

Rigour and Comparison in Urban Morphology: Through the Lens of JWR Whitehand

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Abstract

There are many reasons why we might want to deepen our understanding of urban environments, from the often quoted fact that over half the global population now lives in cities to the seemingly inexorable spread of common building types across the globe and the attendant loss of diversity. Or still, there is the spectre of moribund town centres and stagnating suburbs. The field of urban morphology has made significant contributions to our understanding of cities and has great potential to deepen it further. That contribution has been possible—and continues to be—in large part, because urban morphology provides a rigorous approach to the study of urban form. As argued in this chapter, the rigour of urban morphology derives to a significant degree from the active use of comparison as a core part of its methodology. The suggestion is that comparison is used not just in explicit 'comparative studies' but in a thoroughgoing way at a number of different levels. This suggestion is pursued through the lens of the work of Professor Jeremy Whitehand. Over his long career, Whitehand has made a significant contribution to the rigour of urban morphology through his clarity of language and terminology, consistent reference to testable general principles and his high standards of scholarship. In particular, the chapter will take Whitehand's work on plan analysis, the fringe-belt and cross-cultural studies as topics to explore the different uses of comparison. The paper concludes by taking lessons from Whitehand's work that point to ways in which urban morphology can consolidate and extend its contribution to our understanding of cities.

Keywords: Rigour, Comparison, Perception, Inference, Method

5.1. Introduction

A debate that runs within a number of academic fields of study is whether a given field is a science. Some fields that come to mind include economics, sociology and psychology. Amongst the others are, arguably, cultural geography and architecture. These are obviously relevant to this volume because they are the two fields out of which urban morphology has emerged. The purpose of this chapter is not to address the question—is urban morphology a science?—but to consider a less specific version of that question: can urban morphology be a rigorous field or discipline? The questions clearly overlap to the extent that rigour is an attribute of science.

For the purposes of this chapter, rigour is taken to be generally synonymous with meticulousness, thoroughness, attention to detail, diligence, scrupulousness, exactitude, precision and accuracy. Within the context of an academic discipline, rigour more specifically tends to denote theoretical, methodological and logical consistency, clarity, comprehensiveness and coherence. These attributes tend to be valued where an overall aim within a field is to improve our understanding of the world around us and to build up an accumulated body of knowledge and understanding that is shared within a wider public or community. Rigour is necessary in order to improve and extend accepted ideas as well as to persuasively critique and supersede them. Rigour is necessary whenever we invoke or propose a 'theory' or, more particularly, whenever we invoke or propose concepts of general applicability about regularities of urban form and process. The latter can certainly be applied to the field of urban morphology as exemplified by a range of specific authors from Saverio Muratori, Gianfranco Caniggia and MRG Conzen, to MP Conzen, JWR Whitehand, Lionel March, Philip Steadman and Stephen Marshall as well as, in different ways, Michael Batty, Elsa Arcuate, Bill Hillier, Lars Marcus, Meta Berghauser-Pont, John Peponis and Sergio Porta.

As will be explored in this chapter, an active principle that operates with the exercise of rigour is the act of 'comparison'. The principle operates in different ways at different stages when we seek to understand our surroundings. In some cases it is used explicitly and deliberately in others implicitly. The more specific aim of this chapter is to bring to light the ways that comparison operates in order to facilitate greater rigour in undertaking urban morphological research and the theoretical and methodological development of the field.

The obvious starting point for exploring the operation and use of comparison as a fundamental component of rigour is to examine the work of researchers who have taken a rigorous approach. If there is anyone within the field of urban morphology who has taken a rigorous approach, one of them is JWR Whitehand. Whitehand has been central to the consolidation and development of the British School of urban morphology and the historico-geographical approach to the subject. His rigour is evident in the way he has worked within but extended the concepts of MRG Conzen and in his careful and deliberate use of those concepts in order to maintain their clarity and coherence. It is therefore fitting to the purposes of this volume to explore comparison through the lens of Whitehand's work.

To this end, the chapter is structured to work through a series of examples culminating in an examination of Whitehand's work. The aim is to build up a clear idea of comparison and the different ways in which it operates in order to gain an insight into its role in a rigorous approach to urban morphology.

The series of examples is broken down into three broad groups that are examined in the three main sections of this chapter. The first explores the role of comparison in perception, which operates at the unconscious level as part of an organism's adaptive response to an environment necessarily mediated through the information provided by sense organs. The second section looks at the conscious use of comparison in different fields of study with the aim of establishing objective knowledge or the 'truth' about the subject. In the third

section, Whitehand's work is examined to identify different modes of comparison within urban morphology that provides the foundation for the rigour. The aim, as set out in the concluding section, is to suggest how we might best take advantage of our native capacity for comparison in order to build up a robust body of knowledge that accords with experience and is capable of growth within a community.

The method adopted in the paper is to a large extent self-referential: it takes a fundamentally comparative approach to critical analysis of a concept that is central to urban morphology. By setting out a series of instances of comparison, it is possible to compare one with the others to identify common structural characteristics as well as key differences that establish a basis for differences in modes of comparison.

5.2. A Philosophical Backdrop

To start with an anecdote, not long after I first met Professor Whitehand we were having a discussion in his office at the University of Birmingham. In the midst of the meeting, the desk between us began to shake slightly along with some of the bookshelves, attended by the sound of creaking wood and a quiet rattling. We looked at each other with some surprise and after a moment said, 'must have been an earthquake'. To take a philosophical view of the anecdote, the surprising fact or phenomenon of the shaking table and creaking shelves—being out of the ordinary—was rendered a matter of course by the hypothesis of an earthquake. Put another way, the specific experience was compared with and 'mapped onto' the general schema provided by the concept of an earthquake.

This is an example of what the American logician and philosopher CS Peirce calls 'abduction'. Peirce introduced the principle in the 1860s as a complement to the two classical forms of inference, deduction and induction. As a simple review, deduction is an inference from general to particular and is a matter of logical certainty. Induction is an inference from a set of particulars to a general principle and is always provisional. As Peirce pointed out, however, the move to a general idea from particulars necessarily involves an abductive inference—essentially a 'best guess' that is subsequently supported or not by the inductive checking against examples and further experience (and still always provisional).

