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## Fractal assessment: some questions and comments

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In his response to my plea for interdisciplinary collaboration among urban morphologists Haghani (this issue, pp. 60-3) focuses on my concern about employment of 'the more exact methods of the natural sciences [...] in a mistaken or misleading way' (Ley, 2012, p. 79) and gives an explanation for his method of examining morphological complexity by a fractal assessments of aerial photographs. In so doing he is evidently misunderstanding my position regarding the significance of geometry and geometrical methods for urban morphology. As an architectural historian and urban planner, geometrical methods are my primary tools for understanding, envisaging, and examining urban form (and the same is true for most of my colleagues). In stressing his point about fractal analysis Haghani is claiming a long pedigree of geometrical and mathematical descriptions in architecture and urban design 'from the Renaissance to the post-war periods'. I believe it is unnecessary to re-evaluate the quoted contributions of Lynch (1960, 1981), Marshall (2005) and Stamps (2002). They all represent commonly accepted and fruitful approaches towards urban form. But do they call for the 'mathematical gauge for classifying urban patterns' that Haghani is suggesting?

To my knowledge the use of geometry in the description of architecture and urban form was known already in the Bronze Age (see, for example, the Kassite city plan of Nippur, scratched into stone, c. 1500 BCE, in the Hilprecht collection in Jena, or the city of Umma real estate plan, c. 2200 BCE, in the Louvre in Paris). Geometrical

descriptions were almost concurrent with the development of cities themselves. This early employing of geometry can be explained by a deep human desire to deal with the complexity of the city in simplifying quantitative, and sometimes also normative, ways (for example, in proving possession). However, as we know from the Ideal City of the Renaissance, the widespread attempt to reverse this by producing a 'perfect' geometrical plan to improve urban quality failed. This was despite the intellectual brilliance of authors such as Alberti, Filarete, and Leonardo da Vinci, whom we might call urban designers rather than urban scientists with respect to their urban plans.

In my Viewpoint I never intended to question the necessity of geometry in urban morphology nor the potential benefit of a chaos or fractal approach to describe urban development (as a matter of fact, chaos theory is fundamental to my theory on how we perceive and understand urban form: see Ley, 2009). I do, however, insist that the complexity of urban form, which is always related to the complexity of urban life, cannot be fully described by mere quantitative methods. The anxiety that I expressed in my Viewpoint was that some people might seek to determine the complexity of urban patterns with a complex method to obtain simple numerical values without due caution about how these numerical values might be perceived and employed by third parties. Haghani's response unfortunately adds to my anxiety. On the one hand he states that 'fractal measurement is not an evaluation tool', but on the other he advocates, in the same paragraph, that the use of the fractal

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dimension is 'a new assessment tool in the toolbox of urban designers and decision makers'.

It troubles me that Haghani is advertising fractal classification of urban patterns, especially to politicians, as a method 'wholly independent of the eye of the examiner'. What he is actually examining is not urban spaces, urban landscapes, street views or urban elevations but two-dimensional photographs, which represent only random imagery of real urban form. In his response he does not indicate the method of choosing these photographs: the time, or season in which they were taken; whether they were taken in a standardized manner as part of a scientific documentation, from the same distance and the same angle; or how the study areas, especially their boundaries, were determined. May I repeat from my viewpoint: 'It is necessary to set out clearly the scientific aim of the endeavour and make clear that the categories and criteria involved are inherent in the study rather than the study object' (p. 79). What is the aim of a fractal assessment of photographs?

Haghani refers to two aspects of his particular assessment of complexity: the synchronic comparison and the diachronic comparison. The first is to help classify urban patterns; the second to assess the physical impact of an intervention on existing urban fabric. However, what shall we have found out after these assessments, once we come to the conclusion that a certain neighbourhood is more complex than another one or that a certain design proposal for a neighbourhood will not change its 'morphological fingerprint'? Stamps (2002, p. 178) states that 'from a practical point of view, the implication is that fractal structure may not be an effective design principle for cityscapes'. Haghani himself agrees that 'an urban layout with a greater

degree of complexity is not of necessity a better layout'. This leaves me puzzled.

With respect to the intention of my viewpoint, I am puzzled too by Haghani's suggestion that 'both physical form and the processes shaping it should be studied without either of these aspects in any sense detracting from the other'. He seems to be splitting up urban morphology into two: on the one hand form and on the other processes. This fits ill with his own quotation of Larkham and Jones's definition of urban morphology (1991, p. 55) as being the study of 'the physical (or built) fabric of urban form, *and* the people and processes shaping it' [my emphasis], which I should like to take as support for my plea for a combined approach and interdisciplinary research in urban morphology. I would thus hope for a friendly, co-operative and interdisciplinary discussion of the fractal assessment of urban patterns.

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## PNUM 2013: Urban form in territories of Portuguese heritage

The Annual Conference of the Portuguese Network of Urban Morphology (PNUM) will take place in the old city of Coimbra, Portugal on 27-28 June 2013. It will be hosted by the Department of Civil Engineering of the University of Coimbra, in collaboration with the Centre for Territory, Transport and Environment of the Faculty of Engineering of the University of Porto, with the participation of the Association for the Development of Civil Engineering.

The conference will bring together national and international experts on urban form, particularly those engaged in research on the vast and rich urban heritage left by the Portuguese in all continents over more than 5 centuries

The organizers and the Council of PNUM invite participation in the conference by interested academics and professionals. For more information see the conference website at <http://www.pnum2013.dec.uc.pt/>.

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