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Mapping urban morphology: a classification scheme for interpreting contributions to the study of urban form

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Abstract. *Urban morphology is a thriving field of enquiry involving researchers from a wide diversity of disciplinary, linguistic and cultural backgrounds. While this diversity has helped advance our understanding of the complexity of urban form, confusion and controversy has also arisen over the various theoretical formulations forwarded by researchers from different philosophical and epistemological backgrounds. With the aim of improving intelligibility in the field, this paper proposes a straightforward scheme to identify, classify and interpret, or 'map', individual contributions to the study of urban form according to their respective theoretical or epistemological perspectives. Drawing upon epistemological discussions familiar to the readers of this journal, the authors first distinguish between cognitive and normative studies. A second distinction is made between internalist studies that consider urban form as a relatively independent system, and externalist studies in which urban form stands as a passive product of various external determinants. Using these basic criteria, it is possible to interpret and synthesize a multitude of contributions and map them using a simple Cartesian grid. The paper highlights how contributions from seemingly different theoretical approaches to urban morphology are intrinsically similar in their treatment of urban form as an object of enquiry.*

Key Words: urban morphology, built environment, epistemology, morphological theories, morphological approaches

Urban morphology, in simple terms, is the study of city forms. While there is general agreement among self-proclaimed 'urban morphologists' as to what they study, there is considerable debate over how urban forms are to be studied. An inevitable source of misunderstanding stems from the fact that major contributions to urban morphological scholarship continue to be made by researchers

from a wide variety of disciplinary, linguistic and cultural backgrounds. Undoubtedly, part of the confusion arising from divergent theories and methods in urban morphology could be alleviated with a multi-lingual glossary of terminology in the field (cf. Larkham and Jones, 1991; Malfroy, 1986). Nevertheless, a great deal of confusion and controversy is due to the diversity (and

apparent incompatibility) of the various theoretical formulations that have been adopted and presented by researchers from different philosophical and epistemological backgrounds (Gerosa, 1999). It has therefore been argued that one of the most urgent requirements in the field of urban morphology is the elucidation of its philosophical or epistemological foundations (Conzen, 1998; Gerosa, 1999; Whitehand, 1999). It would then be 'possible to improve intelligibility despite differences of vocabulary and language, and thereby carry forward the dialogue' (Gerosa, 1999, p. 45).

In this paper, we propose a system to identify and interpret, or 'map', individual contributions to the study of urban form according to their respective theoretical or epistemological perspectives. In an effort to 'improve intelligibility' in urban morphology, we offer a two-tiered examination of prevailing approaches in the field. First, we distinguish between *cognitive* and *normative* approaches to urban form, and then a second distinction is made between what we term *internalist* and *externalist* contributions. Using these basic criteria, it is possible to interpret and synthesize a multitude of contributions and map them using a simple Cartesian grid. It is not our aim here to provide a comprehensive review of research on urban form (see instead Conzen, 2001; Darin, 1998; Hofmeister, 2004; Marzot, 2002; Slater, 1990; Vilagrassa Ibarz, 1998; Whitehand, 1987, 1992); however, we do identify some of the major contributions in order to illustrate the utility of the proposed method of classification. While it is not our intention to suggest the superiority of any individual contribution or approach, our discussion focuses particular attention on the so-called British, French, and Italian 'schools' of urban morphology which should be most familiar to readers of this journal (Cataldi *et al.*, 2002; Darin, 1998; Moudon, 1997; Whitehand, 2001). With the proposed framework we shall highlight and discuss how contributions arising from these three seemingly different theoretical approaches are intrinsically similar, in that each one has contributed to the

development of an internalist perspective on the development of urban form.

Cognitive versus normative approaches

Our first level of classification sorts each contribution according to the primary heuristic purpose they serve (whether or not this purpose is *explicitly* stated by the author). In surveying a sample of the most prominent studies dealing with urban form, a twofold distinction can be made. First, there are studies that are aimed at providing explanations or developing *explanatory* frameworks or both (i.e. *cognitive* contributions); and secondly, there are studies aimed at determining the modalities according to which the city should be planned or built in the future (i.e. *normative* contributions).