What is of particular importance for this discussion is that the 'phenomena' from which inferences are made are necessarily plural. We can only make an inductive inference by comparing our experience of multiple examples of the 'same thing'. That is, the idea of 'the same thing'—a cup of coffee or a bicycle—can only be formulated and named if we have in our head the memory of previous experiences. The general idea—something that can be named—is then an aggregate or composite image of those experiences. The composite is based on the similarities in our experiences, which can only be established by comparison between them. As Peirce and others have suggested, there is no sharp break between 'intuition' and 'reason', going as far as to suggest that the process of perception itself, while not accessible to direct conscious attention, takes the form of an abductive inference.

The form of an abductive inference as expressed by Peirce in about 1902 is:

The surprising fact C is observed.

If A were true, C would be a matter of course.

Hence, there is reason to suspect that A is true. (Peirce 1931)

In suggesting that perception takes the form of an abductive inference, the component A in the syllogism is generated by or retrieved from our cognitive system. On the basis that our cognitive capacities are built up by the process of learning, the idea of A would have come either from direct experience or 'book learning' of some kind. To return to the anecdote of the earthquake, if either one of us had no direct experience of an earthquake or exposure to the idea as a principle from our formal or informal education, the shaking and creaking would have remained a curious fact. We could not have the perception or make the inference that the shaking desk and creaking shelves would be a matter of course following on from an earthquake.

Either way, the perception or inference involves a comparison of immediate experience with an idea already in our heads. Peirce takes this further by suggesting first that all ideas are in effect signs and that all thought and reasoning is of necessity by signs. The interpretation of a given sign (perception, idea) can only be by another sign (idea), leading to Peirce's conception of unlimited semiosis. As he proposes it, the process of interpretation could go from sign to sign indefinitely. Peirce goes on to suggest, however, that as a matter of pragmatics, the process does not run infinitely but ends, provisionally, in a habit. That habit is our second nature response to experiences that constitutes meaning: the things that come to mind at the sight of a familiar face or sound of a word.

Peirce's notion of unlimited semiosis and thinking in signs is his response to the age-old philosophical problem of whether we have access to the world in itself. If we only have access to representations of the world around us, (due, in one of Peirce's formulations, to our 'incapacities'; Peirce 1868), then the only way we can build up a stable overall picture of that world is to compare and correlate our different views of it. If we only had access to a sequence of unrelated impressions, there would be no possibility of locating ourselves in relation to anything or recognise objects.

We can only perceive and recognise a cup of coffee or a bicycle as such because we have in our memory the composite image of previous instances. We compare our immediate experience with the image and infer, abductively, the general idea as a best guess. From here, the deductive inference is that, if abduction is fundamentally comparative and perception is a form of abduction, perception is fundamentally comparative. The following section examines three ways in which our unconscious cognitive apparatus involves the comparison of various sense inputs.

5.3. Comparison in Perception

5.3.1. Place Cells, Grid Cells and Border Cells

A fascinating example at the unconscious level is the case of mechanisms working within the hippocampus and entorhinal cortex in the brain. Research since the mid-twentieth century has identified a range of cells in these locations that have a significant role in spatial cognition and memory. These include what are called place cells, grid cells and border cells, amongst others. Place cells were discovered in the 1970s and, in simplified terms, were found to develop in distinct patterns depending on the experience of the organism in its environment. The patterns of place cells were also found to persist and to play a significant part in spatial memory. What was not known early on was how they were formed. More recent research has shown that place cells work together with grid cells and border cells to develop the persistent patterns.

Most relevant to this chapter is the likely mechanisms involved. In their groundbreaking research, Moser et al. (2015) discovered that 'multiple firing fields of individual entorhinal neurons formed a regularly spaced triangular or hexagonal grid pattern, which repeated itself across the entire available space', which they dubbed grid cells. In addition, they found the spacing or scale of the grid varied in different parts of the cortex. While the specific mechanism has not yet been determined, a current proposal is that place cells form by the 'linear combination of periodic firing fields from grid cells with a common central peak, but different grid spacing and orientation'. Here, the suggestion is that because 'the wavelength of the individual grid patterns is different, the patterns cancel each other except at the central peak, which becomes the place field of the receiving cell.'

To give an analogy, the principle described is in essence the same as the phenomenon of a moiré pattern. This occurs when two patterns are overlain and the top layer is semi-transparent or has transparent gaps. If the two patterns are the same or similar but not perfectly aligned, the result is a third 'interference' pattern. An equivalent with sound is the phenomenon of the 'beats' heard when two tones are played simultaneously but slightly 'out of tune'. The beats decrease in frequency as the tones get closer in pitch, disappearing when they are in unison. The phenomenon is used to tune musical instruments.

In simple terms, what would appear to be happening in the brain with grid cells, border cells and place cells is that two or more different patterns (grid, border and others) are being overlain and the resulting 'interference pattern' is playing a part in forming place cells that are active in spatial cognition and memory. In structural terms, this is again the combination and comparison of two sets of information resulting in the generation of a third.

5.3.2. Face Recognition

Another example of comparison working at the unconscious or subconscious level is the capacity of pattern recognition. There are a number of theories that seek to explain the general phenomenon of pattern recognition, though there is no consensus on which of the competing conceptions provide the best picture of the mechanisms involved. Most theories involve the general principle of comparing immediate sense data with some kind of image or information retrieved from memory. The main difference between the theories is the nature of that information, in particular whether it takes the form of a whole image, some kind of abstract template or a combination of individual features.

The more specific case of face recognition has been the subject of considerable research, the results of which are a clearer idea of how the process works—at least for faces. The picture that has emerged from recent investigations (Chang and Tsao 2017) confirms the idea that, for faces, the brain responds to selected features or, more specifically, to a composite or ensemble of features. In essence, the research shows that specific ‘face cells’ in the brain respond to isolated, abstract features relating to the shape and appearance of faces. Identification of an individual’s face then occurs when a particular ensemble of cells fire together and that ensemble corresponds to a remembered one, which is in turn interpreted by the further memories associated with the person resulting in ‘identification’. While the mechanics of the whole process are not fully elaborated, structurally the process involves the same three elements of input, stored information and the further information of recognition. The fact that the recognition is an ‘interpretation’ involving comparison is underscored by the fact that there is always the possibility of uncertainty or a mistake, either of which requires conscious checking.

