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## Urban morphology and the problem of the modern urban fabric: some questions for research

Albert Levy

CNRS, Laboratoire Théorie des Mutations Urbaines, Institut Français d'Urbanisme, Université de Paris VIII, 4 rue Nobel, 77420 Champs sur Marne, France

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**Abstract.** *For most researchers in urban morphology urban form means the form of the urban fabric. Most analyses are concerned above all with historical urban fabrics. There has been insufficient exploration of modern urban tissue. With its vast territorial expansion, the modern city has undergone radical changes. There has been a shift from a closed fabric in which the links between the different elements (plot, street, constructed space, and open space) formed a system, to an open fragmented peri-urban fabric. Autonomous, atomized elements do not relate to each other any more and their scale has changed greatly. In these morphological transformations the infrastructure of transportation has played a dominant role. New tools of analysis are needed to understand the new components of the modern urban fabric and their processes of formation.*

*Key Words:* urban morphology, urban fabric, peripherization, infrastructure, urban quality

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If we look closely at research in urban morphology, it is apparent that, for most researchers, 'urban form' signifies the form of the urban fabric.<sup>1</sup> Paradoxically, however, the concept 'urban fabric' has never been clearly defined. This is despite the fact that in most research on urban form the same elements are identified and analysed, either separately or in relation to each other. These are the plot, the street, the constructed space and the open space. Depending on the aims of the research and the approach adopted, considerations of these elements take into account to varying degrees the site, subdivided into orography, hydrography and vegetation.

Such studies are based on the idea that a particular logic has dictated the organization

of the urban fabric in different periods ; that some categories remain constant ; that certain aspects are permanent ; that there are rules of transformation over time that dictate changes to the fabric ; and that the organization and development of the fabric are not random, but follow laws that urban morphology tries to identify.

A common hypothesis is that there exists a systemic organization, some regarding this as having organic attributes. In this organization there is an interdependence between part and whole, that is between building type and fabric. Some studies envisage a non-causal, dialectical relationship between building types and urban forms. This creative relationship is the focus of much morphological analysis. It helps us to

**Table 1. The primary elements of the urban fabric**

	Plot (P)	Street (S)	Constructed space (CS)	Open space (OS)
Plot (P)	P/OS	S/OS	<u>SC/OS</u>	OS/OS
Street (S)	P/CS	S/CS	<u>CS/CS</u>	OS/CS
Constructed space (CS)	P/S	S/S	<u>CS/S</u>	OS/S
Open space (OS)	P/P	S/P	<u>CS/P</u>	OS/P

understand not only historical urban fabrics, with which most morphological studies have been concerned, but also the analysis of modern urban fabrics, an issue that has rarely been addressed.

### Principles and methods of morphological analysis

To understand the relationship between building type and urban fabric, and between typology and morphology, we can use a synthetic model. Like all synthetic models it is necessarily simplified. Table 1 combines the primary elements of the urban fabric: plot (P), street (S), constructed space (CS), and open space (OS). By open space is meant urban spaces other than streets, for example squares, gardens and courtyards.

The urban fabric consists of the relationships between the different elements. The relationships are shown as two-way to emphasize their dialectical nature. Morphological analysis involves examining these different relationships one by one: that is P/OS, P/CS, P/S, P/P, then S/OS etc – a reading of the table column by column. However, in practice different researchers emphasize different relationships in their analysis according to their interests.

For Caniggia,<sup>2</sup> who adopts an organic approach, the relationship of building type to the urban fabric becomes a 'typological process' or a cumulative process beginning with the 'elementary cell'. This process creates 'pseudo-types', which are functionally

different, lead to a 'basic fabric' and, by extension, along hierarchical pathways (streets) to 'particular fabrics'.

For Conzen,<sup>3</sup> a crucial part of the urban fabric is the town plan, which comprises three distinct complexes of 'plan elements': streets and their arrangement in a street system, plots and their aggregation in street blocks, and buildings or, more precisely, their block-plans. Within an urban area distinct combinations of these plan elements form unitary areas termed 'plan-units'.