Drawing upon the work of Lang (1987), Moudon (1994) has proposed a similar distinction in her ambitious and fairly thorough exposé aimed at producing an epistemological map of substantive research related to urban design. She calls each category *normative-prescriptive* and *substantive-descriptive*: 'it is important to distinguish first between *normative* or *prescriptive* information (emphasizing the 'what should be') and *substantive* or critically *descriptive* knowledge (emphasizing the 'what is' and perhaps also the 'why')' (p. 332). More recently, Levy (2005) has suggested that the same distinction be made in the field of urban morphology, to distinguish between what he termed *normative* and *cognitive* approaches.

For the present purpose we have adopted the more straightforward terminology used by Levy. We use the expression *cognitive* to reflect the heuristic nature of an intellectual enterprise concerned with producing knowledge or at developing theoretical means, methods and techniques destined to produce such knowledge. Likewise, the term *normative* denotes accurately an intellectual exercise, which aims at articulating a view of what the future should look like, or at exposing a doctrine or specific sets of norms and prescriptions that would serve such a view.

Some social scientists or historians might raise an eyebrow at the suggestion that it is necessary to make a distinction between cognitive and normative contributions, thinking that their different character is self-evident. However, others might question the desirability or even the possibility, on epistemological grounds, of making such a distinction. The fact that the same proposition could elicit two entirely legitimate but opposite interpretations is indicative of the complexities at play in underlying epistemological and philosophical questions. It is not our intention in the context of this short article to proceed to a thorough examination of such questions; however, we will evoke briefly some epistemological considerations arising from the proposed distinction.

We posit that differentiating between cognitive and normative studies is a critical step for clarifying the multi-faceted nature of the intellectual agenda of urban morphology. The field of urban morphology lies at the intersection of several academic disciplines such as architecture, urban planning, geography and history. Each of these disciplines is influenced in turn, by a variety of traditions, research programmes, analytical apparatuses, and in particular, by specific research problems and research objectives. Urban planning is a case in point, and one in which the problem of the heuristic programmes and procedures is raised quite acutely. As a practice, urban planning is clearly oriented towards action, whereas as a scholarly subject matter, it assumes a more complex and ambiguous character. The discipline of urban planning seems to possess a mixed identity: science, applied science and prescriptive practice (Levy and Spigai, 1989). In the fields of architecture and by extension urban design and planning, the term 'theory' for instance, could assume two distinctly different meanings. In some circumstances, typically in the literature of applied planning, theory refers to a doctrine accompanied by a series of prescriptions. Whereas in other circumstances, the term theory – as scientists would understand it – refers to a body of principles put forward to explain a phenom-

enon. To add to the confusion, the applied planning literature, including canonic texts of urbanism, often aim at conferring scientific status on what is highly ideological (Choay, 1965; Lefebvre, 1970).

Whether there is an epistemological gap between the explanatory and cognitive on the one hand and the normative on the other, as implied by Choay (1965), or whether these categories correspond to opposite conceptual poles located on a continuum, as Moudon (1992) suggests, is open to interpretation. The former position suggests a difference in nature, while the latter implies a variation in intensity. To distinguish between cognitive and normative approaches does much to clarify the nature of the intellectual contribution of the school of process typology, as exemplified by the ideas of Italian architect Saverio Muratori. Various commentators have posited that the Muratorian tradition has developed a normative approach to the built environment. Moudon (1994) states for instance that the so-called Italian school offers a renewed theoretical foundation for urban planning and design, which engages long-standing city building traditions. She contrasts this contribution with the 'scholarly' approach of the so-called *Conzenians*, that is, British researchers working in the tradition of geographer M.R.G. Conzen. Levy (2005) expressed a similar idea, when making a distinction between what he termed the normative approach of Gianfranco Caniggia and the cognitive approach exemplified by the work of M.R.G. Conzen. Such an interpretation echoes that put forward by Whitehand and Larkham (1992), who, in their genealogy of research traditions in urban morphology, characterize the Italian school as being preoccupied with urban design. We do not dispute such an interpretation, but suggest that it might obscure the scientific contribution made by proponents of process typology, and in particular those of the 'second generation', such as Cataldi, Maretto and Caniggia who, inspired by Muratori's original ideas, have been working towards a science of the built environment (Cataldi *et al.*, 1997; Gerosa, 1992). It is therefore more accurate to depict

the intellectual enterprise of process typology as both normative and cognitive and to map individual studies according to their primary aim. Accordingly, we term cognitive those contributions that aim to produce knowledge (e.g. Caniggia, 1963, 1994) or develop theoretical and analytical tools (e.g. Caniggia and Maffei, 1979; Mareto, 1984), and we reserve the term normative for contributions explicitly aimed at articulating a vision of the future (e.g. Mareto, 2005, or the intellectual contribution represented by the 1983 entry to the *Campo di Marte alla Giudecca* competition in Venice by Caniggia and his team), or at formulating an approach to planning practice (e.g. Caniggia and Marconi (1986) on heritage preservation).