5.3.3. Binocular Vision

A third example of the unconscious use of comparison is binocular vision. As in the other cases, binocular vision involves two sources of information that are compared to generate a third. Unlike the previous two examples, however, in this case the two sources are received by the brain simultaneously rather than first an immediate sense perception and then a remembered one. What is of particular importance moreover is that the two sources are slightly different. The difference arises because the eyes are set slightly apart and produce slightly different perspectives of the same scene. When the two are combined and compared by the brain, even though each is a two-dimensional image, the brain is able to interpret the ‘difference’ as the additional information about the third dimension of depth. Without the different perspectives, there would be no additional information. The capacity of the brain to generate the bonus or yield of depth perception from two ‘flat’ images is amply demonstrated by its exploitation through the use of stereoscopic photography in the production of topographic maps and 3D movies. It is also notable that the combination of two similar but different images to generate a third is similar to the moire effect of overlaying similar but different patterns as described above for grid cells and place cells.

5.4. Conscious, Implicit Comparison

Given the consequences of our ‘incapacities’ as identified by Peirce, the move towards more rigorous attempts to understand our surroundings has not been a matter of short-circuiting our senses to get direct access to the world. Rather, the move has involved the systematic marshalling of comparison. Some of the most basic techniques and procedures central to scientific methods, many of which we now take for granted, are founded on the act of setting one thing against another and identifying the differences, or not, between them. Three examples taken somewhat at random are measurement, experimental control and peer review.

5.4.1. Measurement

Measurement is a simple and straightforward application of comparison that has facilitated a wide range of beneficial human activities—not least trade—along with its systematic application in scientific enquiry. Again, because we have no way to directly intuit quantitative attributes of objects such as mass, length or time, we must determine them by reference, directly or indirectly, to some other object. To declare the mass or weight of something in any unit of measurement is to necessarily refer to and compare it with an object or procedure that defines the unit. The base units of length, mass, time and electromagnetism in the metric system all refer to either a *mise en pratiques*, a practical realisation, or a physical object. The kilogram, for example, is defined by a block of platinum-iridium made and held in France (Bureau International des Poids et Mesures 2018). Strictly, measurement involves three minimum elements: an unknown, new, quantity; a known, fixed, quantity; and the difference between the two, determined by comparison.

One of the essential—and innovative—aspects of measurement by reference to agreed objects or procedures and the use of calibrated measuring devices is the ‘externalisation’ of memory and its embodiment or inscription in the environment. The work of establishing reference objects and procedures and calibrating instruments to the defined units establishes a ‘memory’ of the unit that is not dependent on any particular individual holding it in his or her head. It is therefore ready to hand with little effort, accessible to the community and can persist independent of any individual.

5.4.2. Experimental Control

The principle of experimental control is a further application—and compounding of comparison. Where measurement is a single comparison, an experimental control is a comparison of measurements. And, as with measurement, one is ‘new’ and the other ‘fixed’. The procedure usually involves running two parallel experiments with all inputs and conditions the same except for applying the experimental factor in only one of the two. By comparing measurements of the two as taken both before and after the experiment, it is then possible to infer that any differences in the results can be attributed to the experimental factor.

In cases where the data and evidence for the investigation are necessarily historical or the timescales of the processes involved are extremely long—as in the study of human settlements—the direct use of experimental control is limited. In general, the role of a control is taken by an idealised model or ‘type’, which still allows comparison with a ‘fixed’ or invariant case in order to identify similarities and differences. Clearly this requires more care in drawing conclusions and also the need to review the model or type to ensure it remains relevant.

A further step in the use of controls is to compare the results of a series of controlled experiments working through a range of different factors. The idea of comparing multiple experiments points to the third example procedure, which is peer review.

5.4.3. Peer Review

In summary, the process of peer review involves, first, a scientific investigation and the preparation of works by the investigator(s) to communicate the results. The second step is the submission of that work to other, similar investigators to check the work for adherence to a range of standards. A third is then the judgement by the editor or body disseminating the work whether to publish it or not.

The essence of peer review is a twofold comparison, first on the part of the reviewers and then on the part of the editor. Each individual reviewer will compare the new work against an existing set of methods, techniques and procedures to ensure the results are valid. The reviewer will also compare any new elements with existing theories, concepts and facts to ensure that the new fits with those theories and/or accounts for established results. Finally, the reviewer will compare the new work against established principles of inference to ensure the new work has drawn valid conclusions.

The role of the editor is then to compare the points raised by the reviewers with each other and with his/her own view. The editor weighs the different views in the balance and makes a judgment about whether to publish or not. To draw an analogy, the range of reviews provides a multi-ocular view resulting in greater depth and a wider angle of view than a single perspective and allows for a more considered judgement.

Some of the more formal specifics of peer review as a species of comparison can be explored through three examples of comparative techniques that have been used, some for millennia, in the development of human knowledge. At a general level, peer review is an expression of the fact that human understanding as an accumulated body of knowledge is dependent on language and communication. That body of knowledge, like language itself, has emerged within a community or group of people. An essential feature of any group of people is the variation in capacities, ways of thinking and understanding of individuals.

5.5. Comparative Methods

The pool of human knowledge is fundamentally a diverse mix of ideas held in the heads of individuals and as expressed in recorded works of all kinds. When seeking to establish the 'facts' or 'truth' about even a shared experience, the variability and diversity of perspectives and interpretations pose something of a challenge. Again, as with language, even though a language only emerges in and is shared between a community, it is only ever made manifest in the expressions of individuals. Taking a pragmatist position, the 'truth' necessarily lies in what individual ideas and expressions have in common through active investigation in the long run. And those commonalities can only be identified by comparing the individual ideas and expression.

