How cities internalize their former urban fringes: a cross-cultural comparison

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Abstract. *Studies of urban fringe belts have multiplied in recent years, demonstrating the validity of this morphological concept in a variety of regions around the world. Yet there have been few direct attempts at a comparative assessment of the concept's performance in the different cultural settings in which it has been applied. This paper seeks to contribute to this goal, by examining the fringe-belt structure of several cities drawn from contrasting urban cultural traditions in Europe and the New World. Not surprisingly, certain commonalities emerge, but there are also large differences in the number, scale, complexity, and even basic geometry of fringe belts apparent in this eclectic examination. These differences go well beyond simple explanations of site circumstances, size, and function of the city within the urban hierarchy, and result from essential contrasts in urban social values, property rules, and planning traditions. The analysis leads to speculations about the efficacy and limits of the fringe-belt concept to identify and account for variations in the texture of urban form across urban areas in diverse cultural contexts.*

Key Words: fringe belts, comparative urban form, morphological mapping, Europe, New World

The study of urban form covers not only the buildings and other structures that make up the built environment of cities but also the arrangement of these features in an areal composition most often referred to as the spatial structure of cities. Fundamental to understanding this spatial structure is identifying the processes that create it and the patterns they produce at a variety of geographical scales. At the most detailed, local scale, buildings and their associated spaces fall into types that relate to particular socio-cultural forms and functions needed at particular sites, and they generally exhibit great individual variety. The most common attempts to grasp the spatial patterns of these features are maps of land (and building) use, and maps of (architectonic) building types. Such maps provide clues to the 'deep' or underlying structure of the urban area, but are often complex enough in their localized detail that they obscure rather than reveal it, particularly when formative processes have operated over long periods of time and have been partly obscured by subsequent changes.

For broader-scale explanations we turn to concepts that define distinct spatial units that together account for the organization of the total urban mass. In culture regions with a strong commercial dimension to their history such concepts as the central business district (CBD), residential districts of various kinds,

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and urban fringe belts come into play. The value of these concepts lies in their ability to reveal the broader, historically-derived zones into which urban space has been divided over time while still fitting them together as a coherent whole. Locationally speaking, the economic and social demand for sites and buildings distributes urban forms in response to the often strong centripetal and centrifugal forces acting upon them or some balance between the two. As the CBD reflects the centralizing forces that concentrate business and control functions at the urban core (Murphy, 1972), fringe belts record those portions of the urban area conditioned by accumulations of larger space-using sites and structures originally seeking locations at the periphery (Whitehand, 1967). Both of these zones exhibit great land use heterogeneity. The residential districts or accretions between them are similarly recognizable because they occupy the largest collective proportion of urban space, but in contrast possess a relative unity of form and function greater than other single classes of land and building use. The CBD is distinguished by the density and tight texture of its built form; residential districts by their general compactness; and fringe belts by their significantly looser, more open pattern of land cover and larger ownership parcels.

Fringe belts are the least understood major units of urban spatial structure because their formation depends on the specific effects of marked or prolonged pauses in urban growth – as opposed to the less subtle results of blithe expansion. They also occur in various positions within the urban mass, both at the current margins of cities between rural openness and the fully built-up zone, as well as interior relicts of former fringes that have become embedded with varying degrees of clarity within the expanded urban mass.

The once-slender literature on urban fringe belts has grown significantly in recent years and deserves some assessment with regard to its conceptual progress, particularly as the geographical reach of its empirical application has widened. Most substantive studies of fringe belts have been limited to individual cases. Periodic reviews before have noted the increasing diversity of these cases, but more to demonstrate the concept's theoretical robustness than to attempt a systematic comparison between them (Whitehand, 1967, 1974, 1981, pp. 132-9, 1987, 1988; Whitehand and Morton, 2004). Now it seems reasonable to place the increasingly global accumulation of studies within an explicitly comparative framework to draw out distinctions among processes and patterns that appear to reflect the richness and cultural diversity of fringe belts around the world and to raise questions about what remains poorly understood.[1]

Discovery and conceptualization of fringe belts

Emergence of the fringe-belt concept

There have been three key figures in the discovery and development of the urban fringe-belt concept. The *Stadtrandzone,* as the phenomenon is known in its original German formulation, was first identified by Herbert Louis in a study of Berlin published in 1936. Louis formulated the basic concept and made the first attempt to delineate it cartographically. His accomplishment was to differentiate Berlin's entire metropolitan area into zones legible in terms of their historico-geographical development and to map those zones in detail (Louis, 1936). He discerned two clear, embedded fringe belts and a third, amorphous outer belt. Innermost and surrounding the late-seventeenthth-century prince-elector's town was the first zone strongly oriented to the walled fortifications. This zone became itself surrounded with eighteenth-century *Vorstädte,* and although redeveloped retained a more open character than either the city centre or the new extensions. Encircling these first suburbs was a broad zone of more or less open land separating the core from the late-nineteenth-century residential districts beyond, consisting of extensive gardens, railway facilities, palace compounds, and other non-residential developments. Farther out, Louis demarcated areas according to how densely formed they

were, and labelled them variously as heterogeneous built-up zones, industrial belts, allotment garden districts, villa quarters, and absorbed former village centres. In Louis's study these urban classifications were generalized as zones superimposed upon a detailed topographic map that made correlation between the conceptual categories and the built environment of the metropolitan area easy to follow – a feat of cartographic design in black and white quite exceptional for the time.

A quarter-century later, M. R. G. Conzen (1960), who had once taken courses given by Louis but since moved to Britain, recognized the fringe-belt phenomenon in his detailed morphological study of Alnwick, Northumberland, a small market town in North-East England. He also found three distinct belts, all in close association across what was by comparison with Louis's case a very small built-up area. The Inner Fringe Belt (IFB hereafter) developed around the 'fixation line' of the medieval town wall. Conzen's fundamental conceptual contribution was to incorporate fringe-belt patterns within the city into an elaborate morphological theory of interactions between formative and transformative spatial processes of all kinds – commercial, industrial, residential and institutional – as evidenced in the detailed cartographic record of a city's physical evolution. As part of this he developed an intricate classification of processes in fringe-belt formation and subsequent modification in Alnwick, and later applied the scheme to the IFB of central Newcastle upon Tyne, a much larger and morphologically more challenging case (M. R. G. Conzen, 1962). This study yielded an even more complex analysis, and it is from these two investigations that the classic conceptual vocabulary concerning fringe-belt structure and change used by scholars today is derived. Conzen continued to test the concept and found it worked well in several other British areas, including Ludlow, Conway, and metropolitan Manchester (M. R. G. Conzen, 1966, 1978).