The relationships P/P, S/S, CS/CS and OS/OS (reading Table 1 diagonally) correspond to the typological analysis of each individual element of the fabric. Many studies have taken this approach:

- the typology of plots or the classification of lots;<sup>4</sup>
- the typology of streets or the inventory of types of streets;<sup>5</sup>
- the typology of constructed spaces or the identification of types of buildings;<sup>6</sup>
- the typology of open spaces or the identification of types of urban spaces and squares.<sup>7</sup>

Another feature of this approach is the analysis of the relationships between different instances of the same element: the relationship of plot to plot, street to street, building to building, and square to square.

The relationship of constructed space to other elements (CS/OS, CS/CS, CS/S, CS/P) defines more precisely the 'typology of settlement' (*typologie d'implantation*). This has a fundamental role and is a key concept

in the morphological analysis of certain researchers.<sup>8</sup>

Two of the relationships, that of street to constructed space (S/CS) and that of open space to constructed space (OS/CS) were the subject of regulations of the *Ancien Régime* in France. These regulations were not abolished until the 1950s. They contributed to the uniformity and harmony of the urban landscape of Paris by controlling the ratio between the width of the street, or of the open space, and the height of the building.<sup>9</sup> Some researchers have cited this as another instance of a dialectical typomorphological relationship<sup>10</sup> playing an important role in the formation of the urban landscape. It has also been presented as a relationship between private space and public space.

### Diachronic approaches

Beyond this synchronic approach to morphological analysis, several researchers have tried to develop a diachronic approach. The aim is to explain the mechanisms of evolution or creation and transformation of urban forms. This approach, closely allied to the history of urban form and sometimes referred to as morphogenetic, allows understanding of the passage from one stage to another in the development of the fabric and the process by which it occurs.

There are two main diachronic approaches to the study of urban form. The first focuses on the role of *constants*, or historically persistent elements, in the fabric as the city evolves from one stage to the next. These elements play an important role in the determining the present configuration of the city.<sup>11</sup> The second diachronic approach consists of the study of the relationship between building type and urban fabric over time. Some periods, for example, are characterized by the influence of the fabric on the types of buildings constructed, while in other periods building types have a dominating influence on the fabric. These switches in the relationship help to explain the transformation of the fabric.<sup>12</sup>

Although these two analytical methods take into account the layering of fabrics, or 'urban sedimentation', other models of growth and development describe change in terms of the superimposition of a major fabric on an existing one (for example, the Haussmann fabric superimposed on the medieval Parisian fabric) or by the juxtaposition of different fabrics over time, reflecting successive rings of urban growth.

Most of these conceptions are used to study historical fabrics only. The question that must be asked is how do we deal with the modern urban fabric?

### Contemporary urban fabrics

The modern city has undergone radical changes in its physical form, not only in its vast territorial expansion,<sup>13</sup> but also through internal physical transformations. These have created entirely new kinds of 'fabric'. Cities that were dense, compact and continuous have become diffuse, loose and discontinuous. The traditional structure of the urban fabric, its elements and its rules of organization have all been shown by morphological analysis to have changed dramatically. A shift has occurred from a closed fabric, including central business districts and outlying suburbs in which the links between the different elements (plot, street, constructed space and open space) formed a system (the system of urban architecture),<sup>14</sup> to a peri-urban fabric which is open and fragmented, with autonomous and atomized elements which do not relate to each other. This shift has been accompanied by a significant change in scale, with the appearance of imposing megastructures and relationships between buildings that are now only functional.