5.5.1. Comparison of Multiple Sources: History

In the field of history, one of the core principles that has been established to deal with variations in interpretations is to compare a number of sources that describe the same events (Bodin 1566, Howell and Prevenier 2001). Accounts of events are deemed to be more reliable when they are corroborated by a number of different independent sources. In terms of the schema of comparison, the process involves comparison of two or more sources of information and the identification of similarities and differences. This is followed by the formulation of a hypothesis setting out the most plausible account. As with binocular vision, this case involves two sources of information gained more or less simultaneously as opposed to the comparison of new information and remembered or stored information as in the case of recognition. Put another way, the historian compares two or more 'external' sources rather than one external and one internal.

5.5.2. Comparison of Multiple Sources: Philology

A more specific but related instance of this method is found in the field of philology, which is, broadly, the study of languages through written texts and oral statements (Ziolkowsk 1990). Originating in Ancient Greece when texts were reproduced by hand from previous manuscripts and prone to transcription and translation errors or loss, a principal aim of early philology was to reconstruct a hypothetical 'original' text from variant copies when there was no known extant original. Other branches of philology include decipherment of ancient languages and comparative linguistics in which the development and roots of languages are traced.

The core method of philology for the purposes of reconstructing an 'original' is to read through and compare the variant texts, identify the similarities and differences and propose a 'reliable' version based on a range of principles regarding both the source of the version and critical analysis of the text. As with comparison of multiple sources in history, a philological analysis involves the comparison of two or more 'external' sources of information and the generation of further information in the form of the proposed version and knowledge of its derivation.

5.5.3. Comparison of Multiple Viewpoints: Triangulation

A further instance of the explicit application of comparison as part of a systematic method of investigation is triangulation as used in the social sciences. The principle—and name—is taken from the technique used in land surveying. Describing a simplified version of the land surveying technique is a useful way to illustrate the role of comparison in the process. The aim of this particular technique is to identify an unknown location of an observer from features in the landscape:

- find two prominent features that are separated from each other but on the same sight line as seen from the observers' point of view (i.e. appear superimposed),
- find the features on a map and draw a line through them both and towards the observer,
- do the same for a second set of two features, and
- the observer's location is on the intersection of the two lines.

The procedure involves three sets of comparison:

- compare features in the landscape with each other > aligned,
- compare features in the landscape with the map > match and draw line, and
- compare/combine the lines to find the intersection > infer location.

This method might be termed 'graphic resectioning' with the use of aligned features standing in for reference to a bearing angle and/or a grid reference. Both of the latter still make use of comparison with reference back to some feature on the ground or magnetic north. As with other measurements, a bearing angle from north is a difference and the product of comparison. The basis of triangulation is essentially the same as the principle of binocular vision: the comparison and combination of two sources of information taken from different perspectives to generate additional information—depth perception or location.

This underlying concept was adopted within the social sciences in the 1970s as a methodological principle. The basic idea is that an investigation can be made more robust and credible by undertaking the work from two or more perspectives with the results of each compared and combined. As identified by Denzin (1978), the different perspectives can be taken up with respect to data, investigators, theories and methods.

The benefits of triangulation in research are similar to those identified for binocular vision:

- resilience, redundancy/reliability, credibility,
- wider field of view,

- depth perception/richness, complexity,
- cross/back assessment of sources, and
- enhanced interpolation for faintness or obstruction of views.

5.6. Comparing Comparisons

Taking a broad comparative overview of the foregoing, it is possible to identify three initial modes of comparison operating at the level of an individual. In one mode, immediate perception or new information is compared with known or remembered information. This generally leads on (by abductive inference) to identification or recognition and, in more deliberate, conscious analysis, to the identification and articulation of both similarities and differences. In the second mode, two immediate perceptions or sources of new information taken from two perspectives with a known difference between them are compared with each other. Perception of the resulting ‘interference pattern’ adds further information generally interpreted as an additional dimension of the phenomenon or ‘missing’ information. The third mode is essentially to combine two or more instances of the first two. A further mode operating at the level of a community is the comparison of two or more descriptions or sources of information about the same phenomenon, each taken from the perspective of a different individual. For convenience, these might be referred to, respectively, as sequential, simultaneous, compound and multiple modes of comparison.

While it is far beyond the scope of this chapter to say there might be some structured way in which the different modes operate and relate to each other, it is fair to say that the different modes, singly and together, underpin and, in part, constitute what we refer to as rigour. Rather, the chapter began with the premise that comparison is an active principle that operates with the exercise of rigour. The argument so far is thus that rigour might be operationally defined as the application of measurement, experimental control, peer review, multiple sources and triangulation—amongst many other techniques and procedures. As the foregoing seeks to show, those techniques and procedures fundamentally involve comparison. Therefore, comparison is fundamental to rigour. It remains to explore the extent to which urban morphology makes use of ‘comparative techniques’ and so can be said to be a rigorous discipline.

5.7. Comparison in Urban Morphology Through the Lens of JWR Whitehand

At this point, it might be argued that a better way to express the argument is to say that urban morphology ‘can be undertaken in a rigorous way’. The variable here is the individual undertaking the work. Use of comparative techniques is not a guarantee of rigour: the techniques are necessary but not sufficient, which is why the choice of JWR Whitehand is so appropriate to the task of showing that urban morphology can be rigorous. That is, as will be discussed, not only does Whitehand make use of comparative techniques, he

has, over his career, combined them in a way that makes the most of their underlying rigour. In order to begin to flesh out this argument, the following traces out a number of the ways that Whitehand has applied comparative techniques in his work, which in turn points to the way he puts them together. As a brief note before moving on, while Whitehand's work provides an excellent example for the purposes of this chapter, he would himself be one of the first to point out that he is part of a community of scholars who are working—with rigour—towards a common goal of building up an accumulated body of knowledge that improves our understanding of the settlements in which we live.

This section will examine three main examples of Whitehand's work, focusing on a particular element or concept rather than a particular study, topic or publication. By the same token, the selection and source material is necessarily limited by the scope of the chapter—it is by no means an exhaustive survey. The three main examples examined are:

- plan components—comparing patterns,
- the fringe-belt—comparing different descriptions of the same 'thing' and
- comparative study—comparing different examples of the same 'thing'.