Building upon this work, Jeremy Whitehand confirmed the utility of mapping fringe belts in large urban settings, such as the Tyneside conurbation, Glasgow, and Birmingham. More importantly, however, he advanced the theoretical underpinnings of fringe-belt theory in two major ways. First, he directly explored the relationship between fringe belts and pulsations in urban construction cycles, thereby proving statistically what Conzen had recognized intuitively (Whitehand, 1967, 1972, 1987, 1988, 1994; see also Barke, 1976). This had the effect of legitimizing the cartographic approach to fringe-belt dynamics by demonstrating their close link to the urban economy over time. Secondly, Whitehand sought to develop an explicit concern for agency in the fringe-belt process, undertaking studies that probed the interactions of landowners, developers, financiers, and planners in the land use and development struggles that increased, decreased, and transformed urban areas. While these studies began with central area redevelopment, residential change, and suburban housing issues, he ultimately applied this 'agents of change' approach to fringe belts, specifically with work on Birmingham's dispersed but well-defined Edwardian (or middle) fringe belt, with particular attention to its environmental character and the implications this has for urban planning (Whitehand, 1996, 2005; Whitehand and Morton, 2003, 2004, 2006; Whitehand, Morton and Hopkins, 2003). In addition, Whitehand took advantage of travel to test the fringe-belt concept in far-flung cities (for example, Clermont-Ferrand, Lusaka, and St Petersburg), with positive results.

As a consequence of these and other research developments, the fringe-belt concept – nurtured during a period in which urban morphology was not prominent within urban geography in the anglophone world or, indeed, urban studies at large (M. P. Conzen, 1978) – is now included in many general works concerned with urban form (Allain, 2004, pp. 79, 95; Carter, 1995, pp. 371-4; Pacione, 2001, pp. 139-140; Parkes and Thrift, 1980, pp. 433-5; Whitehand, 2001).

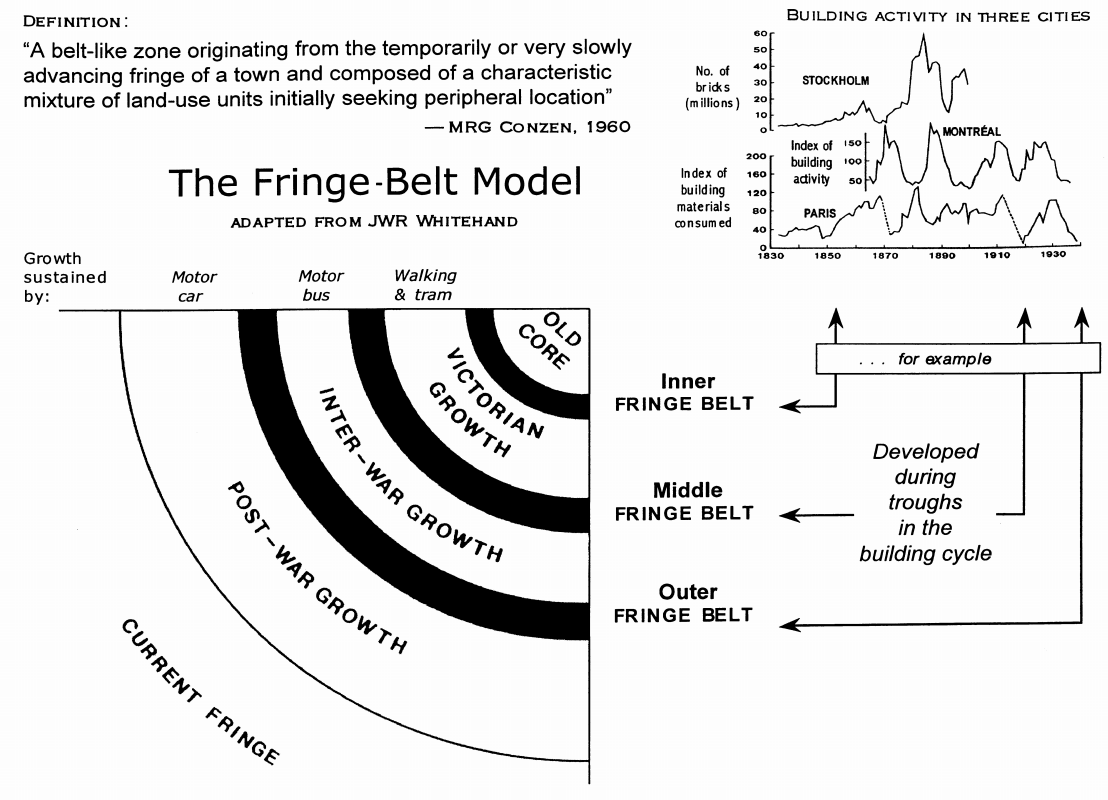

Figure 1. The fringe-belt model in relation to building cycles.

Fundamentals of urban fringe-belt theory

At its most basic, urban fringe-belt theory is based on the uneven nature of urban growth over time in response to business cycles – both Kuznets cycles and Kondratieff waves[2] – and the prediction that these occillations produce an alternation of land-use belts in the outward growth of the urban built-up area of markedly different character (Whitehand, 1987, pp. 76–94, 1988) (Figure 1). During good economic times private capital is readily available and therefore residential building is extensive and comprises the bulk of the new urban periphery. During economic slumps private capital is scarce while public capital remains more available, and consequently many institutional developments (including infrastructure improvements), particularly those requiring large inexpensive land parcels, have the opportunity to accumulate at the urban fringe. In these downturns, private developments that seek or require large spaces also tend to appear, to take advantage of depressed land prices. Typically, such land uses might include cemeteries, parks, villa estates, military barracks, college grounds, hospitals, golf courses, waste disposal plants, sports fields, and religious retreats such as monasteries (Table 1). The result is a *fringe belt* of mixed land uses with a less dense, more open character than the relatively homogeneous residential densities of the previous zone (M. R. G. Conzen, 1960). If residential accretions to the city appear to some degree 'planned' in character, because they have been constructed in a rapid and somewhat unified fashion, fringe belts by contrast appear on the whole more 'spontaneous'. And while fringe belts are most easily defined and demarcated with reference to land use and lower development densities when compared with non-fringe-belt zones, they also possess different combinations of built forms that likewise contribute to their distinctive character within urban areas.