These developments have led certain authors to call into question, or even deny the very existence of, a suburban fabric, or a recognizable form in the outlying urban reaches, since this territory appears broken up and chaotic. Portzamparc, for example, has evoked two distinct ages when considering

the transformation of the forms of the city: age I (the age of the traditional closed city) and age II (the age of the modern open city).<sup>15</sup>

This transformation, involving the spread and disruption of urban space, has given rise to a whole body of critical literature. Choay associated the death of the city with the disappearance of the last great urban figures: Haussmann in Paris, Wagner in Vienna and Cerdà in Barcelona. But she is dispassionate in her conclusion, calling this transformation inevitable and irreversible.<sup>16</sup> Friedmann and Miller have referred to the new form of suburb as the 'the urban field'. It is characterized by a low density, a polynuclear structure and an absence of boundaries and rigid form: 'unlike the traditional city, [it] will no longer be directly accessible to the senses', nor is there anything 'rigid or predetermined about the physical form of the field'.<sup>17</sup> Two French researchers, Roux and Bauer, have used the term 'rurbanization'<sup>18</sup> to describe the sprawl of these new urban forms into the rural areas around cities. In these areas rural and urban activities are confused. In recent decades, new large urban areas have emerged on the periphery of large American cities that are difficult to define because they are completely different from the classic downtowns and the traditional residential suburbs. These have been dubbed 'edge cities' by Garreau.<sup>19</sup> They have all the functions of a city, but they have tended to develop near major transport installations, such as freeway interchanges and airports.

In these morphological phenomena, the infrastructure of transportation, associated with growing demands for mobility created by post-industrial patterns of employment, has played a dominant role. Roads and parking spaces occupy a large proportion of land within cities. This infrastructure is an essential part of the new urban fabric. It has been the primary tool of urban expansion and the principal agent of urban change. Looking at outlying urban zones, we can indeed see an upheaval in the classic urban form with the creation of new kinds of urban elements and new constructions, in which the road plays a central role in the modelling of forms

and in the creation of new suburban landscapes: ring roads, urban motorways, bypasses, detours, interchanges and traffic circles replace avenues, boulevards, streets, crossroads and corners, while elevated walkways, platforms and shopping centres become the new public squares; supermarkets and malls replace department stores, market streets and covered markets; lawns and playing fields replace parks and gardens; towers and linear buildings replace individual units and blocks, and the new private housing estate supersedes the garden city.

The way in which these new urban features relate to each other, as we can see, is also different. It is often the result of adjacent zoning projects having been created one by one, each with a different plan, strung along the transportation routes, creating a fabric that is open, fragmented, heterogeneous and disrupted. This mode of production has been referred to as peripherization or peri-urbanization. Little understood, it has yet to be subjected to formal analysis.

In the terms of Portzamparc, radical morphological changes have taken place between the city in age I and the city in age II. Beyond description and formal analysis of, for example, the loss of the dialectical relationship between urban form and building type, and the appearance of new types of element like motorways, it is important to look at the origins of these changes, especially the categories of urban design and urbanistic thought that permitted them. These include the concepts of infrastructure, road network, 'public amenity', and 'facility', none of which have been given sufficient attention by researchers. An epistemological and historical study of these new urbanistic categories<sup>20</sup> is necessary in order to understand the reasons for the transformations in the peri-urban fabric, the particular nature of the fabric produced and the problems that result, such as the deterioration of the environment, the quality of urban forms and the transformation of public space in the new built-up areas.

### Analysing the modern urban fabric

Returning to Table 1, we can see that, with these changes in urban form, the elements of the fabric have changed. Plots have been transformed into building areas, planning sectors or construction zones: owing to land consolidation, plots no longer have a structuring role. Streets have been transformed into transportation infrastructure, notably motorways and highways. In the case of constructed space, blocks have been transformed into linear or point-block buildings, and traditional public buildings into 'facilities'. In the case of open space, gardens and parks have been transformed into lawns and playing fields; open squares into elevated walkways, podiums, malls, and sometimes car parks.

