographer and planner M R G Conzen was the founder of the school that developed theory of city building covering the historical aspects, planning efforts and the townscape management. They remained focused on why and how of city building.

The urban landscape is a century old study. J Fritz in 1894 made extensive use of town plan analysis for understanding the layout of German towns<sup>14,15</sup>.

The English school is known to have geography as its theoretical base. The German speaking countries have extensively adopted the urban morphology studies banded on this tradition. Friedrich Ratzal in 1886 was appointed to the chair of geography in University of Leipzig. He wrote his treatise – Geographical location of large cities (1903). He was equally concerned with the growth factors of the location of a city. He studied cities and found that it is quality of space that attracts people to a particular city and location, and coined the term QUALITY of Space<sup>13</sup>.

The earlier works of Otto Schluter, who was appointed to the chair of geography in University of Halle in 1911 published two paper between 1899-1928<sup>7</sup>. He coined the term morphology of cultural landscape (Li Y., 2013). The first paper was influenced by the works of Fritz. This morphogenetic approach of his became benchmark on which Conzen works was based<sup>7</sup>. He highlighted the aspects of cultural geography. The cultural landscape which was focus of Schluter is further subdivided into Human geography- settlement geography, economic geography, and transport geography. He brought physical form and appearance of town as urban landscape in the focus of morphological research<sup>9</sup>. Conzen worked on two morphological studies One was survey of Whitby in 1958 in which he recorded the land and building utilization and building types, and second is study of “Alnwick, Northumberland: a study in town plan analysis” in 1960 recognising plot as a fundamental basic unit of analysis<sup>1</sup>.

The influence that Schluter works had is reflected in the dissertation of his students Geisler in 1918 on the development of morphology study of Danzig. Walter Geisler was a student of Shluter published detailed study of Danzig in 1918. He produced detailed color maps presenting land-use, height etc.<sup>7</sup>. Later wrote book titled ‘German Town – A contribution to the morphology of cultural landscape’. He was interested in describing the urban form categorizing the sites, plan layouts, and building types. (1924).

However several authors critiqued that the urban from should also be studied with other urban characters/aspects<sup>15</sup>.

In 1963 Friedrich Huttenlocher recognised the impression of local material on architecture. He identified three such provinces in Germany A E Smailes in 1955 published his famous paper ‘Some reflection of geographical description and analysis of townscapes’. Between 1930-50 there was a lean phase of the field however the in Britain, France and Italy the study still carried on. Author Ye Li in his thesis says that Sauer’s The morphology of landscape when the term cultural landscape was introduced in. according to him the inception of the term morphology lies in biological science therefore the organic for and structures in urban studies should form the key areas<sup>16</sup>.

The works of British geographer M R G Conzen on townscape of Alnwick 1960 was a trend setter in the town plan analysis<sup>15</sup>. “His ideas proved to be the turning point of urban geographical approach on the urban morphology<sup>9</sup>.” The English school is finally emerged in the mid twentieth century. The credit for its emergence as an idea behind the study goes to MRG Conzen. His town plan analysis developed an idea that helped in understanding the urban area as an agglomeration of its constituents parts<sup>17</sup>With the help of His seminal work of Alnwick- Northumberland: a study in town plan analysis in 1969 he investigated the geographical complexity.

His main elements of analysis were

- *street and street system,*
- *plot pattern and their agglomeration in street block, and*
- *buildings or more precisely, their block pattern*

The basic ideology of Cozen lies in the spatial layouts of these elements to that help in appropriate comprehension of the urban system of the town.

### Details of Conzen approach

Comert in the research combined and produced an integrated approach to understanding a city. Conzenian's concepts of the morphological region, morphological period, fringe belt and townscape, and to see whether they can be combined, both theoretically and in application, with the typological process, materials, structures, tissues, and urban organisms defined by Caniggia.

