

VIEWPOINTS

Discussion of topical issues
in urban morphology

Urban design as urban morphology

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In perusing the provocative Viewpoints in recent issues of *Urban Morphology*, three views in particular stood out for me: the call for an abbreviated research process that can be deployed with simplified analytical and prescriptive elements (Sanders, 2013, pp. 116-7; see also McGlynn and Samuels, 2000); the argument for urban repair rather than totalizing master plans (Scheer, 2013, pp. 48-50); and the case for more linkages between sustainability and the study of urban form (Marat-Mendes, 2013, pp. 123-4). I believe these views encapsulate what happens when urban planners teach and practice urban design in a way that is not so much about balance, texture and composition – so important in the design of a building or specific site – but more about design that gives emphasis to *where* and *why* a building or site needs to be designed, a landscape enhanced, a street calmed, or a garden planted (Talen, 2009).

Two concrete examples amplify what I mean by this. They show how urban morphology informs urban design in ways that hit all three targets: analytically straightforward, incremental in approach, and directed by sustainability principles. The connection to sustainability requires explanation. Urban planning approaches to urban design are often directly related to sustainability: first, they emphasize diversity (the mix of people, uses and functions); secondly, they assume that cities should be scaled to the walking human body rather than to the fast-moving private vehicle; and thirdly, they

are intended for places that already exist, thus prioritizing infill over greenfield development. This is obviously not the *only* definition of sustainability, nor does it claim to include all dimensions. But these are the dimensions of urban design that urban planners regularly emphasize, and for which an urban morphology perspective is invaluable.

My first example is connectivity, which is an essential theme in urban design. Cities and neighbourhoods that maximize mix and increase the connections between people and things are thought to be more vibrant and healthy. Strategies for increasing connectivity are based on the view that the built environment has the effect of constraining or promoting passive contact. These connections vary in scale and involve different types of routes and spaces – public and private, residential and non-residential, storefront and sidewalk. A focus on street connections draws attention to the size and shape of blocks, which have a significant impact on the corresponding patterns of movement.

An urban morphology-inspired analysis might involve the following: finding the regional systems (roads, greenways, transit lines) that intersect the neighbourhood, and identifying the points at which the neighbourhood connects to these regional systems; looking closely at streets, blocks, parcels and land use to identify areas that may have connection problems, such as culs-de-sac, housing areas built after 1960, or multifamily housing arranged in superblocks; looking at places that

function as neighbourhood centres and identifying routes and pathways immediately around them that seem to have poor connectivity; and examining clusters of activity spaces or other places that should have a high degree of interconnection.

A second example involves the urban design idea that sometimes it is important for neighbourhoods to have centres – places that provide a common, centrally-located destination that not only provides needed services for people, but also functions as tangible evidence of the common bond that people living in the same area share. Such places may, over time, promote a sense of shared responsibility.

Again, an urban morphology-inspired analysis might involve characterizing the different kinds of centres already known to exist (schools, libraries, road intersections), and understanding how their character, functionality and design requirements vary along dimensions of use, physical condition, public access, and the character of surrounding thoroughfares. Is there good building frontage for a sense of enclosure around the space, or are there weaknesses that need to be mitigated? Is there one side on which to focus, and others to leave as they are? Should some frontages be lined or wrapped with more permeable, pedestrian-friendly frontage? Is there a good mix of uses at the centre (especially public as distinct from commercial)? Are there uses that should be added, such as facilities or commercial spaces, or even parking? Could existing uses like parking lots be given dual purpose? Are there well-designed entrances and gateways to the centre? How do people from all points around the centre get to it? Are the

surrounding street crossings appropriate? What design elements might be added on the site to improve its function as a plaza, square, green, or other civic space?

These are but two examples of how urban morphology is central to urban design that advances sustainability and is incremental and pragmatic in spirit. I believe that planners who use the intellectual and pragmatic tools of urban morphology will be the ones who help ensure that, in the design of human settlements, fundamentals do not get lost – like how to make a neighbourhood function well, how to support social diversity through design, and how to make a place more civic-minded. With an urban morphology orientation, they can be the ones ensuring that the creative process of urban design does not obfuscate fundamental considerations in favour of fashion.

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Consolidating urban morphology as a discipline

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When I gave a lecture to the Urban Design Group (UDG) in London on the subject of urban morphology, I started by stating my unapologetic determination to use the term urban morphology. I felt that statement was necessary – confirmed by the audience's response – because of the number of people who either stare blankly when I say what I do or who suggest it might be better to find another

term. The latter group includes urban design professionals who value the contribution urban morphology makes to urban design practice.

Comments over the years in the Viewpoints in this journal reinforce the perception that urban morphology is not well understood or actively used in planning and urban design practice. Indeed the ISUF Task Force on Research and Practice was set

up to address this point (see Barke, 2013; Samuels, 2013).

In support of the work of the Task Force and with the prospect that a similar situation might apply in other fields in which urban morphology is relevant, it is worth asking the question, ‘how is urban morphology perceived?’ How big a task do we have to raise the profile of the discipline in urban planning and design and how might we go about it? Central to the task is being clear what urban morphology is about.