The identification of these new urban elements and typological transformations must be refined and developed: the principal aim of morphological analysis of the new fabric should be to understand the changes that have led to its creation.<sup>21</sup>

In the case of changes from the street to infrastructure, the confusion between inter-urban and intra-urban mobility has been a major factor, especially in the peri-urban area, where inter-urban transport infrastructure has been introduced most intensively, with the consequent disappearance of the street and the deterioration of public space. The relationship between the width of the street and the height of the buildings, as well as the position and alignment of the buildings in relation to the street, which were the basis of traditional urban development control and helped to create the urban landscape, have been eliminated in the new built-up areas. The separation of the different modes of transport (pedestrian, bicycle and car) and of the different functions, through zoning and the reduction of the street to a simple space for movement only, has killed the street as a public space and destroyed its traditional typological configuration. An interesting example is the phenomenon of the out-of-town supermarket. This has completely changed the relationships between

trade and city, raising many questions. What are the origins of this building type? How has it evolved? What are its means of access? What is the relation between pedestrian pathways, the street and new building types? Consideration of these issues is necessary to understand the development of these new elements.

The new elements are entirely autonomous. Constructed space no longer corresponds to the plot. There is no longer a clear relation between one building and another, and between buildings and streets or open spaces. Modern architects have called this (r)evolution 'the freeing of the ground'. In fact, it is a freeing from all relationships between the elements that form the urban fabric. Can we still speak of such a fabric? Many researchers are sceptical, and criticize this lack of traditional form in the peripheries.

The problem, therefore, facing urban morphology, is to analyze the contemporary urban fabric, to understand its distinctive components and specific process of formation, its syntax, but in a critical way. The aim should be to determine on the basis of the demands of to-day and from the knowledge we have of the general rules of the formation of urban fabric, some criteria of quality for the creation of new urban fabrics.

### Notes

1. The study of the urban fabric is not the only approach to understanding urban form. Other approaches have been developed. One of these considers the form of urban layouts. See Lavedan, P. (1926, 1941, 1952) *Histoire de l'urbanisme* vols 1-3 (Henri Laurens, Paris); Lavedan, P. (1936) *Géographie des villes* (Gallimard, Paris); Unwin, R. (1909) *Town planning in practice* (Fisher Unwin, London); Danger, R. (1933) *Cours d'urbanisme* (Eyrolles, Paris).
2. For a general presentation of Caniggia's concepts see Malfroy, S. and Caniggia, G. (1986) *L'approche morphologique de la ville et du territoire* (Eidgenössische