The central conditions for the emergence of

Table 1. The conceptual terminology of fringe belts: contributing features, processes, and products

Contributing features (illustrative, not exhaustive; these have changed through time with shifts in technology and social needs)

OPEN SPACE
- Cemeteries
- Public parks
- Nurseries / market gardens
- Allotments

INSTITUTIONS
- Religious retreats (e.g., monasteries)
- Military barracks
- College grounds
- Hospitals
- Waste disposal plants

INDUSTRY
- Transport facilities (incl. warehouses)
- Factories
- Quarries

RESIDENTIAL — low-density only
- Villa estates

RECREATION
- Golf courses
- Sports fields
- Riding schools

Processes

F R I N G E - B E L T F O R M A T I O N

Fringe-belt accretion
- Fixation phase (in assoc. with a fixation line) —*incipient character*
- Expansion phase —*pronounced character*
- Consolidation phase —*dominant character*

F R I N G E - B E L T M O D I F I C A T I O N

Fringe-belt alienation — *loss to residential or CBD*

Fringe-belt reduction — *ditto.*

Fringe-belt translation — *transfer to another FB*

Products

Inner fringe belt — IFB
- Intramural / extramural
- Built-up / open

Middle fringe belt — MFB

Outer fringe belt — OFB

Fringe-belt aureole — *FB influence in residential area*

'Metamorphosed' fringe belt

Sources: M. R. G. Conzen (1969; 2004, appendix A); Larkham and Jones (1991, p. 41).

fringe belts are: (1) a clear sequence of economic cycles that separate urban growth into distinct phases of strong and weak lateral expansion, most marked since the historical rise of industrial capital (Vance, 1971); and (2) an established urban core around which outward expansion occurs in zones similar in principle to the growth rings of trees. When the rate of urban growth exhibits no clear pulsations fringe belts are far less likely to form. Similarly, in the absence of a single core around which growth spreads outwards, the land uses that would normally cluster in fringe belts would appear far more scattered and less organized in circumferential belts. The importance of these conditions will be considered later in this review.

Towns and cities old and young can develop fringe belts. It is a characteristic of the world's urban history that most cities of ancient lineage have grown slowly and in spatially compact ways until comparatively modern times. Consequently, initial urban fringes often developed within quite narrow spatial bounds and had centuries in which to mature. This results in rather tight spatial textures that, once captured within the urban mass, can exhibit substantial inertia and resist complete annihilation. Towns and cities founded during and after the Industrial Revolution, on the other hand, being younger, have fewer and less closely-bound fringe belts. While historic cities may exhibit up to three successive fringe belts (an inner fringe belt or

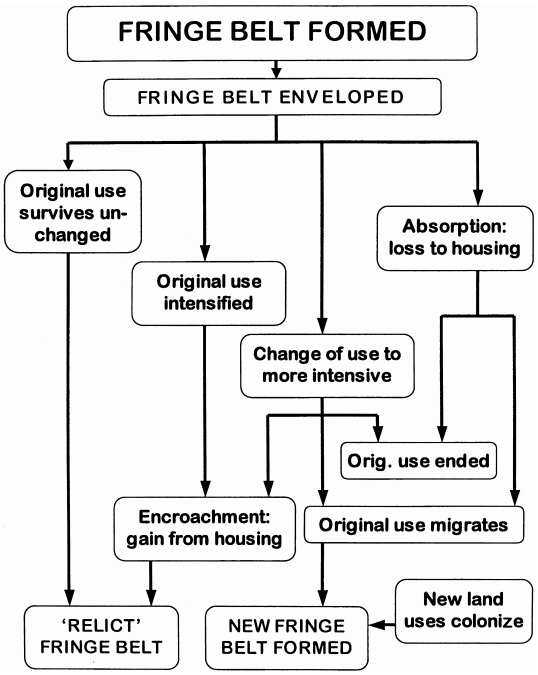

Figure 2. Model of land-use outcomes during fringe-belt evolution (after Barke, 1990, p. 283).

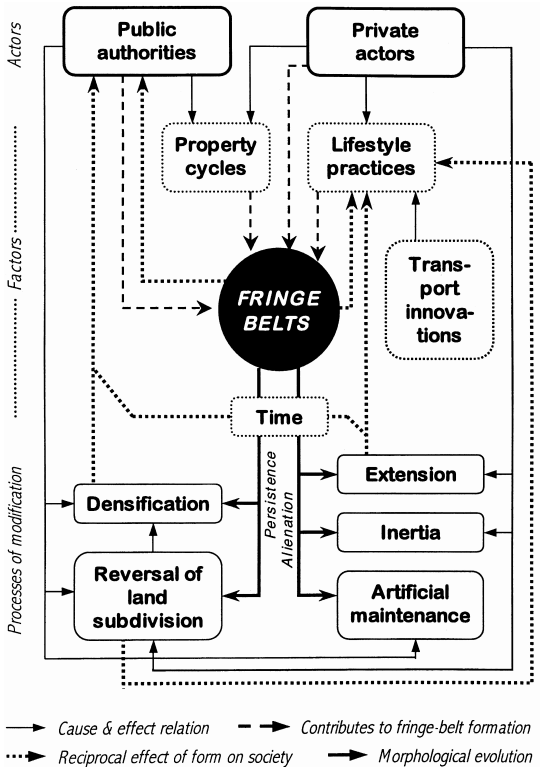

Figure 3. Model of fringe-belt dynamics (after Ducom, 2005c, p. 247).

IFB, a middle fringe belt or MFB, and an outer fringe belt or OFB), younger cities may show only one or two (Figure 1). An old city's MFB or an OFB may be of similar age to an IFB or a MFB in a younger city.

Fringe belts develop an internal history because they evolve over time. They pass through two grand stages, distinguished for analytical purposes as stages of *formation* and *modification*, which in terms of chronology might well overlap. During the formative stage they typically progress from an early *fixation phase* (usually tied to a strong *fixation line*) to an *expansion phase,* and then a *consolidation phase* (Table 1). Once formed, fringe belts tend to remain *in situ* like buried fossils as the built-up area spreads outwards beyond them. Over time these once peripheral but now embedded fringe belts adjust to the ever-changing dynamics of urban land use. Their existence within the urban mass can be perpetuated when similar uses are attracted to them by their established character (*fringe-belt accretion*), thus consolidating a now interior fringe belt. But, alternatively, fringe belts may lose size or coherence when radical or large-scale redevelopment takes place (*fringe-belt alienation* or *reduction*). Depending on their positions, specific sites may also undergo *translation* from one fringe belt to another. Two useful attempts to systematize understanding of general fringe-belt dynamics in the form of process models are those by Michael Barke (1990, p. 283) and Estelle Ducom (2005c, p. 247). Barke's model describes the permutations of land use change as fringe belts multiply and mature (Figure 2). Ducom's model conceptualizes the interrelations between decision takers, contributing factors, and processes of modification as fringe belts evolve (Figure 3).

These processes of fringe-belt formation and change, and their spatial expression in the urban landscape, take different forms under the specific conditions of historical, socio-economic and cultural development to be found in the different cities and regions of the world. While theoretically they might be expected to occur in all urban circumstances, there are significant differences from region to

region in the conditions under which they appear – or fail to appear – and such variability calls for comparative study.