The appeal of comparing and assessing the process typology and Conzenian approaches resides in the fact that both have developed – based on different philosophical and epistemological grounds – rather sophisticated descriptive and explanatory frameworks to study urban form and its transformations. The following section posits that these explanatory frameworks confer a similar epistemic status to urban form as an object of enquiry, and that this common trait distinguishes these approaches from the vast majority of other approaches to the study of urban form.

Internalist versus externalist approaches

According to the second proposed criterion for classification, each contribution is sorted according to the epistemic status conferred to urban form: by distinguishing between contributions that consider urban form as a relatively independent system, and contributions in which urban form stands as a dependent variable, or passive product of various external determinants.

An examination of the key research traditions in urban morphology, specifically the British, Italian and French schools, reveals that they hold in common the intent to capture in the empirical reality of the city, some ‘forms’, understood here as the form of the urban fabric, and to study intricate details of

such forms. Levy describes the common ground of these studies as ‘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’ (Levy, 1999, p. 79). To comprehend the urban fabric in terms of ‘urban form’, understood as a system of its own that is governed by internal sets of relations, necessitates two prerequisites: first, that the elements in the system are not discrete objects; and secondly, that the relations between elements are not contingent. In other words, there exists an ‘internal’ logic to this system. Such a perspective allows for the development of theoretical frameworks that find the primary explanation for morphogenesis in the constraints and potential for change present within the system itself. We propose to call these approaches that are primarily concerned with understanding the internal logic of the urban fabric *internalist* approaches to urban morphology.

Jean Castex and colleagues (1980) posit that, although to a certain extent a city is a material projection of social, political and economic systems or structures, to comprehend it as a built object and a form comprising the city as an object allows one to observe that this projection proceeds through various systems of spatial symbolization, and is manifested in a substance, the *built space*, that has its own consistency and resilience (Castex *et al.*, 1980, XI). The understanding of such modes of spatial symbolization and of structurally resilient settlement configurations and urban forms that make up the specific physiognomy of a city lies at the heart of the heuristic project of internalist approaches to urban morphology.

Alternatively, we label as *externalist* those approaches that primarily see the urban form as the end product of processes driven by political (e.g. Çelik, 1997), anthropological (e.g. Rapoport, 1977, 1982; Rykwert, 1988),

geographical and economic (e.g. Vance, 1977, 1990), historical (e.g. Benevolo, 1980), and perceptual (e.g. Lynch and Rodwin, 1958; Lynch, 1960) determinants. Historically, externalist contributions have been far more numerous than internalist ones; notwithstanding the numbers, the importance of the internalist approach lies in its ability to produce original and highly innovative interpretations of urban material culture.

We posit that a common object of enquiry, i.e. the city as a spatial form, and a common conceptualization of the urban built environment as a dynamic system granted with relative autonomy, connects the contributions of the three 'schools' and constitutes the primary core of the urban morphology research programme, albeit this programme is still in the process of becoming a paradigm. From an epistemological perspective, the commensurability of the cognitive-explanatory theoretical frameworks developed under the auspices of the three schools of urban morphology lies in their common internalist perspective. It is interesting to discover how these similarly systemic or structuralist frameworks were informed by particular disciplinary and philosophical traditions that are only very remotely connected: geographer M.R.G. Conzen drew insights from Cassirer's philosophy of symbolic forms (Conzen, 1998), whereas Italian architect and planner Caniggia was inspired by the European continental structural linguistics, particularly the structural phonology of the *Cercle de Prague* (Caniggia and Marconi, 1985; Caniggia, 1988). The adoption of Italian methods by architectural scholars in France marked their entrance into the animated French structuralist debate (Cohen, 1984).