5.7.1. Plan Analysis

In their paper on extending the compass of plan analysis, (Whitehand and Gu 2007) report on their application of MRG Conzen's method of town-plan analysis to the Chinese city of Pingyao (see also Chap. 2). There is a redundant space between the '2' and the ')'. This case is illuminating for the purposes of this chapter in a number of ways: in terms of the basic analytical techniques used, their qualification in light of the nature of the particular case and the inferences made from the results.

As set out by Conzen in his seminal study of Alnwick (Conzen 1960), town-plan analysis entails a systematic and progressive distinction of form complexes, plan element complexes and town-plan elements, as well as the distinction of different plan units, being the individualised combinations of the plan elements: streets, plots and buildings. The basic technique of distinguishing different complexes, elements and plan units is fundamentally comparative. In the terms set out in the first two sections, the comparison operates in the individual sequential mode, working from cartographic plans. The process necessarily involves both familiarity with a number of different plans, in order to generate a body of memories to which subsequent experiences are compared, and repeated scanning and visual scrutiny of the plan currently under analysis. To identify similarities and differences, one area of the plan must be compared with another.

Within Conzen's method of town-plan analysis as applied by Whitehand and Gu, there are two different types of comparison: synchronic and diachronic. That is, one is a comparison of different parts of the plan as it stands at a given point in time and the other comparison of the same part at different points in a time series. The two types are made evident in the study of

Pingyao by the categories of plan elements identified in the analysis. On the one hand, the street-plan types are distinguished on a principally synchronic basis by their geometry (square grid, rectilinear and irregular rectilinear), and on the other hand, courtyard plots are distinguished on a diachronic basis in terms of the degree of modification (orthomorphic, hypometamorphic and metamorphic).

At a more conscious level, Whitehand and Gu make use of comparison in the study of Pingyao, though not explicitly as such. In any application of a set of defined concepts and methods, there is necessarily a comparison made between the new material being analysed and the established concepts and methods. One must potentially ask, does a given element identified in the analysis fit a particular defined category type? This question comes to the fore in the case of Pingyao because of the limited source material on which the analysis is based. Indeed, it is the 'lack' of source material that is highlighted by the authors at the outset and is one of the things that makes the article important in the effort to extend the application of Conzenian methods outside of Western Europe. What is of particular note is the carefully calibrated way in which Whitehand and Gu make the extension. In framing the issue, the authors qualify their results by stating that,

'key morphogenetic features can be brought together in the form of a mapcum-cartogram, though the limited historical record, especially in the form of true plans, and minimal archaeological evidence, have meant that this is necessarily more reliant on hypothesis than the nearest equivalent of Conzen's maps. However, although plan units—the end products of Conzen's more historically-informed plan analyses—have not been delimited, Fig. 5.1 contains a major part of the groundwork for the recognition of such units.' (Whitehand and Gu 2007, p. 98)

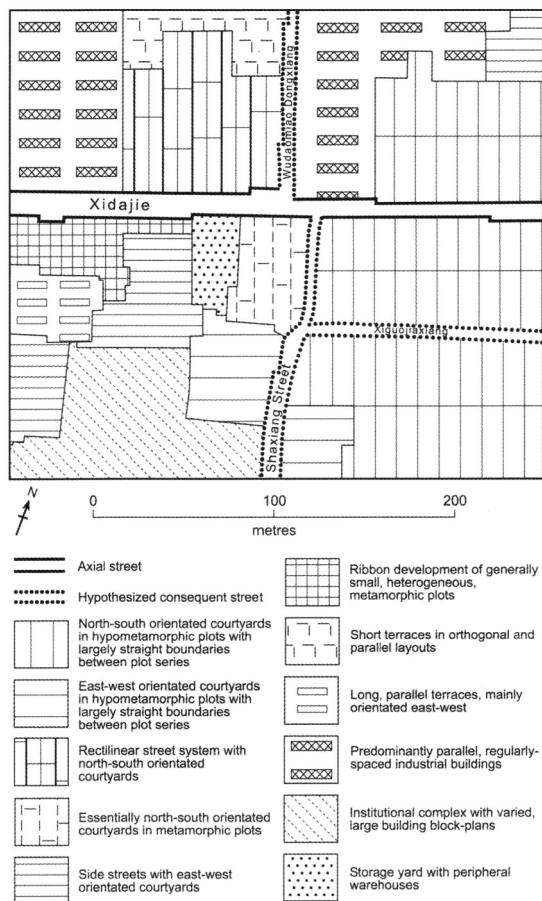


Fig. 5.1

A detail of the main figure showing a representation of the principal plan components of Pingyao. The outline of different areas with distinct characteristics as described in the key is the product of sequential comparison, scanning the plan visually to identify similarities and differences. Further comparisons of plots patterns are made to infer the transformational types (Source Whitehand and Gu 2007)

This statement demonstrates the detailed comparison that has been made between Conzen's work and the authors' own in terms of the evidence on which the analysis was based, the specific concepts and terminology used and the inferences that might be drawn from the results.

In addition to the use of the sequential mode of comparison in identifying similarities and differences in the plan and in checking the results against the core concepts and methods of the discipline, the paper also makes use of the simultaneous mode of triangulation. The two authors bring to the paper different perspectives due to their different experience, education and cultural background. It is fair to say the comparison and combination of Whitehand and Gu's perspectives on Pingyao bring the benefits identified for triangulation of:

- credibility,
- wider field of view,
- depth perception/ richness, complexity and
- enhanced interpolation for faintness or obstruction of views.

5.7.2. The Fringe-Belt Model

The idea of extending a concept and method such as town-plan analysis was not new to Whitehand in his paper with Gu. In the early 1970s, Whitehand took the concept of the fringe-belt as set out by Conzen and stretched it in a deliberate and, as he put it, eclectic way (Whitehand 1972)—see also Chap. 3. Though not explicitly so, Whitehand's approach can be seen as an example of methodological triangulation, comparing and combining the results of looking at the same phenomenon from different points of view.