The diffusion of urban fringe-belt research

What began as a discovery of a major urban landscape type in a 1930s German metropolitan area and a 1950s English market town has blossomed into an empirical finding of global morphological significance.[3] Fringe belts have now been confirmed in cities on every populated continent, and at every geographical scale, although the determinants of their number, size, complexity, and formative contexts have only begun to be understood in a comparative way (Table 2).[4]

The fact that the record of research begins with the singular study of Berlin by Louis in the mid-1930s is all the more remarkable since Louis's principal research interests lay in geomorphology, not urban geography. Indeed, some might see in his extraordinary metropolitan map the eye of the stratigrapher in mapping the 'deep' structure of this urban terrain. Louis's Berlin discovery did not become a staple in German urban geography, but it took the conviction of only one other scholar, years later, to rescue the fringe-belt concept from oblivion when M. R. G. Conzen found it highly applicable to towns and cities in Britain. Conzen greatly developed the theoretical content and interpretive power of the idea in his work on half a dozen places in Britain, and in the process found an enthusiastic adopter of the idea in Jeremy Whitehand (briefly his colleague at Newcastle University). Whitehand in turn substantially broadened the research possibilities surrounding the fringe-belt concept, and through his extensive personal research as well as the work of the Urban Morphology Research Group at Birmingham which he founded in 1974, succeeded in stimulating a growing international cadre of scholars – geographers, architects, and others – to explore the applicability of the concept even further afield (Table 2). Also influential has been Ivor Samuels, an urban designer at Oxford Brookes University, whose awareness of Conzen's work served to spread interest among urban morphologists training in urban planning and design in Britain.

By now, urban fringe belts have been documented in a score of countries worldwide. The scale of investigations has ranged all the way from small towns (as small as Whithorn and Bromsgrove in Britain) to large metropolitan areas such as the Tyneside conurbation, Birmingham, Baghdad, Lusaka, and Auckland.

Fringe belts can be isolated and studied at any point in their development, of course, yielding reconstructions and explanations devoted to historical moments of particular interest. There have been limited studies of fringe-belt processes in medieval and other pre-industrial towns (Lublin, Koblenz), as well as studies devoted to single fringe belts. Of special interest here are analyses of IFBs in cities of substantial age in which the pressures of CBD expansion and transformation have brought major changes to the IFB (as in Newcastle, Auckland, and Morelia, for example); and studies of MFBs subject to pressures for additional housing, especially on so-called 'brownfield sites' (with Birmingham being the best explored case) (Table 2). More investigations than not, however, have sought to identify the full series of fringe belts of a place identifiable at the time of study, addressing contemporary conditions and the ways in which fringe-belt dynamics have contributed to urban spatial structure as a whole.

The urban fringe-belt phenomenon as a widely distributed – though not necessarily universal – aspect of urban structure worldwide is beyond question. What beg attention are the comparative inferences to be drawn from the research completed to date, and the questions they open up for further investigation. While the relationship between fringe belts, construction cycles, and land-rent theory demonstrated by Whitehand has given fringe belts a firm conceptual foundation within general models of urban structure, much if not most of the empirical literature on fringe belts has taken these connections for granted and focused on defining the complex

Table 2. Applications of the fringe-belt concept

Place studied	Founding	Population*	FBs	Publ. date¶	Investigator(s)
BRITAIN & IRELAND					
Alnwick	Saxon	7489	3	1960	Conzen MRG
Newcastle	Roman	336 000	3	1962	Conzen MRG
Ludlow	11th-C.	6774	IFB	1966	Conzen MRG
Conway	13th-C.	11 392	IFB	1966	Conzen MRG
Whithorn	Medieval	990	1	1966	Conzen MRG
Tyneside	various	(799 000)	3	1967	Whitehand
Glasgow	Medieval	897 000	MFB	1972 / 2006	Whitehand
Falkirk	Medieval	38 044	3	1974 (1961)	Barke
Cirencester†	Roman	(16 214)	FB	1976 (1800)	Slater
Arundel†	11th-C.	2500	FB	1977	Slater
Warwick†	10th-C.	18 292	FB	1977	Slater
Manchester	18th-C.	**714 333	3	1978 (1900)	Conzen MRG
Aberystwyth	15th-C.	10 687	2	1979	Carter & Wheatley
Birmingham	12th-C.	1 001 200	MFB	2001	Whitehand *et al.*
Sligo, Ireland	13th-C. (1245)	17 892	IFB	2004	Sligo Co. Council
Bromsgrove	Medieval	27 633	IFB	2007 (2005)	Bienstman
ELSEWHERE IN EUROPE					
Berlin, Germany	13th-C.	4 200 000	3	1936	Louis
Clermont-Ferrand, France	Roman	(140 700)	IFB	1974 (1967)	Whitehand
Lublin, Poland	10th-C.	(354 272)	2	1989 (1762)	Slater
Koblenz, Germany	Roman	10 000	IFB	1990 (1792)	von der Dollen
Lleida, Spain	Roman	(112 600)	2	1990	Vilagrasa
Nantes, France	Gallo-Roman	281 500	3	2003-5	Ducom
Rennes, France	Gallo-Roman	206 229	3	2003-5	Ducom
Tours, France	Gallo-Roman	140 000	3	2003-5	Ducom
Como, Italy	Roman	78 680	3	2004	Conzen MP
Haarlem, Netherlands	Medieval	(147 613)	IFB	2004	Suurenbroek
Alkmaar, Netherlands	Medieval	94 000	IFB	2007 (2005)	Bienstman
Reykjavik, Iceland	18th-C.(1786)	200 969	n.a.	2007	Kristjánsdóttir
St Petersburg, Russia	18th-C.(1703)	4 600 000	MFB	2009 (2006)	Whitehand
Karlovac, Croatia	16th-C.(1579)	(49 082)	IFB	2008	Krajnik *et al.*
Osijek, Croatia	12th-C.	(114 616)	IFB	2008	Krajnik *et al.*
Upplands Väsby, Sweden	20th-C.	(2005) 35 977	IFB	2009 (2008)	Whitehand
MIDDLE EAST					
Baghdad, Iraq	8th-C.	1 984 142	3	1974	Al-Ashab
NORTH AMERICA					
Madison, Wis., USA	19th-C.(1836)	126 706	2	1968 (1962)	Conzen MP
Cambridge, Mass., USA	17th-C.(1630)	95 802	MFB	1977	Krim
Mineral Point, Wis., USA	19th-C.(1825)	2617	2	1997	Conzen MP
Paris, Ill., USA	19th-C.(1825)	9077	3	2001	Conzen MP
Lantzville, B.C., Canada	20th-C.(1920)	3661	IFB	2009 (2005)	Whitehand
CENTRAL & SOUTH AMERICA					
Morelia, Mexico	16th-C.(1541)	608 049	2	1999 (1960)§	Rodrigo-Cervantes
Ouro Preto, Brazil	18th-C.(1711)	66 277	2	2007	Conzen MP
AFRICA					
Lusaka, Zambia	20th-C.(1905)	1 084 703)	MFB	2009 (1993)	Whitehand
OTHER NEW WORLDS					
Krasnoyarsk, Russia	17th-C.(1628)	950 000	2	2006	Kukina
Auckland, New Zealand	19th-C.(1840)	1 319 352	3	2008	Gu