This to me is the essence of the discussion that has ensued from Michael Conzen’s reflections on the role of meaning in urban morphology (Conzen, 2013, 2014; Kropf and Malfroy, 2013). The question of meaning *in* urban morphology is just as much about the meaning *of* urban morphology: the label and its contents. One of the points I take from Conzen’s passionate arguments in his Viewpoint in the previous issue of this journal – and a point with which I strongly agree – is that ‘unbundling’ urban morphology as it has come to be constituted would be a profligate waste. Too much effort and energy would be lost, too many insights would be dissipated and stirred into the soup of larger fields.

But, at the same lecture that I gave to the UDG, one of the comments at the end was this. Having described the broad range of topics that fall within the remit of urban morphology, someone asked, ‘isn’t that claiming too much ground for urban morphology?’ As if to say, is it not hubris to suggest that urban morphology on its own can fully explain something as complex as a city? And what about the other individuals and groups who use different concepts and methods under the label of urban morphology: for example, Michael Batty, Bill Hillier, Philip Steadman, Serge Salat, Christopher Alexander and Nikos Salingaros. And if we keep a broader conception of urban morphology, what should we call the specific focus on the basic elements of built form, their structure and relationships – a common definition of morphology in other fields? We could start by reflecting on the fact that geomorphology is the study of landforms and the processes that shape them. But I find it difficult not to return to the source: Goethe and his original conception of morphology – keeping some flexibility of mind in carrying over the core principles from ‘living forms’ to built form.

The man of science has always evinced a tendency to recognize living forms as such, to understand their outwardly visible and tangible parts in relation to one another, to lay hold of

them as indicia of the inner parts, and thus, in contemplation, to acquire a degree of mastery over the whole. How closely this scientific aspiration is bound up with the creative and imitative urges need not be dealt with in detail.

Hence several attempts are found in the progress of art, learning and science to establish and develop a theory to which we should like to give the name ‘morphology’...

When we study forms, the organic ones in particular, nowhere do we find permanence, repose or termination. We find rather that everything is in ceaseless flux. This is why our language makes such frequent use of the term ‘Bildung’ to designate what has been brought forth and likewise what is in the process of being brought forth’ (Goethe, 1952, p. 23).

Goethe’s version of morphology, with which Conzen accords, is profoundly synthetic. And it is explicitly a mental discipline – a way of looking at and organizing phenomena. Strangely, that side of morphology seems to have been lost in the transition from natural history to biology. So we have Goethe’s synthetic, inclusive, holistic method; the analytical, exclusive, ancillary methods of current biological and linguistic morphology; and the heterogeneity of actual practice. Some claim too much; some claim too little. I personally do not think that it is a choice between one or the others. We need them all.

The way to integrate that broad church is through some degree of specialization. It has its risks but it is the way forward for growth and development of the discipline. That should include returning to and setting out in more detail the synthetic methods so that they can become a shared, community practice subject to scrutiny and debate.

The principle behind this position is both Goethe’s identification of utilizers, fact-finders, contemplators and comprehenders and the concept of differentiation as applied in education and teaching (Gardner, 2006). This principle starts from the accumulated evidence that different people learn in different ways, and is rooted in the fact that different people have different cognitive strengths and weaknesses. Some people find it easier to understand numbers, others three dimensions, text or kinaesthetic experience.

If we want to attract as many people as possible to make contributions to the discipline of urban morphology we need to provide opportunities for them to do so. That means providing different ways into the subject – sub-disciplines – and

making contributions in different ways. It also means being clear what ties all the sub-disciplines together – which takes us to theory. What is the mutual role of the different aspects of form in the formation and transformation of human settlements?

Malfroy and I have suggested that there are benefits in seeing meaning as a distinct aspect dealt with in a sub-discipline (Kropf and Malfroy, 2013). We maintained, however, that meaning is central to the social process that results in the formation and transformation of settlements, not least in the *ideas* that are the basis for the creation of form. In order for those ideas and meanings to help reinforce and extend the discipline of urban morphology as a whole, they need to be seen not in terms of an isolated narrative but in terms of the common concepts of the discipline. Local histories, for example, need to be investigated to see if they might be instances of a more general recurring process using the categories, terms and identified regularities of the discipline. That means shifting the focus from the specific meaning of a particular object or set of objects to the role of the elements and agents in the process.

Knowing the meanings of the shapes used in Queen's Square, the Circus and the Crescent in Bath, as understood by their builders, helps us to understand how and why they came to give that part of Bath the form and character it has. For that knowledge to contribute to a wider understanding of morphological processes and regularities, we also need to shift to looking at the more general act of borrowing and using forms for the purpose of signification and the recombination of elements from different sources. To use somewhat old-fashioned language, there is a balance to be struck between a focus on particulars and a focus on universals. That is to say, in addition to acknowledging that there might be distinct sub-disciplines within urban morphology, it is worth acknowledging that there are different levels of abstraction.