On its own, the fringe-belt model is already the product of compound comparison. It is rightly considered a model in that it posits a set of both spatial and temporal relations that can be used to both understand existing settlements and to predict likely general, aggregate processes and spatial results. Putting together the model in the first place required, on the one hand, comparing a number of different settlements with each other in order to identify common patterns of development (synchronic). On the other hand, it involved comparing the different states of a given settlement, one with the next at different stages in its development (diachronic). It was then necessary to compare the resulting series with each other in order to identify the common pattern of successive fringe-belt formation (both synchronic and diachronic). Very briefly this entails the accumulation of a heterogeneous mix of generally large, non-residential plots on the periphery of a settlement (fringe features) in periods of relative stasis followed by the extension of finer grained, more regular mainly residential development beyond those fringe features in periods of relative growth. This leaves the fringe features embedded within the built-up area. Diachronic comparison also shows that there is a strong tendency for the fringe features to persist over time. There is also a tendency for the cycle of stasis-accumulation and growth-extension

to repeat. As a result, a settlement may have a series of inner, middle and outer fringe-belts depending on the size and age of the settlement.

In taking his eclectic approach to this phenomenon, Whitehand sought to add depth to the model. He did so by combining different theoretical and methodological perspectives (see Fig. 5.2). Most crucially, he added the economic perspective of urban-rent theory to the synchronic comparison of physical form (to distinguish non-residential fringe features from residential integument). This was done within the diachronic comparative framework of the time series and morphogenesis—tracking the changes in fringe features and residential areas as the settlement grows.

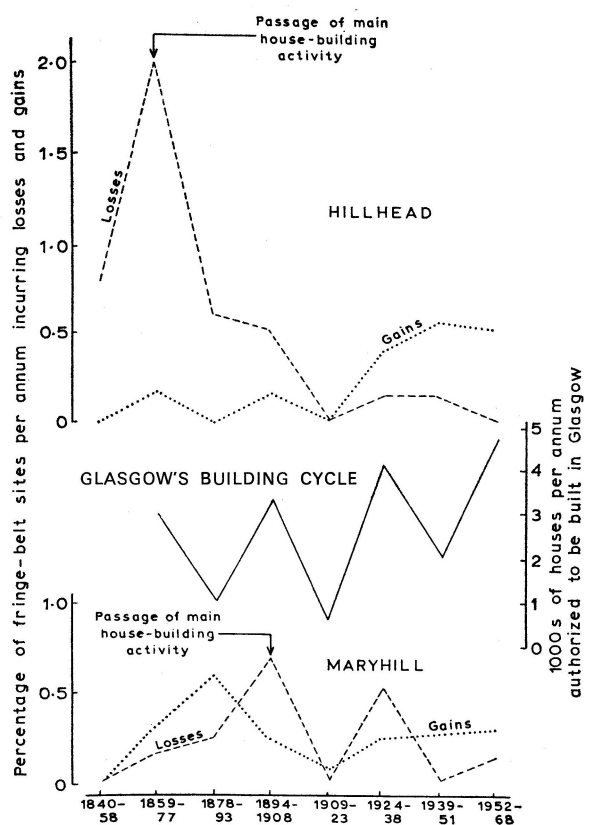


Fig. 5.2

A graph showing the temporal correlation of the building cycle and morphogenesis of fringe-belt sites. Comparison is used in numerous ways to construct the graph, from sequential comparison of plans to identify fringe-belt sites as well as changes over time, measurement of areas, and correlating variations to a common chronology

(Source Whitehand 1972)

The depth provided by that additional perspective allowed Whitehand to paint a much more nuanced picture of the process of successive fringe formation. Importantly, it opens up a view into the finer mechanisms that may be at work, such as the thresholds of land value on bid-rent gradients to which agents are responding in their actions. As with binocular vision and triangulation, effective comparison of different views of the same phenomena requires a clear understanding of the relationships between the different views and how they are accurately focused on the same point. This highlights the importance of information sources and the treatment of evidence when seeking to tie things together. Information needs to be accurately correlated, spatially and in time, which in turn requires, on the one hand, clear and credible sources of information and, on the other, comparison of the information to make the correlations. As in the case of Pingyao, in the exploration of the fringe-belt process, Whitehand is very careful to qualify his statements and openly identifies the limits imposed by lack of information on the inferences that can be drawn.

In addition to the general comparison of viewpoints and the more detailed comparison of evidence involved in Whitehand's investigation, the work also implicitly entails a comparison between case studies and the fringe-belt model. As set out in the 1972 paper, Whitehand refers on the one hand to a case study in Glasgow and on the other to hypothetical illustrative models. The latter are no doubt based on an aggregate of other cases—which necessarily involves comparison of the cases to establish a credible model.

In summary, this case involves all four of the different modes of comparison: sequential, simultaneous, compound and multiple, some direct, some indirect. The end result, in particular of the compound comparison involved in the fringe-belt model and the multiple comparisons made by bringing in the perspective of land economics, is a picture of much greater depth with significant potential for further use and elaboration.

5.7.3. A Cross-Cultural Comparative Study

A third example of Whitehand's work is of particular interest because it is both obvious that it should be included and at the same time constitutes a special case. That it should be seen as a special case might seem odd, given that it is one of the few instances of an explicitly comparative study in which Whitehand has been involved, specifically the work set out in the article, 'Plan analysis of historical cities: a Sino-European comparison' (Whitehand et al. 2016).

In brief, the paper, co-authored by Whitehand, MP Conzen and K Gu, sets out a comparative analysis of the cities of Pingyao in China and Como in Italy. The particular elements on which the comparison focuses include the morphological frame—notably fortifications—the street system, plot pattern and building pattern. What makes the case special, as seen in light of the previous discussions of comparison in the first and second parts of this chapter, is not the specific methodology or details of the case but the nature of an openly 'comparative study'. Within the terms of the first two sections, such a comparative study is, in its basic methodology, an application of the sequential mode of comparison. That is, to undertake the comparison, one needs to look first at one and then the other. The act of comparison is thus between the first, as held in one's memory, and the second as immediate perception.