Sources: see endnotes 4 and 6 and references. * Corresponding to period studied; otherwise the modern size (in brackets); various sources. ** In 1911, the nearest available date corresponding to the Manchester fringe-belt map. ¶ Dates in brackets indicate time of survey or terminal date of study, when indicated by author. † With special reference to landscape parks or ornamental villas or both. § The period studied is 1541–1960, while the effective date chosen here for mapping fringe belts in Morelia is 1700 (see Figure 6).

spatial configuration of fringe belts in actual cases.[5] This has proven a major challenge, since agencies collecting urban data and mapping them have traditionally not recognized fringe belts as a unified category. While the essential theoretical underpinnings of fringe belts may be sound, their empirical investigation – and even basic delineation on the ground – in diverse cultural settings presents many practical obstacles, but also opportunities. Hence, the remainder of this review concentrates heavily on the cartographic dimension, seeking to identify interpretive findings that in turn might advance and enrich the theoretical side of comparative fringe-belt research. Immediately, some methodological issues arise.

A strategy for comparative study of fringe belts

Mapping at a common scale: a schema

In order to begin to compare fringe-belt morphology among a large selection of the cases listed in Table 2, it has been necessary to reduce the maps portraying them to uniform scales.[6] The differences between the largest and the smallest territories involved are so great that one scale proved impossible, so three have been chosen, two scales for 'whole city' cases, and one for IFBs at the urban core. Figures 4 and 5 show maps of fringe-belt series of large cities and metropolitan areas at a common scale – the smallest of the three scales, covering the greatest territory – in order to show the most extensive cases in their entirety at the time the studies were done. At a scale four times larger, the fringe belts of the smaller towns reviewed here are presented for direct comparison in Figure 6. A third common scale, somewhat larger still, is employed in Figure 7 to show the IFBs of four cases where detailed investigations have yielded much that is of analytical and methodological interest.

In order to bring the differences between the three map scales into sharp focus, the map of Paris, Illinois (USA) has been included in both Figures 5 and 6. In Figure 5 Paris is seen in the context of the large urban areas, while its depiction at the common scale used in Figure 6 highlights how truly small the small towns shown here are in relation to the metropolitan cases in Figure 4. Similarly, one of the maps of central Newcastle is repeated in Figures 6 and 7 to reveal the difference in scales used in these two figures, and the Falkirk IFB visible in Figure 6 can also be seen at the appropriate scale in Figure 7. And, to complete triangulation between the three map scales, Auckland is represented by its three-fringe-belt map in Figure 5 and its IFB map in Figure 7; and Rennes, too, is represented twice, at the metropolitan scale in Figure 4 and the IFB/MFB scale in Figure 7.

Other methodological issues

It would be too much to expect all studies of urban fringe belts to have used precisely the same definitions of terms and the same criteria for delineating fringe belts on maps in actual practice. Each has been conducted in a local setting where information sources, opportunity for field research, and other considerations have put perfect comparability beyond reach.[7] Some differences will be noted in the following discussion, but for the most part in this broad-brush effort at comparison potentially important methodological differences between studies have reluctantly been set aside, in the full knowledge that if they were more closely examined they might affect some interpretations. For future study, of course, the precise mapping criteria of the studies being compared ought to be evaluated. There are many questions to be answered: what exactly belongs to a fringe belt; what principle includes or excludes particular land-use categories or sites from any given fringe belt or fringe belts in general; how do scattered fringe-belt sites become assigned to one fringe belt or another? These are just a soupçon of the questions that need to be answered on another occasion.

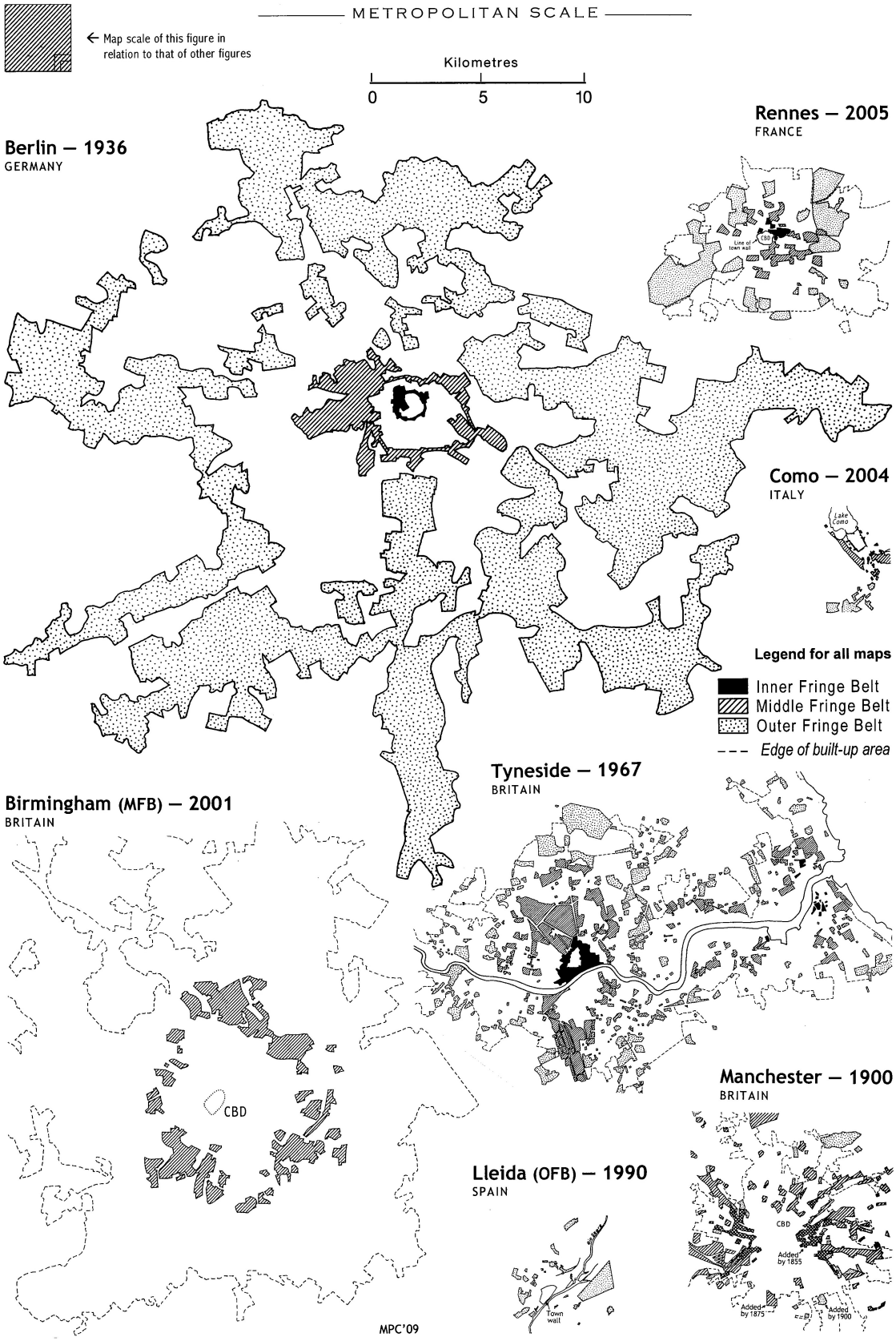

Figure 4. Fringe belts at the metropolitan scale: European cases.