In the end the goal of this discussion is to consolidate and strengthen urban morphology as a field. Far from seeking to impose strict separation of sub-disciplines, I strongly advocate a catholic, inclusive and collaborative approach – something that is not in principle exclusive of specialization. Such an approach necessitates adopting an abstract and flexible view of borrowings and analogies but at the same time requires rigour in putting them together for different purposes. In Goethe's words:

Morphology may be regarded both as an independent science and as an auxiliary physiological science. As a whole, it is based upon natural history, from which it extracts phenomena for its own purposes; it likewise rests on the anatomy of all bodies and especially zootomy (Goethe, 1952, p. 88).

In this light, urban morphology may be regarded as both an independent discipline and an auxiliary one. As a whole, it is based on urban geography and urban and architectural history, from which it extracts phenomena for its own purposes (where would we be without, for example, the periodization of architectural history?). It likewise rests on typology and configurational analysis of individual elements. Each sub-discipline uses a slightly different set of methods, making use of developments in related fields, rather than seeking to invent them all from scratch. All these then contribute to the broader aims of the synthetic theory of built form and the discipline that seeks to explain built form in terms of the processes of its formation and transformation.

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A symbolic articulation of morphological structure

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Urban morphology faces challenges of how to articulate the structure of the urban fabric on at least two fronts. First, there are discontinuities between different morphological traditions (e.g. different schools, languages or locations of application) (Whitehand, 2012). Secondly, there is the apparent discontinuity between traditional qualitative methods (e.g. historico-geographical or typo-morphological) and more recent quantitative methods (e.g. computer modelling) (Stanilov, 2010). Resolving these challenges could be assisted by an explicitly symbolic or mathematical articulation of morphological phenomena.

Just as the book of nature is ‘written in the language of mathematics’, so too can the built environment be expressed in mathematical form. Most essentially, a town plan is a work of geometric abstraction; to this we may add mathematical treatments as diverse as topological or graph-theoretical approaches (e.g. Krüger, 1979), the binary coding of ‘morphospace’ (Steadman and Mitchell, 2010), and formal ontological articulation of urban elements such as boundaries (e.g. Bittner, 2001). The ‘mathematization’ of morphology could in principle help overcome language barriers between different traditions, and its abstraction should allow application in any urban context. Mathematical precision could also help to clarify concepts, and avoid getting lost in a fog of morphological terminology. And a more explicitly mathematical approach could help, as in other fields, to make research more systematic and scientific.

However, the more formally mathematical treatments may seem overly abstract and perhaps inaccessible to ‘regular’ morphologists. Moreover, computerized approaches often lack transparency: these are often perceived as ‘black boxes’, with their ontologies buried within software, inaccessible to the kind of scrutiny and independence of interpretation that should be a strength of a scientific approach.

Nevertheless, it is possible that a symbolic approach could help bridge between traditional and more consciously mathematical approaches to morphology. Alfred North Whitehead (1911, p. 60) classically asserted the importance of symbols to science, including their ability to be concise, precise and intuitive in their ‘almost pictorial representation’ of their subject. Some previous symbolic manipulations of urban morphology have been observed, in the work of Augusto Cavallari-Murat (*Forma urbana e architettura nella Torino Barocca*; noted by Bazzanella *et al.*, 2012) or the ‘design operations’ of Taeke de Jong (2012, p. 274), but these treatments have yet to be fully realized or integrated with mainstream urban morphology.

Presented here is an initial suggestion for a symbolic articulation of the urban fabric, based on ‘area structures’. This could provide a common ‘morphic language’ that is simple enough for any morphologist to use but which could form part of a more systematic mathematical approach to urban morphology.

Table 1. Area structure relations

Relation	Description	Example
$X \cdot Y$	‘X touches Y at a point’	
$X Y$	‘X abuts Y’	
$X \sqcap Z$	‘X is contiguous with Z’	}
$X Z$	‘X indirectly abuts Z’	
$X \vdash Y$	‘X abuts and accesses Y’	
$X - Z$	‘X accesses Z’ (directly or indirectly)	}
$X \dashv Z$	‘X accesses but does not directly abut Z’	