Clearly, the choice of which case to view first might be arbitrary and one could also reverse the order at a later stage by spending time viewing the 'second' case in order to set it in one's short-term memory and then make a comparison with the 'first' case as the immediate perception. But that potential variability in the process underlines a point of particular importance however obvious it may be. To make a useful comparison in such a study, it is essential to identify the common generic elements that provide the reference for 'rectifying' the two cases in order to make a like-for-like comparison. In the case of Pingyao and Como, the 'control points' for the rectification are the generic plan elements of streets, plots and buildings. That is to say, it is a common comparison back to the basic concepts and methods of urban morphology.

If the need for reference features as control points may seem obvious, it should then be equally obvious that the identification of the reference features themselves must have been the product of previous comparisons. The case of comparing Pingyao and Como is then only an interim step in a long iterative sequence that must have started somewhere, likely as a vague perception—and abductive inference—of similarity. Each successive comparison of different cases is then an inductive checking of the hypothesis of similarity, ideally with progressively increasing specificity and precision. The case of Pingyao and Como meets that ideal, and at the same time, the authors are careful to move forward systematically. Whitehand, Conzen and Gu do not rush in where angels fear to tread. The care is shown primarily in the consistent reference to established Conzenean concepts and the attendant terminology—a comparison back to principles. At the same time, they are careful not to suggest everything is the same. Indeed, despite identifying similar morphological frames including city walls with gates and arterial streets, gridded street patterns, a range of plot patterns that have undergone similar degrees of transformation from orthomorphic to metamorphic and courtyard houses, the authors begin their conclusion by stating that, ‘in physical form the cities display more differences than they share similarities’ (Whitehand et al. 2016, p. 156). Perhaps this is to say you would not mistake yourself for being in Como when walking down a street in Pingyao or vice versa (Fig. 5.3).

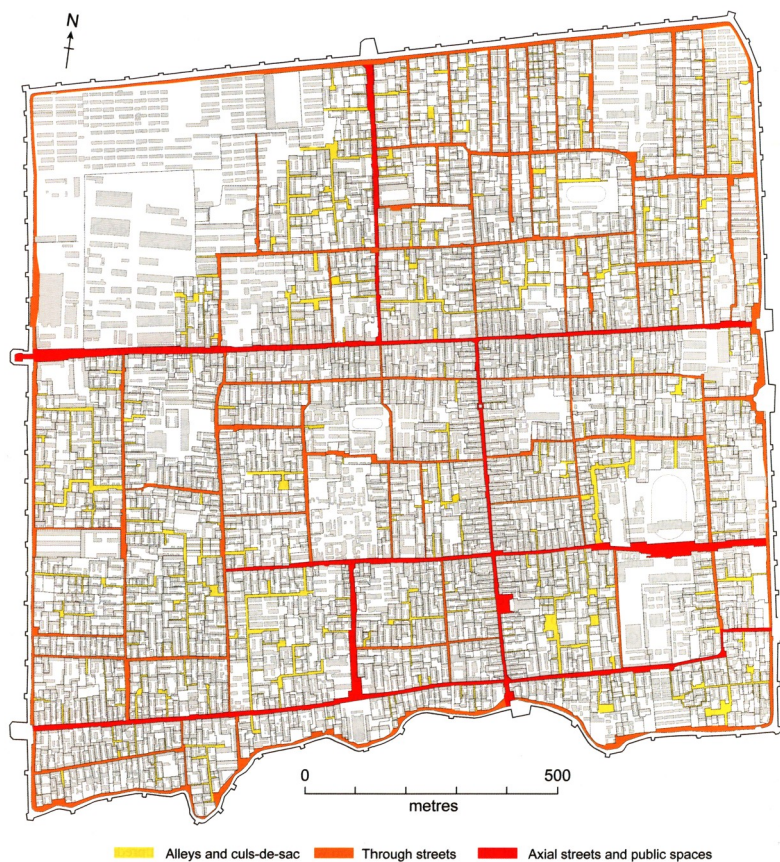
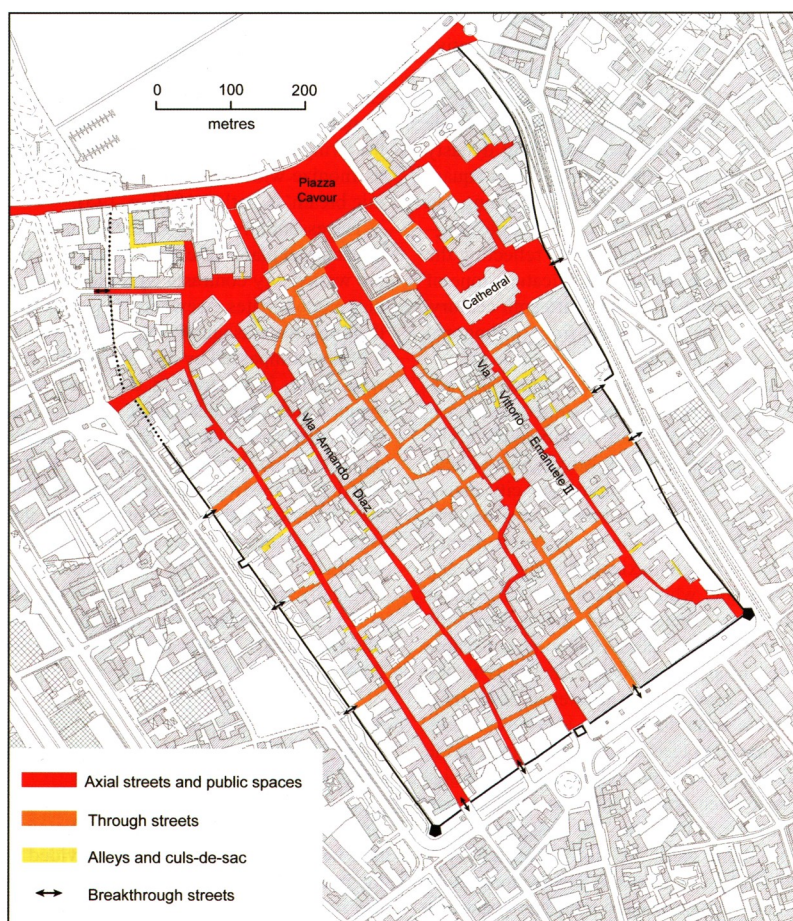