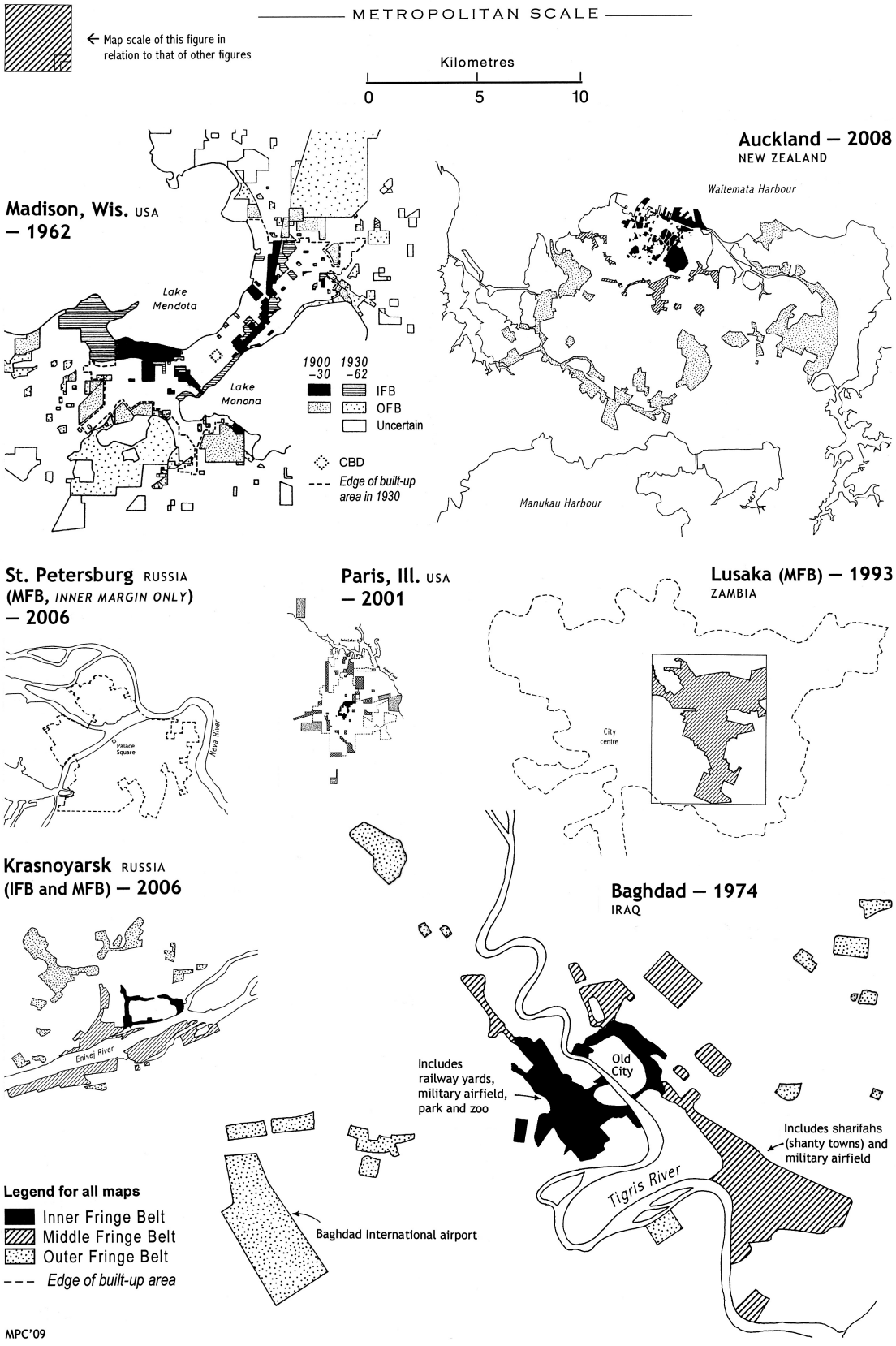

Figure 5. Fringe belts at the metropolitan scale: Russia and beyond Europe.