Perhaps the most important contribution of urban morphology to the study of cities has been to show how the built environment can be understood as a system of relations submitted to rules of transformation. The conceptual possibility to capture some cultural occurrences in systemic terms has proven extremely fruitful in urban morphology, as it has in numerous other scientific fields and

disciplines. This simple theoretical *a priori* allows us to better understand the complexity of the urban built environment, and in particular to better comprehend how the process of a city's physical formation has its own weight and inertia, that work to oppose social, economic and political factors, in the same way that it has been alternatively assumed that the physical development of the city is conditioned by these factors.

Mapping urban morphology

The usefulness of graphically mapping various contributions to the study of urban form on a grid should be seen at both a practical level for researchers interested in urban morphology, and at a more analytical and epistemological level, as it elicits new interpretations on the nature of contributions or groups of contributions that deal with urban form. This section will illustrate the benefits of the mapping exercise by discussing briefly some of its results (see Figure 1). It is not our intention to draw a comprehensive picture of the various contributions to urban morphology, but we do reference some well-known contributions in order to illustrate the pertinence of the proposed approach.

At a practical level, the grid allows for a synthetic representation of some commonalities and distinctions observable in the theoretical and epistemological perspectives favoured in various contributions. Such mapping is beneficial as it provides an immediate basis for comparison when faced with the corpus of contributions emanating from a variety of disciplinary traditions and linguistic environments. In fact, the idea to develop such a tool originated in the authors' attempts to make sense of the wide variety of contributions to the study of urban form by researchers in Canada (Gilliland and Gauthier, 2006) (see this issue, pp. 51-66). When conducted more comprehensively, the mapping can help to identify tendencies in a national research effort on urban form, for instance, or to distinguish the leanings of

| | | | |
|--|---|--|---|
| Hillier (1996) Hillier & Hanson (1984) Cataldi (1977) Maretto (1984) Caniggia (1963) | Muratori (1960) Caniggia & Maffei (1979) | Cognitive Normative | Caniggia & Marconi (1986) |
| Boudon <i>et al.</i> (1977) Castex <i>et al.</i> (1980) Conzen (1968) Conzen (1960) | Moudon (1986) Habraken (1998) | Samuels & Pattacini (1997) Levy & Spigai (1992) Levy & Spigai (1989) | Conzen (1975) Spigai (1980) Duany <i>et al.</i> (1999) Calthorpe (1993) Cervallati <i>et al.</i> (1981) Davoli & Zaffagnini (1993) Kropf (1996) |
| Internalist approach | | | |
| Externalist approach | | | |
| Slater (1978) Whitehand (1972a) Whitehand (1974) Kostof (1991) | Rapoport (1982) | | Larkham (1996) Whitehand (1981) Rapoport (1977) |
| Çelik (1997) King (1984) Vance (1977) | Lynch (1960) Mumford (1961) Benevolo (1980) | | Lynch (1981) |

Figure 1. Mapping contributions to the study of urban form.

various groups of researchers, whether or not these groups conduct formal exchanges.

On a more analytical level, in addition to the intrinsic heuristic value of the proposed categories, the mapping allows one to study the distribution of various contributions in different quadrants in order to identify patterns of concentration (possible research ‘clusters’) or dispersion. The exercise allows for the recognition of similarities or differences between narratives, which might otherwise go unnoticed.

A closer look at the grid reveals that the internalist/cognitive quadrant includes various

scientific studies concerned with the city as an artifact and spatial form, and which conceptualize its built environment as a system. Such a depiction best qualifies the work of M.R.G. Conzen (1960, 1962, 1968), for instance, as well as the scientific efforts of various proponents of process typology. Whereas Muratori’s philosophy and research methods broke the ground, the second generation process typologists such as Caniggia and Maffei (1979), Cataldi (1977), and Maretto (1984), have worked more attentively at developing a science of the built environment. The research tradition known as

space syntax has also produced several important contributions to urban morphology that fall in this category, and is best represented by the work of Bill Hillier and Julienne Hanson from the Bartlett School of Planning at University College London (e.g. Hillier and Hanson, 1984; Hillier, 1996).