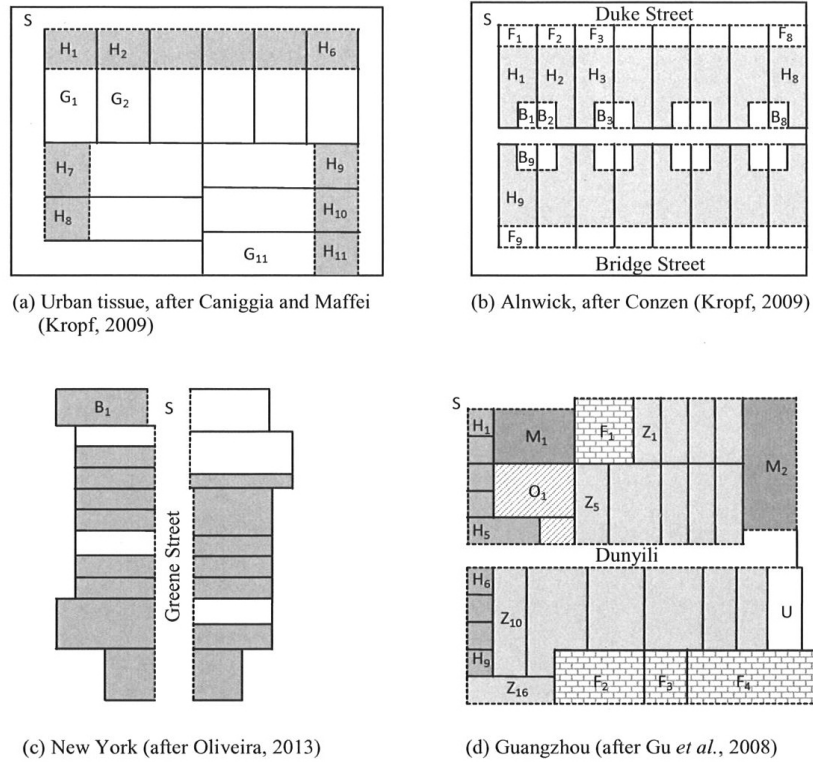


Figure 1. Excerpts of urban fabric, interpreted as area structures.
Dotted lines indicate boundaries with inferred access.

The system presented here is based simply on the town plan or urban morphological map interpreted as an ‘area structure’ – that is, a set of areas (polygons) and their relationships. In an area structure, each area is given a label, e.g. A, B, C. Each area represents a standard cartographical or morphological element, such as a building footprint, plot area or area of street space. A contiguous set of areas can be placed in square brackets, hence a plot series comprising plots P_1, P_2, \dots, P_n can be denoted $[P_1, P_2, \dots, P_n]$. Here, we use some existing mathematical conventions: ‘ Σ ’ for summation; ‘ \Rightarrow ’ for ‘implies’ and ‘ \neg ’ for ‘not’.

Table 1 shows a suggested set of basic relations of adjacency and access, their common language meanings, and graphic examples. All these relations are transitive, e.g. $X|Y \Rightarrow Y|X$. Some relations imply others: e.g. $X \cdot Y \Rightarrow X \square Y$.

These conventions can now be applied to specifically urban morphological structures. Figure 1 shows some examples of area structures interpreted from the urban morphological literature. Here, adjacency relations are directly taken from the originals, but access relations have been inferred.

In Figure 1(a), there are three contiguous terraces of houses: $[H_1, \dots, H_6]$, $[H_7, H_8]$ and $[H_9, H_{10}, H_{11}]$. Within each terrace, $H_i|H_{i+1}$ (for $i=1$ to $n-1$, where n is number of houses in each terrace). Here, as it happens, all garden areas are contiguous with each other, $G_i \square G_j$, for any i, j . We may infer that all houses access the street, i.e. $\Sigma H_i|S$. Houses are only indirectly accessible to each other: $H_i \neg H_j$ (for any i, j). Ultimately $H_i \neg H_j$ (for any i, j) but only via S . For each plot i we may infer $S|H_i|G_i$. We may also infer $G_i \neg S$; but $G_i \neg S$ (via H_i). For each terrace, gardens abut consecutively but are not directly accessible to each other: $[G_i|G_{i+1}]$ but $G_i \neg G_{i+1}$.

In Figure 1(b), the structure is a little more complex by featuring both front (F) and back (B) yards. In this excerpt, $[H_i|H_{i+1}]$ (for $1 \leq i \leq 7$ and $9 \leq i \leq 15$); $H_i \square H_j$ for any $0 \leq i \leq 8$, $0 \leq j \leq 8$; or for any $9 \leq i \leq 16$, $9 \leq j \leq 16$. Here, $\Sigma H_i|S$ at the rear. If we infer rear access to the back yard (i.e. $S|B$) then for each plot i , the access relation is $S|F_i|H_i|B_i|S$. As before $H_i \neg H_j$ (via S) for any i, j . For any plot i , $F_i|B_i$. We infer no direct access between adjacent front or back yards, $F_i \neg F_{i+1}$, $B_i \neg B_{i+1}$. Each back yard is accessible only indirectly to the front yard:

$B_i \dashv F_i$ (either via H_i or S).

In Figure 1(c), a simple differentiation of landuse suggests no particular pattern of relations between the (lighter) residential and (darker) non-residential land uses; but the relations between buildings (B) and the street (S) are the same as in the earlier cases, i.e. on each side of the street, $B_i|B_{i+1}$ and $B_i \dashv_i B_{i+1}$ (for $i=1$ to $n-1$); $S|\Sigma B$; hence $B_i \dashv B_j$ (for all i, j) via S .

Finally, in Figure 1(d), we see some small sections of regularity within a wider pattern of irregularity. Here, in general, $S|X_i$ and $X_i \dashv_i X_{i+1}$ are inferred (where X_i is any area of any type), except in one case where a plot (O_1) appears to be 'boxed in' (i.e. $S \dashv_i O_1$). There are some consecutive series of buildings of the same type, namely a series of multi-storey flats [F_2, F_3, F_4]; two series of shophouses [H_1, H_2, \dots, H_5] and [H_6, \dots, H_9]; and three series of *zhutongwu* [Z_1, \dots, Z_4], [Z_5, \dots, Z_9] and [Z_{10}, \dots, Z_{15}].