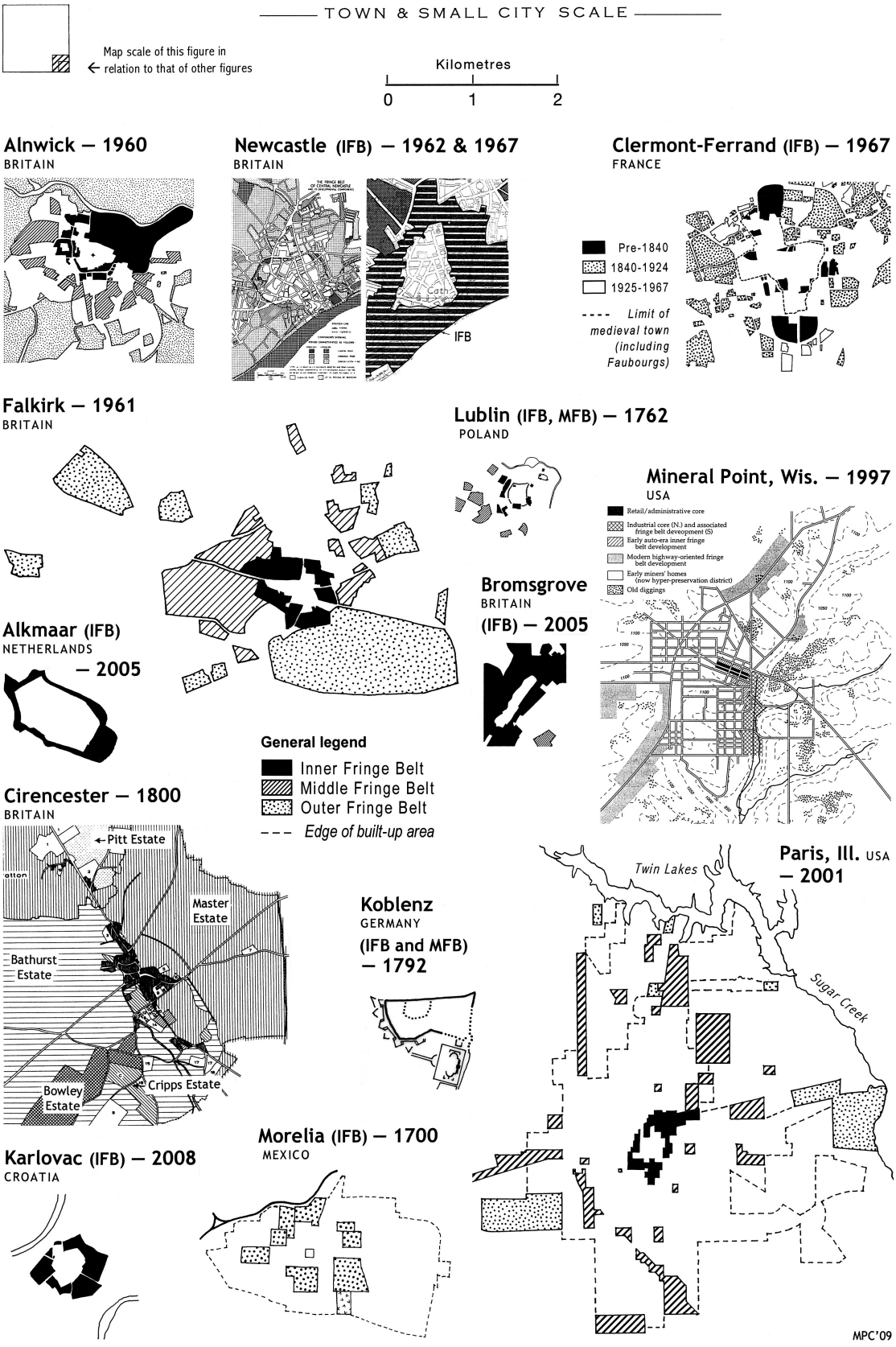

Figure 6. Fringe belts at the small-city scale.

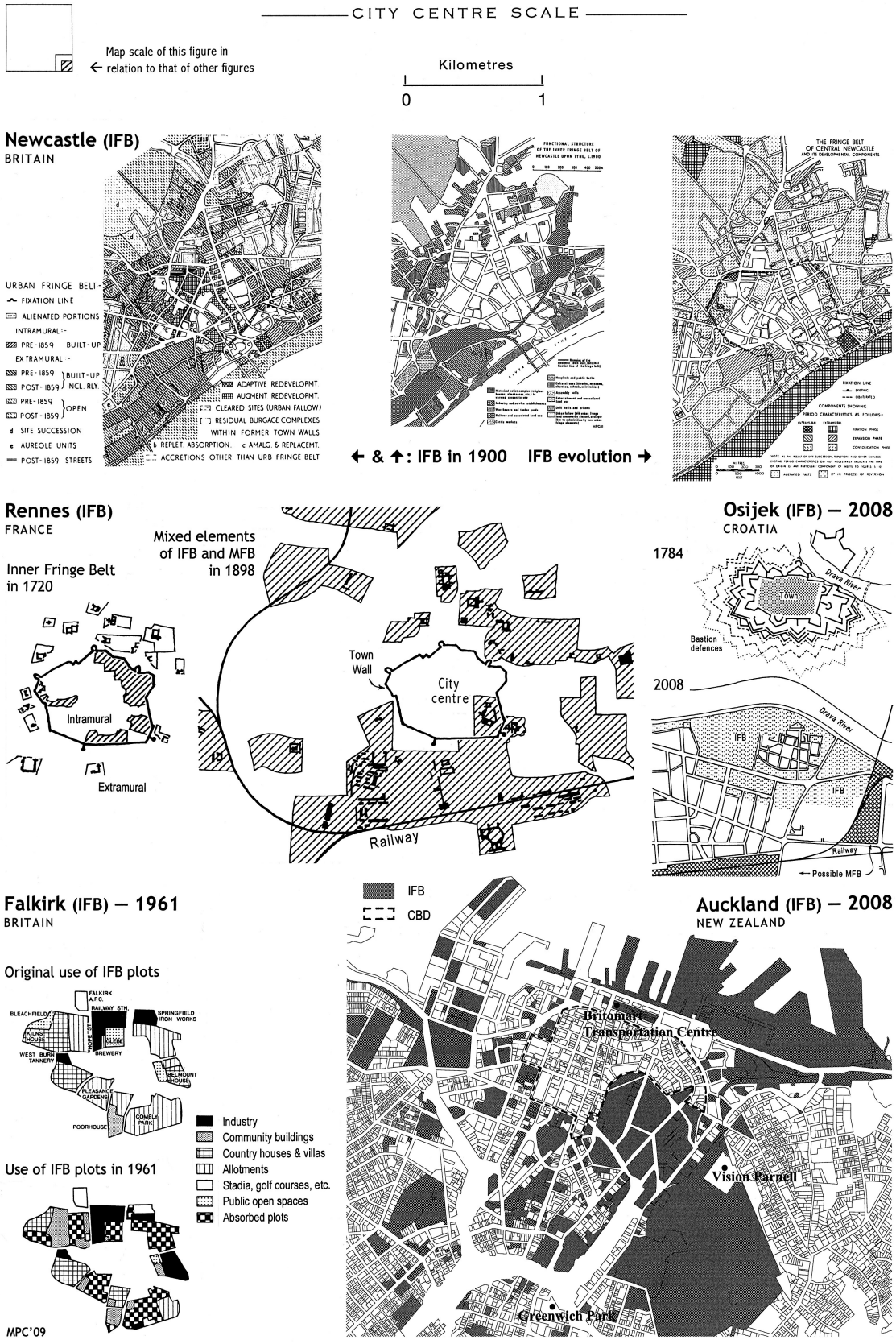

Figure 7. Inner-fringe-belt dynamics.

Dynamics and differentiation of fringe-belt types

Urban growth history and the number, size, and general form of fringe belts

Many factors contribute to the morphology of fringe belts, but several general characteristics stand out from a superficial comparison of fringe belts in Figures 4-7 (the discussions following are based on sources given in notes 4 and 6 and the references). The first characteristic is obvious: that the number and size of fringe belts appear to be related to the size and growth history of towns and cities. Although these relationships can only be judged roughly by reference to the founding eras and population data offered in Table 2, they seem to hold. It does not follow, however, that the relationships are direct. The cases considered include cities that have grown large and remain dynamic (for example, Berlin, Baghdad, and Birmingham) as well as towns that reached a certain size and functional role within their regional urban systems at some point in the past and have not advanced beyond them. Notwithstanding such disparities, it is interesting to see that even small towns with sufficient history can produce three fringe belts, regardless of size and functional importance.

A second comment concerns the general shapes and positions of fringe belts. IFBs are generally more continuous than MFBs or OFBs, the latter being the most discontinuous. However, these patterns are directly contingent on the criteria for defining fringe belts, and some of the differences evident in the maps may reflect methodological problems rather than any underlying reality. For example, the lack of a continuous IFB in Rennes, capital of Brittany in France, is curious, compared to that of Newcastle or even Clermont-Ferrand.