The externalist/cognitive quadrant regroups the scientific contributions concerned with the forms and transformations of the urban built environment, but which rely predominantly on explanatory frameworks based on external conditions of development. The vast majority of scientific contributions dealing with urban form (especially from the Anglo-Saxon world) have adopted a common externalist perspective, even though they have come from a wide array of disciplinary perspectives (e.g. Benevolo, 1980; Lynch, 1960; Mumford, 1961; Rapoport, 1982; Vance, 1977). Most of the work that has been conducted in the so-called Conzenian tradition (most notably the contributions of geographer Jeremy Whitehand (1972a, b, 1974, Whitehand and Whitehand, 1984) has been concerned with the impact of social or economic factors on the evolution of urban form. It therefore could be argued that although these more recent contributions draw upon Conzen's ideas, they are fundamentally different in that they adopt an externalist explanatory framework.

The studies categorized as internalist/normative could be otherwise qualified as urban design normative contributions, as they aim at devising an urban form that has yet to be built. Many contributions from process typologists could be cited in this category (e.g. Cervallati *et al.*, 1981; Davoli and Zaffagnini, 1993; Maretto, 2005; Spigai, 1980). For further discussion of the influence of typomorphological approaches on urban design, see Lane (1993) and Nigrelli (1999). Some of the ideas about heritage preservation that have been put forward by Conzenian researchers also belong in this category, such as Kropf's (1996) paper on typological zoning and Conzen's (1966, 1975) own work on the utility of town-plan analysis. This category of studies also includes the popular urban design doctrines that have come out of the United

States in recent decades, such as New Urbanism (Duany *et al.*, 1999) and transit-oriented development (Calthorpe, 1993).

In the externalist/normative quadrant group are studies that develop applied approaches to the processes dealing with the making of urban fabrics. Among the contributions to be found in this category are those arising from researchers who first developed externalist explanatory theoretical frameworks and then translated them into operational planning and design tools for the benefit of practitioners (e.g. Larkham, 1992, 1996; Lynch, 1981; Rapoport, 1977).

Conclusion

Thus far, most commentators in urban morphology have insisted on the simple cognitive/normative dichotomy to characterize research on urban form in general, and contributions arising from the Conzenian and process typology approaches in particular. The mapping of specific contributions displayed in Figure 1 shows that, from the proposed epistemological perspective at least, there might actually be more similarities between the core contributions of M.R.G. Conzen and the cognitive contributions of the process typologists than there are between Conzen's own work and the contributions of the so-called second generation Conzenians.

Reading the proposed mapping allows one also to visualize the dual nature of the intellectual contribution of process typology; the enterprise has produced works of an explanatory or cognitive nature as well as normative treatises. The mapping stresses implicitly that its dual nature distinguishes process typology from more purely normative planning and design theoretical perspectives (e.g. New Urbanism), which are confined to the internalist/normative quadrant. The said duality could raise specific epistemological questions pertaining to the modalities according to which morphological knowledge could be operationalized in applied circumstances and, conversely, how planning issues could be problematized for research. Spigai

(1980) and Levy and Spigai (1989) have discussed such matters, and have proposed theoretical formulations aimed at building bridges between the two heuristic poles. Accordingly, their contributions are mapped at the intersection of the cognitive and normative categories.

It is expected that the proposed 'mapping' system will be useful to act as a guide for future reviews of literature in the field. Furthermore, it is hoped that this system will help to clarify and adequately acknowledge the nature of a wide array of intellectual contributions to the understanding, management and making of the urban built environment.

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Building Futures

The group Building Futures, set up by the Royal Institute of British Architects, seeks to address future built environments, and issues affecting the built environment professions, in 20 years and even further in the future. Its aims are:

- to promote debate on the future of the built environment;
- to influence relevant professionals, clients, educationalists, decision makers and policy makers to anticipate and analyse developments affecting architecture and urban design, both as professional disciplines and as activities influencing society;
- to collaborate with key individuals and organizations;
- to build upon and complement existing work;
- to use a variety of media including publications and events.

Examples of questions that Building Futures seeks to answer are: how and where shall we be living in 50 or 100 years' time, when the climate has changed and cities are bigger than ever? What technologies will architects be using to design buildings and what new materials will they be specifying? How will new technologies affect the buildings we use every day?

Collaboration and dialogue are central to the Building Futures programme. A steering group has overall responsibility for the programme. There is also an advisory group which is involved in and consulted on projects.

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