Hence this kind of area structure analysis can be used to highlight regularities of structure, to compare structures, and deduce any common 'urban syntax' between cases (Marshall, 2009, p. 68). The symbolic treatment allows systematic articulation of structure in a way that is simple and intuitive – though abstract, it can be transparently related to the mapped morphology. It can transcend differences in language and nomenclature between different morphological traditions, and may also (like computer pseudocode) serve as a stepping stone between human-oriented expression and a more formal mathematical treatment amenable to computation.

The approach invites fuller formal definitions, further formal development (e.g. axioms of area structure) and applications to other contexts, whether building floor plans or any other morphologies expressed as area structures.

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The metropolitan skyline: researching the vertical dimension in urban morphology

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In response to the debate in this journal on the definition of urban morphology (Conzen, 2013) and the importance of strengthening the interconnection of research and practice (Whitehand, 2013), we

wish to outline the case for research on the metropolitan skyline. In particular, we summarize a major new project on this topic.

The urban skyline may be broadly defined as the

silhouette of the built environment seen against the sky. But there is more to it than the physical dimension (Attoe, 1981; Kostof, 1991). Skylines are socially selected combinations of viewpoints and of views framing urban panoramas from afar, or from high vantage points, that allow broad views of the city.

Why study skylines? There are a number of reasons, of which two are especially important. First, conflicts are emerging, often in the name of sustainability, about the vertical development and 'privatization' of the skyline following recent approvals of tall buildings by local authorities in major European cities (Appert, 2011). Secondly, the fact that tall buildings 'rescale' the urban landscape has meant that they have taken on especial significance, for example in relation to 'heritage' sites in the vicinity. Inevitably divergent points of view have emerged on the desired contours of the urban silhouette. It is therefore important to understand the key drivers of the changing skyline: not only the hard economics of real estate, but also images, representations, and identity claims (Appert, 2008, 2011; Charney, 2007; Dixon, 2010; Kaika, 2010; McNeill, 2002, 2005). By articulating local and global contexts (Swyngedouw and Kaika, 2005), skylines are acting as a kind of landscape 'grammar' (Debarbieux, 2007), common to transnational real estate actors (Sklair, 2005), but not always to planners and the wider public.

The SKYLINE research project, funded for the period 2013-2016 by the French research agency Agence Nationale de la Recherche, aims to respond to the lack of investigation of the skyline as a contested dimension of the urban landscape at a time when skyscrapers are rapidly diffusing throughout the world. SKYLINE is being conducted in a multi-disciplinary way, interconnecting researchers and practitioners. The Environnement Ville et Société Research Laboratory (UMR5600) is leading the project, together with Ecole des Ingénieurs de la Ville de Paris. The Laboratoire d'Informatique en Image et Systèmes d'Information (Lyon 1 and Lyon 2 Universities) and Agence d'Urbanisme de Lyon are team partners. Paris and Lyon in France, and London, UK, have been designated as case studies because they all face 'verticalization' pressures and because they are developing specific regulatory frameworks (Appert, 2008; Dixon, 2010; Short, 2004). Collaborators include the Greater London Authority, Westminster Borough Council, the Design Council Commission for Architecture and the Built Environment, locally organized groups, and CBRE, the world's largest

commercial real estate services firm.

A website (http://recherche.univ-lyon2.fr/skyline/wordpress/?page_id=452) is designed to disseminate to a wider audience the team documents, presentations and videos from workshops. The gains of collaboration between practitioners and researchers are numerous: for example, researchers will improve their understanding of the way practitioners cope with the implementation of often inherited regulations, increase their appreciation of practitioners' 'cultures', and gain access to real estate actors. Practitioners will, in turn, improve their understanding of fundamental research by participating in workshops.

The 3 years work on the project will involve five missions, involving both researchers and practitioners. The first mission concerns quantitative and qualitative assessments of pressures for high-rise development in European cities. These will be made by improving existing databases on high-rise development and by detailed analysis of the spatial and temporal dynamics of skyscrapers in cities. The second mission is to assess the principles and tools of skyline regulations in Europe, taking into consideration the long American history of skyscrapers. The third mission will help to assess the perceptions and representations of the skyline by architects, landscape architects, planners, developers and the general public, using photo-polls and eye-tracking devices (Le Lay *et al.*, 2008; Zacharias, 1999). Geometrical measures of skyline structures will also be taken in order to objectivate mental representations of skylines and identify specific features linked to perceptions (Stamps *et al.*, 2005).

The fourth mission is to understand skyline conflicts. Economic and architectural constraints and regulatory environments for the design of the skyline will therefore be studied, and design iterations and perceptions of regulations will be assessed. The final mission consists of assessing viewpoints in relation to location, visibility measures, facilities and access. A typology based on the characteristics and conditions of access to views will help identify strategic places to regulate and identify new criteria for assessing applications for tall buildings, with the ethos of the city in mind (Ayoub, 2009; Lefebvre, 1968).