It is further affirmed that the Urban Form is the primary sources to understanding the Conzen's approach. The town plan analysis has been the major work of MRG Conzen who was disciple of Otto Schluter, Ye Li cites Whitehand<sup>16</sup>. The Alnwick town plan analysis was his seminal work that has established this as a method for over 60 years. He established a framework of principles that have major role in the research in the field.

The MRG Conzen approach on urban morphology under three headings which are

- (i) town plan,
- (ii) fringe belt concept, and
- (iii) townscape is a combination of land utilization, building type and plan unit.

### Town Plan

A town plan is the arrangement of an urban – built up area in all its manmade features the built environment on the piece of land, expressed in the terms of topographical or geographical features that form the pertinent characteristic town plan. It has its characteristics relationship with the street systems, plot pattern and built form arrangement.

These features that the town plan consist of four element complexes which are site, street system, plot pattern and building arrangement. According to Conzen Ye Li proposes that town plan analysis is the topographical arrangement of an built up area in all its man-made features.

Referring to Conzen, 1969 *Comert has concluded that Town plan element complexes* are, namely

- street and their arrangement in a street-system;
- plots and their aggregation in street blocks;
- buildings or more precisely their block-plans

Let us discuss street system as defined by conzen

The *street* is an open space composed of street lines and is meant for traffic whether pedestrian or vehicular. Fig 1 shows the street systems approach on element complex of the town plan.

### Figure 3: Street, Plot Pattern (Source: Comert, 2013)

#### Plot Pattern

Referring to Conzen, in Comert's words it is "*the arrangement of contiguous plots in a built-up area are viewed as a separate complex of the town plan and divided into street-blocks*<sup>9</sup>." The contiguous arrangement of streets give rise to street pattern likewise the plot arranged in a certain geometry or a series give rise to formation of plot series. Hence is arranged in a definite pattern of series the *plot series* is a row of plots each having its own frontage arranged contiguously along the same street line Figure 2 shows the arrangement of both street-blocks and a plot series. The spatial relation between the plots and streets are clear. Thus street and plots are discreet pattern of plot pattern. However Conzen is cited to have defined the street block as is a "*plot or group of contiguous plots bonded partly or wholly by street-lines and forming a discrete part of plot pattern of the town*<sup>9</sup>." Finally the plot group together in a block defining the block. These blocks are confined or defined by street lines that act as boundary between streets and street-blocks. They bind the street block in its perimeter. The plots aggregate is called as street block and the street line as an aggregate of some of whole parts of plots taken together but may not necessarily form a complete closed figure.

#### Building Pattern

Navter expresses block pattern as "*an arrangement of existing buildings, i.e. their block-plans in a built-up area viewed as a separate element complex of the town plan*<sup>9</sup>."

As the combination of buildings, the appropriate feature clarifying the *building pattern* is the spatial relation between elements. The fundamental element of building pattern is the block-plan, which is a closed figure and consists of the ground surface within

the boundaries. The lines of wall form *the boundaries* of the building. in architectural graphics a line defines difference in level, material etc. the physical interface of building in a plot is the boundary line.

### **Townscape**

Townscape is also referred to as urban landscape. Town's character is identified by the man-made built environment. The historicity of a town is carried forward with the smooth transformation of man made environment causing impact of the natural environment also. All these lead to a complex townscape formation having its own style with distinctive morphological periods.

### **Figure 4: Townscape and Morphological region (Source: Comert, 2013)**

#### **Land Utilisation Pattern**

The land use pattern is the order or spatial distribution of uses allocated to the land. The land use can further be categorised into residential, commercial, industrial, community service, recreation, open areas etc.

#### **Building Type / Building Fabric**

The building fabric is defined as "*the elements of the urban land utilization pattern, that is the individual units of land utilization occupying discrete plots*"<sup>9</sup>. The buildings of a town are built to suit a particular function. Building fabric is defined in the original function, period of construction and dominant part of land use of the plot in which building is constructed.