Fig. 5.3

*Plan representation of **a** Pingyao and **b** Como (following page), highlighting the different route types identified as one of the common elements that acts as ‘control points’ for the comparison. It is worth noting that the route types are defined in terms of more abstract, topological characteristics, which help minimise the potential cultural bias of the control points (Source Whitehand et al. 2016)*



More importantly, what is striking in the comparison made by Whitehand, Conzen and Gu is that their discussion of the differences in physical form moves almost directly to differences of conception, intention and use. Thus, whereas Pingyao has few public open spaces and many culs-de-sac, there are many public spaces and few culs-de-sac in Como, pointing to different patterns of social interaction, rooted in different social structures and attitudes. Similarly, the street pattern and plot types in Pingyao are structured with the majority of plots facing south with an entrance on the southern end. In contrast, in Como the orientation of the streets relates primarily to the topography and plots are oriented with public fronts facing onto the streets irrespective of the orientation of the street. Similarly, with building types, the traditional courtyard houses in Pingyao are predominantly inward facing with 'plain relatively undifferentiated exteriors... which lack windows on to the street' (Whitehand et al. 2016, p. 152), while buildings in Como typically have a 'high frequency of windows, doorways and arched vehicular entranceways allowing easy access to the interior of plots' (Whitehand et al. 2016, p. 154). As the authors explain, these differences in physical form arise with the significant differences in underlying conceptions of the world, attendant values and activities. To summarise very reductively, the Chinese city of traditional origin is informed by the ancient concept of *qi* and the principles of Feng Shui, fairly abruptly shifting to the sociopolitical order(s) of the Communist period, whereas the Italian city of early origin is informed by Classical polytheistic cosmology and the *genius loci*, transmuted and progressively reimagined through Christian cultural-political and Modernist socio-economic orders.

At the beginning of this section, it was suggested that the direct comparative study of Pingyao and Como was both an obvious choice and a special case as an example to explore the role of comparison in urban morphology. It is an obvious choice because, methodologically, it involves sequential comparison of the two cases, compound comparison with the reference back to the framework of concepts from Conzenian town-plan analysis as well as measurement and sequential comparison of multiple sources within each case to identify types of element and associations with activities and world views. The case also involves multiple comparisons because it is a multiauthored paper published in a peer-reviewed journal.

The case is special, or rather, a *distinct* form of comparison because it highlights an issue that gets to the heart of the matter of *rigour*. As a point of background, one argument 'against' comparative studies, in particular crosscultural comparative studies, is that the methodological apparatus—concepts, categories, models and techniques—blinds or distorts the view of the investigators to features or attributes that do not fit into that apparatus. Features are missed or misinterpreted. The critique from the other side is that if we must use a different method and set of concepts for each study we lose our way. We have no 'control points' and cannot rectify the two descriptions. This opposition can be caricatured as reductionist rigidity on one hand and solipsistic aimlessness on the other. The third position is to say that there is an inescapable trade-off between consistency, in order to maintain a coherent body of knowledge, and flexibility, in order to accommodate and account for the diversity of evidence as it emerges.

Taking that third position suggests that a comparative study of different settlements need not be just a sequential comparison that identifies similarities and differences. As a first step, the investigation could identify similarities, differences and also, openly, ambiguities. From there, the similarities provide the control points and the differences and ambiguities provide the starting point for bringing to bear information on the underlying cultural differences in world view, intentions and activities of their creators and residents. Such a move begins to generate two different views of the same thing—two different ways of seeing and using the city. That is, the investigation shifts from a sequential comparison to a simultaneous one, which brings with it the potential for greater depth perception. The 'known relation' between the views, analogous to the known distance between viewpoints in triangulation, is the relation of each view to the generic physical forms already identified as similarities. Viewing 'the settlement' from two cultural viewpoints generates a kind of interference pattern. The added depth is that the 'meaning' of generic elements—the 'settlement', 'street', 'plot' and 'building'—becomes richer, extending out in slightly different directions from the generalised physical form.

And in that act of comparison, the added depth opens up and, in a sense, temporarily 'loosens' the definitions of the elements. That loosened state presents the opportunity to re-evaluate the definitions and check if they need qualification, modification or adaptation in order to account for the evidence presented by both cases. At the least, that loosened state allows the

possibility of identifying more clearly the boundaries of ambiguity. And, in the end, it might be said that acknowledging ambiguity and holding the two or more viewpoints in one's head is a form of depth perception.

5.8. Conclusion

The question posed at the outset of this chapter was can urban morphology be a rigorous field or discipline? This was later qualified to the question can urban morphology be undertaken in a rigorous way? It was also suggested at the outset that due to our 'incapacities', a necessary, though not sufficient component of rigour is comparison. In considering a series of examples, it was shown that comparison operates at a number of different levels: at the unconscious level of perception; in common techniques used as a matter of course such as measurement and experimental control; and more deliberately as part of disciplinary methodologies. A further result of surveying those examples was to identify different modes of comparison: sequential, simultaneous, compound and multiple. Looking then at the work of JWR Whitehand and his co-authors, what also became evident is that all these modes of comparison were seen to be operating in the methods used in urban morphology. Using the different levels and modes of comparison in a deliberate way—measurement, control by reference to generic structures and models, comparison of sources and triangulation to multiple authors, comparative studies and peer review—creates an interwoven fabric of comparison with different modes and levels working in different directions to give strength and resilience to the results of an investigation. But as noted, while this is necessary for rigour, it is not sufficient. What Whitehand's work demonstrates in an exemplary way is that the modes and levels of comparison need to be complemented by further 'principles of application'. As an initial and provisional list, those include:

- consistent use of terminology,
- consistently setting evidence within an established theoretical framework,
- direct and careful use of multiple primary sources,
- careful use of inference and
- working with co-authors with different experience.

If we were all to follow his example, the field of urban morphology as a whole would only gain strength and standing. The example in particular of the comparative study, with its potential for greater depth perception by viewing urban form from different cultural perspectives, presents enormous scope for growth and discovery. And if we, like Whitehand, remain open to eclectic approaches, combining views with care and attention, we will improve our understanding of human settlements and contribute to building up an accumulated body of knowledge and understanding that is shared within a wider public or community.

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