Although it is clearly impossible to cover the entire relevant field of study, both diachronic and synchronic analyses will be undertaken. The historical approach will enable us to compare skylines on the basis of their founding principles and the acculturation of practitioners. Certain questions need to be treated in a synchronic way beyond

America and Europe, to put the project into a broad contemporary perspective. Several other regions have been identified, in Japan, China and Brazil, taking advantage of existing collaborations with local researchers.

The project and discussions emanating from it among researchers and practitioners will provide the basis for both enriching and shaping the public debate on the impact of towers and tall buildings on the urban landscape.

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Manuals for urban morphological education

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The debate on urban morphological education is regaining interest. Within ISUF this has been evident in a recent viewpoint in this journal (Oliveira, 2012), a number of papers presented at the conference in Delft (Larkham, 2012; Marat-

Mendes *et al.*, 2012; Slater, 2012) and the report of the Task Force on the relation between urban morphological research and planning practice (Samuels, 2012). In addition, the organizing committee of ISUF 2014 has already announced

that the Porto conference will include a number of sessions on 'Teaching urban form'.

Surprisingly, there are not many books on urban morphology offering students an introduction to the different morphological approaches, theories, concepts, methods and techniques (for an exception, see Allain, 2004). A manual is needed to support the study of urban form in higher education. Seven fundamental contents are suggested.

First, it is necessary to include an introduction to the main components of urban form: urban tissue, streets and street blocks, plots and plot series, buildings, rooms or spaces, structures (such as walls and roofs), and materials. This need arises in part because the education of students tends to promote disciplinary perspectives (architectural, geographical and planning), emphasizing particular elements of the urban landscape rather than integrated approaches. For example, the education of architects focuses almost exclusively on buildings. Furthermore, it is usually centred, not on the production of the ordinary buildings in which most people live, but on the design and construction of exceptional objects of architecture.

Secondly, a manual should offer insight into the main agents and processes responsible for the transformation of urban landscapes. Students must be able to understand not only the physical form of the city but also how politicians, planners, property owners, architects and developers act on and transform it. Both 'public' and 'private' activities must be covered.

Thirdly, an outline should be provided of the long-term evolution of the physical form of cities. This should include consideration of the various elements of urban form in different historical periods, and how each of these has changed over time.

Fourthly, there should be descriptions and explanations of both inherited and emerging types of urban forms, including not only Euro-America but also Asia, South America and Africa. Considerations of different parts of the world should be linked to wider frameworks of thinking.

Fifthly, attention should be given to how urban morphologists describe, explain and prescribe urban form. This would include a review of the main approaches to the study of urban form. Here there would be introductions to the classics in urban morphology; the main morphological approaches that exist – from the Conzenian school to the Muratorian school, from space syntax to spatial

analysis (including cellular automata, agent-based models and fractals) and shape grammars; and, not least, examples of comparative studies.

Sixthly, the link should be explored between, on the one hand, morphological description and explanation, and on the other the prescription of urban forms. Evidence should be provided on the incorporation of morphological concepts and methods in planning proposals and on the effective results on the ground of morphologically-based professional practice. There should be an explanation of what is a successful application of urban morphological research in practice, and what criteria and what measurements can be used to judge success. Especially in this regard, education is crucial in raising the level of understanding and application of urban morphology in a range of professions (Samuels, 2012).

Finally, the manual should identify and characterize the most relevant contributions of urban morphology to a wider knowledge of contemporary cities and societies. This process of building bridges towards an effective multi-disciplinarity should embrace the social, economic and environmental dimensions of the city.

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Hypothesizing Roman Alnwick

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In his Viewpoint, Cataldi (2013) puts into print a hypothesis first proposed at the IGC urban morphology conference at the University of Northumbria in 2004 (Cataldi *et al.*, 2004). I spent some time on the morning following its presentation suggesting to delegates why this was a false hypothesis. Unfortunately it has now been resurrected in print and so I too must turn to print.

The first point to make is that Roman Britain was not Italy. The area between Hadrian's Wall and the Antonine Wall was the extreme northern edge of the Roman Empire. It was a military zone and for much of the period was disputed territory, to the extent that the Romans by about 105 CE withdrew back behind Hadrian's defences, though at one time they had marched troops beyond the River Forth into Perthshire (Scotland). Even then, there were subsequent periods of revolt in these border areas when troops had been withdrawn to serve elsewhere in the Empire (Wacher, 1978 pp. 38-58). Secondly, although the coastal plain and broad river valleys of present-day Northumberland were, and are, good agricultural land, the Pennine uplands are boggy moorland and, for much of the year, extremely inhospitable climatically. This is a landscape where walkers could quite easily 'sink into the mud' (Cataldi, 2013, p. 125), though in this case they will sink into peat bogs. A walk on Alnwick Moor, just to the west of the town, would prove the point. There are prehistoric ridgeway routes on the Northumberland hills, marked by cairns and small earthwork fortifications, but they are not necessarily the easiest way to traverse the land over long distances. Thirdly, until the eighteenth century the vast majority of this upland was unenclosed woodland and moorland: almost all the field boundaries derive from the enclosures of the eighteenth and nineteenth centuries. Using mapped field boundaries as evidence of Roman grid planning is therefore injudicious in the extreme without close examination of enclosure map evidence to determine which, if any, field boundaries derive from pre-enclosure times. The leap backwards by another 1000 years to hypothesize a Roman origin, as Cataldi does, is still more injudicious.