#### **Fringe Belt**

Comert asserts that the fringe-belt is "*a belt-like zone originating from the temporarily stationary or very slow advancing fringe of a town and composed of a characteristic mixture of land-use units initially seeking peripheral location*"<sup>9</sup>.

City does not grow equally on all direction outwardly. Fringe belt have variety of physical attributes<sup>7</sup>. There are always some restraints in any of the directions. These push and discontinue the growth of city in that direction. However there could be some other pull factor having geographic and economic attractions that pulls the growth in its direction. The process of such outwards growth is never consistent but has cycles of accelerations and recession

The fortification wall, river, hill, existence of some large /major land use such as institution defense land, open green conservation zone, absence of housing, sparse road network etc. are known as inner, middle or outer fringe belts. These dynamics alongwith geographical conditions altered the uniform pattern of outward growth of town away from core.

According to Ye Li citing Whitehand the Urban fringe belts are the physical manifestation of how city expands outwardly incorporating variety of landuses.

This concept can be seen in conjunction with the Conzen's morphological frame the urban development i.e conversion of rural land into urban with the development of plot boundaries and street network is most resistant to change . They remain unchanged for a longer period of time. Whitehand asserts that the town plan are pass on to next generation of society along with the residual features over a long period of time.

#### **Morphological region**

Whitehand has stressed that Conzen explorative work of physical development of town work climaxed in the identification of what is called Morphological region. It is a region that is an area that has unified distinct form and characteristics that distinguishes it from surrounding areas. (Whitehand) However, the boundaries between regions vary in strength also referred to as townscape; these are the homogeneous regions that have similarity in land use, building type and plan type<sup>9</sup>.

*"The morphological region is a composite of separate maps of plan type areas, building type areas, and landutilisation areas"*<sup>7</sup>.

#### **Discussion**

Thus the above discussions prove the interdisciplinary approach to understand the urban morphology of region.

#### **References**

1. Can, I, In-Between Space and Social Interaction: A Case study of three neighbourhoods in Izmir, PhD. Thesis, University of Nottingham, 2012.
2. [https://en.wikipedia.org/wiki/Urban\\_morphology](https://en.wikipedia.org/wiki/Urban_morphology), (Accessed July 2017)
3. <http://www.oxforddictionaries.com/definition/english/morphology>, (Accessed July 2017)
4. Moudon , A V., Urban morphology as an emerging interdisciplinary field, Urban Morphology, 1997, Vol. 1, pp 3-10
5. Conzen, M P, Study of urban Form in United States, Urban Morphology, 2001, Vol. 5, Issue 1, pp 3-14.

6. Whitehand. J W R, Conzenian urban morphology and urban landscapes, Proceedings, 6th International Space Syntax Symposium, İstanbul, 2007, pp ii 2-9.
7. Whitehand. J W R, British urban morphology: the Conzenian tradition, Urban Morphology, 2001, Vol. 5, Issue 3, pp 103-109.
8. Moudon. A V, The Changing Morphology of Suburban Neighborhoods, 1998, Accessed from , <https://s3.amazonaws.com/media.archnet.org/system/publications/contents/4249/original/DPC0453.pdf?1384782328> (Accessed on December 2018)
9. Cömert. N Z, Testing an Integrated Methodology for Urban Typo-morphological Analysis on Famagusta and Ludlow, PhD. Thesis Eastern Mediterranean University, March 2013.
10. Kropf. K, Ambiguity in the definition of built form, Urban Morphology, 2014, Vol. 18, Issue 1, pp 41-57
11. Sima. Y & Zhang. D, Comparative Precedents on the Study of Urban Morphology, Proceedings of the 7th International Space Syntax Symposium, 2009, pp 103: 1-8.
12. <http://www.urbanform.org/about.html>, (Accessed July 2017)
13. Chakma. M, Mapping Mountains: A Morphological Study of Traditional Highland Settlements in Chittagong Hill Tracts of Bangladesh, Master’s Thesis, Queensland University of Technology, 2014
14. Gauthiez. B, The history of urban morphology, Urban Morphology, 2004, Vol. 8, Issue 2, pp 71-89
15. Hofmeister . B, 2004, The study of urban form in Germany, Urban Morphology, 2004, Vol. 8, pp 3-12
16. Li. Y, A Typo-morphological Enquiry into the Evolution of Residential Architecture and Urban Tissues of the Guangfunan area of Guangzhou, China, Master’s Thesis, Concordia University, 2013.
17. Feng. Q, A Typo-morphological Enquiry into the Evolution of Urban and Architectural Forms in the Huangpu District of Shanghai, China, Master’s Thesis, Concordia University, 2013.