- Technische Hochschule, Zürich).
3. Conzen, M.R.G. (1960) *Alnwick, Northumberland: a study in town-plan analysis* Institute of British Geographers Publication 27 (George Philip, London).
  4. For example, Rouleau B. (1985) *Villages et faubourgs de l'ancien Paris. Histoire d'un espace urbain* (Seuil, Paris); Boudon, F., Chastel, A., Couzy, A. and Hamon, F. (1977) *Système de l'architecture urbaine: le quartier des Halles à Paris* (Centre National de Recherche Scientifique, Paris).
  5. For example, Rouleau, B. (1983) *Le tracé des rues de Paris* (Centre National de la Recherche Scientifique, Paris); Anderson, S. (ed.) (1978) *On streets* (MIT Press, Cambridge, Mass.).
  6. On this issue see, for example, the opposing positions of Aymonino, C. (1977) *Lo studio dei fenomeni urbani* (Officina, Roma); Rossi, A. (1982) *Architecture of the city* (MIT Press, Cambridge, Mass); Caniggia, G. (1968) 'Tipizzazione', 'Tipo', in Portoghesi, P. (ed.) *Dizionario Enciclopedico di Architettura e di Urbanistica* (Unione Tipografica Romana, Roma), 207, republished in Caniggia, G. (1976) *Struttura dello spazio antropico* (Alinea, Firenze). I explained my own position on this problem in Levy, A. (1997) 'The typo-morphological approach of G. Caniggia and his school of thought', *Urban Morphology* 1, 52-6.
  7. See, for example, Sitte, C. (1889) *Der Städtebau* (Wien), translated into English (1945) *The art of building cities* (Reinhold, New York); Krier, R. (1980) *L'espace de la ville* (Archives d'Architecture Moderne, Bruxelles); Morini, M. (1960) *Atlante storica dell'urbanistica* (Hoepli, Milano); Lavedan, P. (1926, 1941, 1952) *op. cit.*
  8. Castex, J., Celeste, P. and Panerai, Ph. (1980) *Lecture d'une ville: Versailles* (Moniteur, Paris) and Conzen, M.R.G. (1960) *op. cit.* have used this typology in their analysis.
  9. See, for example, the study of the concept of 'regularity' undertaken by Maïzia, M. (1997) 'Towards a quantitative morphology: a new method of morphological investigation', unpublished paper presented to the Fourth International Seminar on Urban Form, Birmingham, July, and Maïzia, M. (1998) 'Systématisation de la morphologie', *Urbanisme* 301, 35-9.
  10. For example, Laisney, F. (1987) *La question du règlement dans l'évolution de l'urbanisme parisien, 1600-1902* (Bureau de la Recherche Architecturale, Paris). See also Harouel, J.H. (1993) *L'embellissement des villes. L'urbanisme français au XVIIIème siècle* (Picard, Paris); Starkman, N. (1987) 'Règlements d'urbanisme et paysage à Paris', *Cahiers du Centre de Recherche et d'Etudes sur Paris et l'Île-de-France* 19, 51-67.
  11. Many studies have been undertaken on this issue: for example, Lavedan, P. (1936) *op. cit.*; Caniggia, G. (1976) *op. cit.*; Rouleau, B. (1985) *op. cit.*; Rossi, A. (1981) *op. cit.*; Pinon, P., Boniface, P. and Gullon, P. (1986) *Lotissements spéculatifs et formes urbaines: le quartier de la Chaussée d'Antin à la fin de l'Ancien Régime* (Bureau de la Recherche Architecturale, Ecole d'architecture de Paris - La Défense, Paris); Pinon, P. (1998) 'L'archéologie des lotissements: quelques exemples parisiens', *Paris: formes urbaines et architecturales* Les Cahiers de l'Ipraus architecture, urbanistique, société 1 (Editions Recherches/Ipraus, Paris).
  12. Castex, J. *et al.* (1980) *op. cit.* show this very well in Versailles. See also Aymonino, C., Lovero, P. and Rossi, A. (1970) *La città di Padova. Saggio di analisi urbana* (Officina, Roma).
  13. See the pioneering book of Gottmann, J. (1961) *Megalopolis: the urbanized northeastern seaboard of the United States* (Twentieth Century Fund, New York).
  14. Boudon, F. *et al.*, *op. cit.*
  15. Portzamparc, Ch. (1997) *La ville âge III* (Pavillon de l'Arsenal, Paris).
  16. Choay, F. (1994) 'Le règne de l'urbain, et la mort de la ville' in *La ville: art et architecture en Europe 1870-1993* (Centre Georges Pompidou, Paris).
  17. Friedmann, J. and Miller, J. (1965) 'The urban field', *Journal of the American Institute of Planners* 31, 312-20. See also Friedmann, J. (1978) 'The urban field as human habitat', in Simmons, J.W. and Bourne, L. (eds) *Systems of cities* (University Press, New York) 42-52.
  18. Bauer, G. and Roux, J.M. (1976) *L'urbanisation ou la ville éparpillée* (Seuil, Paris).

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19. Garreau, J. (1991) *Edge city: life on the new frontier* (Anchor Books, New York).
20. See Levy, A. (1999) 'Infrastructure viaire et forme urbaine: g n se et developpement d'un concept', *Espaces et Soci t s* (L'Harmattan, Paris) forthcoming.
21. On mobility and its impact, see, for example, (1966) *New movement in cities* (Studio Vista, London); (1976) *Moving in cities* (Studio Vista, London); Brian, R. (1990) *Transport in cities* (Architecture Design and Technology Press, London).
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