Cataldi's hypotheses, however, begin not in Northumberland but in south-east England, using the Ordnance Survey Map of Roman Britain, which is published at the scale of 16 miles to an inch: in

other words, it is an extremely small-scale map on which to base a metrological argument for a geodetically oriented grid of 12-mile-sided squares covering the whole country except for the extreme north of Scotland. Archaeologists and landscape historians have, over the past century, beginning with Haverfield (1921), investigated the evidence for Roman centuriation (grid planning) in the rural landscape. They have found a number of small areas, most of them in the south and east of the country, where historic field boundaries, tracks and roads hint that such planning may have been a reality in a few places on a small scale. There is very little evidence that grid planning took place on a large scale or over extensive areas (Dilke, 1971), though Peterson's recent work has hypothesized a number of larger-scale grids similar to Cataldi's. However, none of the speculated grids are north of Hadrian's Wall (Peterson, 2006).

A closer look at the evidence around Alnwick demonstrates how the argument breaks down at the local scale. Cataldi's Figure 3 shows the Roman road which was later known as the Devil's Causeway. If this is examined on the Ordnance Survey 1:25 000 map (OS Explorer Map 332, 2005) (not the 1:50 000, which does not show field boundaries), it can be traced running approximately north-north-west, 6-8 km west of Alnwick. Sensibly, it does not follow the topographical ridges, but passes from the Coquet valley into the Aln valley by way of a traverse across Lamb Hill, a mere 200 m high, using the valleys of small streams to ascend and descend the steep slopes. Then, having crossed the Edlingham Burn, the road crosses the low hill on its northern side before descending steeply into the valley of the Coe Burn, a minor tributary of the River Aln, which it crosses 1-2 km to the north. On the level land to the east of the Coe Burn, and a few hundred metres to the north of the Devil's Causeway road, the Romans built their fort of *Alauna*. This is marked on the Ordnance Survey map of Roman Britain as at Learchild. High Learchild Farm is in fact about 1 km south west of the fort, on the other side of the Coe Burn, but the fields around the fort were known as Low Learchild. It is noteworthy that there are only four or five farmsteads within a kilometre or so of the fort and it is because there is no overlying later settlement that the fort was discovered in 1945 through the air photographic

explorations of St Joseph (1951, p. 56). Later photographs, taken in the early 1950s, show that there were at least two periods of construction, so the fort was expanded, or made smaller, at some point in its history (St Joseph, 1955, p. 85). It has not been excavated and so there is no dating evidence. The fort is a large one – 244 x 183 metres, or about 4.4 ha. The fort's name is known from Ptolemy's *Geography* (II, 7) and the *Ravenna Cosmology*, where it is referred to as one of the three 'towns' (*polis*) of the Votadini tribe (Rivet and Smith, 1979, p. 245). It is listed between Corbridge (*Corstopitum*) and High Rochester (*Bremenium*) in a correct geographical sequence. However, Rivet and Smith suggest that these classical references may be repeating the name of another *Alauna*, the fort of Ardoch in Perthshire. There are up to eight places in Roman Britain named *Alauna*, all taking their name from the rivers on which they stand. The most urbanized of these settlements was at present-day Alcester in Warwickshire, on the River Alne, which was succeeded by a small medieval borough (Rivet and Smith, 1979, pp. 243-6).

So where does this leave 'Roman Alnwick'? The current town is 8 km from the Devil's Causeway Roman road and it is 8 km from the Low Learchild Roman fort. There is absolutely no archaeological evidence for a Roman presence within the later town bounds. It is located in the military zone beyond Hadrian's Wall where local people were no friends of the Romans, and where the Roman military authorities had to work hard to maintain order, usually with too few troops to do the job properly. It is extremely unlikely that there were troops to spare to man another fort at Alnwick so close to Low Learchild and so far from the only strategically important road through this part of the country. Finally, forts in the military zone rarely generated much in the way of civilian settlements at their gates, and these *vicus* settlements became ruinous as soon as the troops were withdrawn. They were not self-sustaining commercial entities (Wacher, 1978, pp. 38-58).