**Figures**

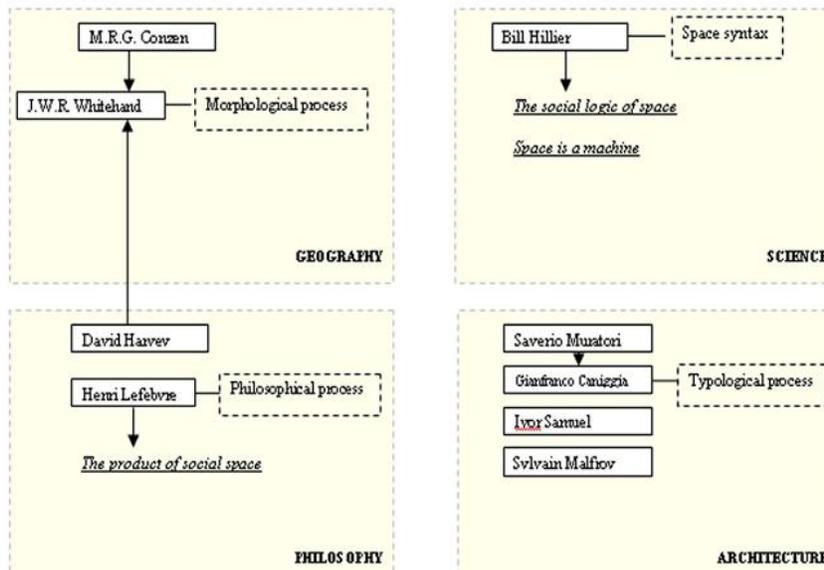


Figure 1: Genealogy of study in Urban Morphology (Source: Sima & Zhang, 2009)

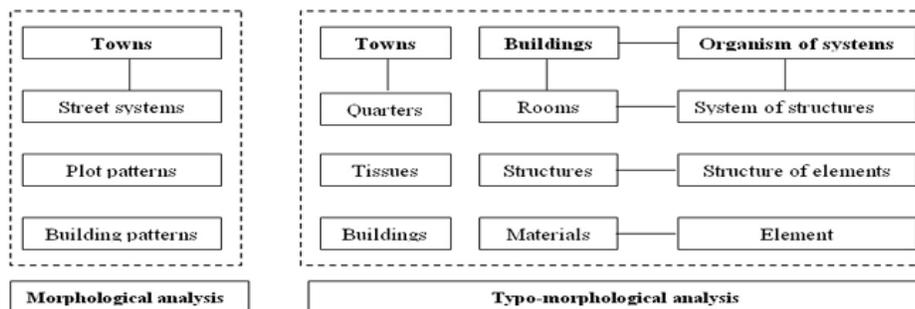


Figure 2: Morphological and typo-morphological (Source: Sima & Zhang, 2009)