That leads to Cataldi's final strand of evidence for his hypotheses, namely the *-wic* place-name of Alnwick. He is correct in his assertion that this derives from the Latin *vicus*, but it is a loan word in Old English that has a number of meanings, some of which have urban connotations and others of which do not. Its most common meaning is 'dairy farm' (Smith, 1956) and there are other *-wic* settlements in the vicinity of Alnwick, including Denwick, over 1 km to the north-east, meaning 'dairy farm in the valley', and Howick, 'the high

farmstead', a few kilometres farther towards the coast. The element with the closest association to Roman sites is *wīchām* names, which are thought to be the location of Roman estates, often associated with Roman villas in the south of England, which became medieval parishes (Gelling, 1978 pp. 69-72). The urban *-wic* place names are attached to the coastal and riverine trading places that developed around the North Sea and English Channel in the late-eighth and early-ninth centuries (Hodges, 1989, pp. 69-104). Some of these places were close to preceding Roman settlements (though they did not overlie them), such as Hamwic (Southampton), Eoferwic / Jorvic (York) and Lundenwic (London), but others were on previously unoccupied sites, such as Gyppeswic (Ipswich), Dunwich and Norwich. It may be that Alnwick takes its name ('trading settlement on the River Aln?') as a, thus far unrecognized, already developing trading settlement of the eighth / ninth century. Berwick-on-Tweed ('barley farm', or, more probably, 'place where barley is traded') should also be added to this group of settlements. However, these are late eighth-century possibilities at the earliest and the Romans had withdrawn from Britain in 410 CE, so the origins of Alnwick are firmly where M. R. G. Conzen placed them – in the Anglian period, not the Roman. A 'more unified theory of urban morphology' (Cataldi, 2013, p.128) needs to be based on firm factual foundations, not hypothesis and speculation.

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Excavating the origins of urban form: Çatalhöyük

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The early Neolithic settlement site of Çatalhöyük on the Konya Plain of central Anatolia, Turkey merits greater attention from urban morphologists for the evidence it provides of a very early urban form. Originally discovered by British archaeologist James Mellaart in 1958, Çatalhöyük ('twin mound' in Turkish) was initially identified as an early urban complex. Extensively excavated during 1962-1965, it was originally estimated to date from 6500 BC (Mellaart, 1967). Recent carbon 14 dating has revealed a range of eighteen settlement levels from 7400 BC to 6200 BC (Cessford, 2001), making it among the oldest substantial urban settlement complexes yet discovered in the Near East. Excavation by British archaeologist Ian Hodder from 1993 onward has divided the site into three areas: the South Area originally excavated by Mellaart, the North Area, excavated by Hodder, and the recent West Area site, revealed to be a Chalcolithic mound, dating between 6200 and 5200 BC (Connolly, 1999; UNESCO World Heritage Centre, 2013).

The primary focus of the Çatalhöyük site has been the South Area, where the oldest settlement levels have been excavated, notably Level VIB, now dated to 6500 BC (Cessford, 2001) with its complex of single-cell mud-brick, square rooms (Figure 1). Hodder (2007, p. 26) has characterized Çatalhöyük as 'a dense corporate huddling of houses'. This early agglomerated urban form differs substantially from the more familiar lateral form of medieval burgages and access streets as described by Conzen (1960). Instead the Neolithic form of Çatalhöyük had a vertical succession of settlement layers, each house cell replicating the form of an earlier family kinship room (During, 2005). The mud-brick houses were built on top of each other, replicating the former footprint of the earlier cell.

As a group, the kinship house cells formed an extensive array of adjacent rooms as seen in Level

VIB, now dated at 6500 BC (Figure 1). Here there is a connected group of rooms with a series of open spaces, originally thought to be communal 'courtyards' by Mellaart (1967), but now understood by Hodder (2006) to be refuge waste areas for sewage and trash: in effect proto-fringe zones for the complex. With access to each room cell by ladder, the roof areas probably served as open work platforms for domestic activities such as pottery, food preparation and weaving, which were already established in the Neolithic period. The room cells were used for cooking with an oven. They contained a raised sleeping platform, and were also used for burial of the dead (Mellaart, 1967, p. 60). The walls were whitewashed with lime, and sometimes decorated with hunting murals in the tradition of Palaeolithic cave art (Mellaart, 1962), although this has been vigorously debated (Hodder, 2007). The rooms were kept 'scrupulously clean', as Mellaart (1964, p. 59) noted, and whitewashed to reflect the light, as there were no wall openings or windows. The only access was the ladder opening which also served as a smoke vent, as in the pueblo settlements of the south-west United States (Hodder, 2006, p. 25).

From the excavations by Mellaart and Hodder over the last half century, Çatalhöyük emerges as a proto-urban settlement of the early Neolithic period, among the largest discovered in the Near East based on domesticated agriculture and animal herding. Estimates of population size now range between 5000 and 8000 at the height of settlement, c. 6500 BC (During, 2007), certainly within the modern classification of a town, covering some 13 ha. It is this extensive area and complexity of form that has justified Çatalhöyük as a UNESCO World Heritage Site (Hodder, 2013). It preserves an early urban form that exhibits the transition from a Palaeolithic cave site, with its windowless mural rooms and hunting scenes, to a Mesopotamian town layout, with its square mud-brick houses and fringe



Figure 1. Çatalhöyük, Level VIB, 6500 BC. Drawn by Grace Huxtable and Anne-Louise Stockdale (reproduced from Mellaart, 1967, p. 59, with minor clarifications).

waste areas. Its form bespeaks its early age, with its sequence of replicated building levels in a vertical series that transferred kinship houses from one generation to the next as a 'höyük' mound. These characteristics make Çatalhöyük a valuable indicator of the origins of modern urban form.

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