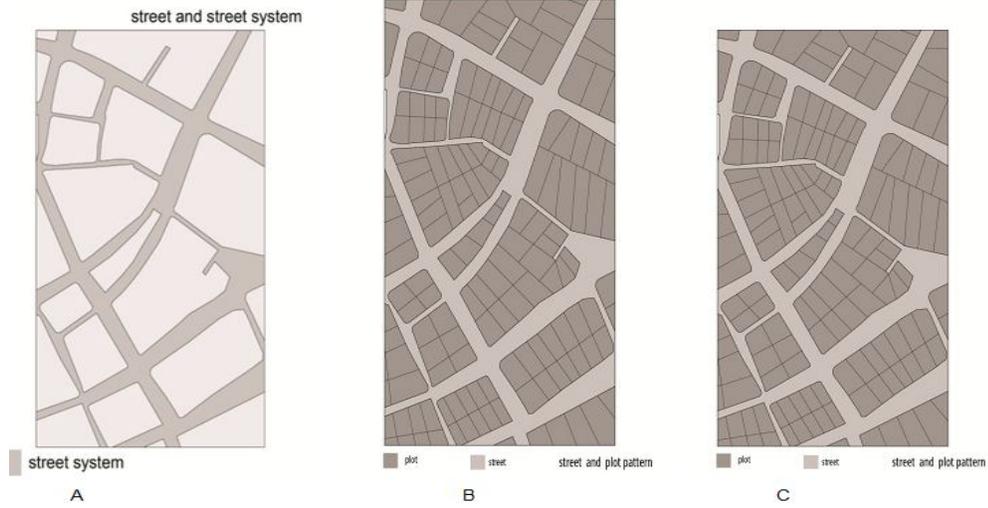
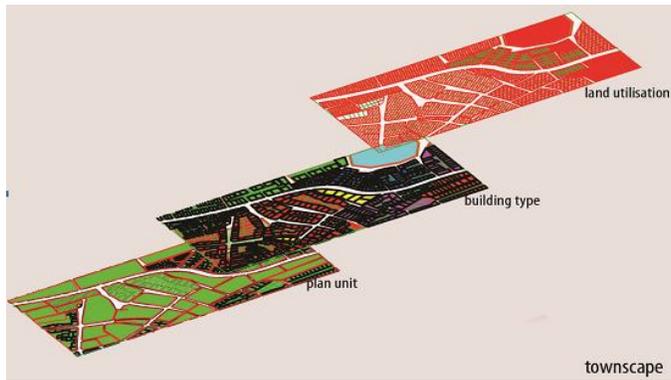
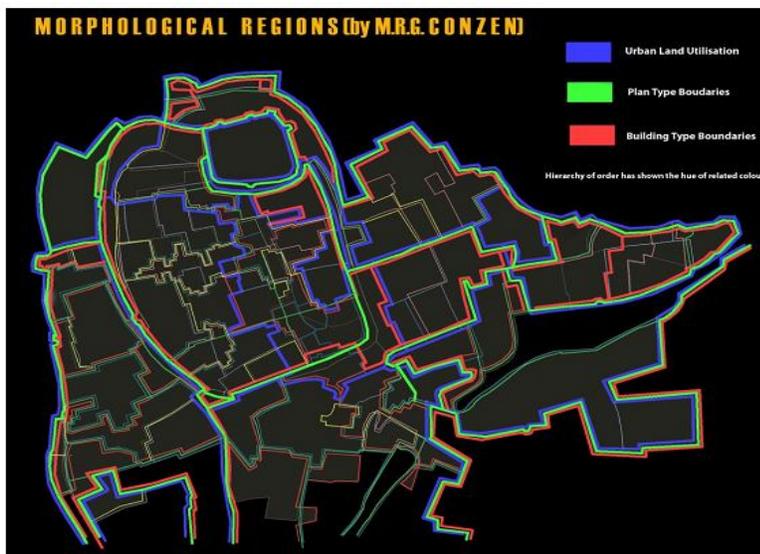


Figure 3: Street, Plot Pattern (Source: Comert, 2013)



A



B

A An example of Townscape

B An example of morphological region

Figure 4: Town scape and Morphological region (Source: Comert, 2013)