A third remark concerns possible differences related to cultural variables. The built environment densities of Europe and the Middle East are notably different from those of New World cases. Paris (USA), with a population of 9000 in the year 2000 had developed fringe belts somewhat comparable in scale to those of Falkirk in 1961, which had over 38 000 residents when its fringe belts were studied. These general observations lead to further questions about the characteristics of fringe belts in different historical and geographical contexts.

Fringe belts in towns before the industrial era

The majority of studies of fringe belts have sought to identify them in the contemporary urban landscape, but a few cast light on factors in early fringe-belt formation. Problems of data availability before the era of cadastral maps account for the paucity of such work, but those cases that have focused on the nature of fringe belts before the industrial era bring to light the importance of ecclesiastical colonization of towns and privileged control of land.

Based on detailed historical and cartographic reconstruction of central Lublin (Poland), the town's IFB and MFB can be said to have formed during the late-medieval and Renaissance periods (Figure 6). Both fringe belts were composed almost entirely of religious houses. The IFB gained its first monastery in 1342, whereas the MFB mostly took shape in the seventeenth and eighteenth centuries – spurred by the Counter Reformation – beginning only a few hundred metres farther out from the IFB. Typically the medieval city wall served as a fixation line for the IFB. Several of the later monastic houses also found room in the IFB, consolidating its character. In the ducal city of Koblenz (Germany) a similar pattern of monasteries defined two early fringe belts during the same periods. However, the revolution in military defences caused the creation of the MFB, and when by the late-eighteenth century these defences became redundant they were replaced in part by a large palace complex (Figure 6).

Similar processes of fringe-belt formation and modification can be found half a world away. A strikingly extensive IFB formed in the sixteenth century around the urban core of Morelia (Mexico), the first city in Michoacán founded to Christianize the western regions of

New Spain. This fringe belt lasted intact until the middle of the nineteenth century when the convents were disestablished and their large grounds sold to private interests or used for public institutions. Today, Morelia's entire historic IFB has largely disappeared under the pressure of CBD expansion.

Long after the dissolution of the monasteries in England, the shape of small town fringe belts was often strongly influenced by the attitude of rural landowners at the urban fringe. Here, for example, the Bathurst estate abutting Cirencester to the west had no interest in releasing land for urban expansion; consequently small urban extensions and a loose fringe belt of suburban villas formed emphatically south and east of the town (Figure 6).

The composition of fringe-belt series in the industrial and post-industrial age

With the onset of the industrial age, beginning in Britain in the eighteenth century, towns expanded rapidly. And with this economic acceleration came increased, systemic boom-bust cycles that contributed to the clarity with which fringe belts emerged and were internalized within the growing urban mass. Long-established towns and cities that already possessed fringe belts dating from the Middle Ages now added what could be called MFBs and OFBs. Examples range from small market towns such as Alnwick and Falkirk to larger centres such as Newcastle upon Tyne and Tyneside (Figures 4 and 6). Other cities favoured by economic location and political history rose to prominence and developed a full 'suite' of fringe belts, such as Berlin and Manchester (Figure 4). As industrial growth reached towns in other regions of Europe, places like Rennes and Clermont-Ferrand in France, and Como in Italy followed suit at a scale reflecting their position in their regional urban hierarchy and local topographic conditions. Interestingly, this phenomenon can also be observed in a traditional Middle Eastern city setting where modern urban infrastructure and industrial activity came much later: by 1974, however, Baghdad displayed a full set of fringe belts, forming strikingly asymmetrical patterns within the urban fabric that invite closer investigation (Figure 5).

In younger urbanized regions, such as New World settings, fringe belts also seem to have developed in something approaching comprehensive fashion. But what is most evident is the greater areal scale of the urban areas as a whole and fringe belts in particular compared with those of the Old World. Despite the complicated isthmus site, Madison's second fringe belt seems to be noticeably more spread out than that of St Petersburg in Russia, with but a fraction of the latter's urban population (Figure 5). Paris, Illinois, was only slightly larger than Alnwick at their respective mapping dates and yet the fringe-belt series for Paris is more fractured and spread out (Table 2, Figure 6). Even lowly Mineral Point, Wisconsin, with a long-stable population around 2600 residents has developed fringe belts that rival those of Cirencester in 1840 after its centuries of existence. However, such comparisons across both culture system and historical epoch may be of rather limited significance.

Krasnoyarsk (Siberia) and Auckland (New Zealand) display somewhat distinctive patterns, though it is hard to interpret them in a global context (Figure 5). Krasnoyarsk remained a relatively small, largely wooden town until the Trans-Siberian railway reached it in 1895, and after the 1917 Revolution the city industrialized in a large way. Although its MFB and OFB have not been systematically mapped, there are indications that the central planning of the Soviet era has contributed to well-defined fringe belts because of a strong belief in segregated land use (Kukina, 2006b). Auckland, on the other hand, which has been fully mapped in its peninsula area, displays a pattern reminiscent of British cases, although the size of its MFB is miniscule compared with that of Birmingham (Figures 4 and 5). This difference in cities otherwise of comparable size today may be attributable to the late start Auckland had (1840) and the recency of its major growth.

In comparative terms, however, the largest fringe-belt series ever mapped are those belonging to Berlin and Baghdad, mapped in 1936 and 1974 respectively. Berlin then was near the height of its political and economic power (population 4.2 million) and its fringe-belt series remains the most ambitiously and comprehensively mapped of all to date. With only half Berlin's physical extent, Baghdad shows fringe belts significantly more modest and distinctly less regular. What differences should be ascribed to cultural context and what to variable mapping criteria must remain a question for future research.

The peculiarities of individual fringe belts

Inner fringe belts. The spatial structure of IFBs can be expected to be the most complex of all fringe-belt types because they have had longest to adjust to the myriad forces working over time on the urban core. The IFB with the longest-standing relationship to the city's centre studied here is that of Baghdad. While it is not known precisely when it first formed, it surrounds a historical core of large dimensions and is correspondingly large in initial circumference. Much later, the development of a large industrial and storage zone surrounding the railway facilities on the south-west side of the Old Town accounts for much of its dramatic augmentation in modern times.

Urban fortifications have been central to early IFB dynamics in numerous towns and cities, in most cultural contexts. Across Europe this morphological element has great historical significance as a fixation line influencing IFB development. It shows up particularly in the cases examined here: Alnwick, Alkmaar, Karlovac, Koblenz, Lublin, and Osijek, and to a lesser degree in Rennes (Figures 4, 6, and 7). In Alkmaar, the town ditch consisted of part of the town's canal system and froze the boundary between the medieval core and the town's later extensions (Figure 6). In the Croatian cases of Karlovac and Osijek, extensive bastion fortifications developed and renewed amid the prolonged struggle between the Habsburg and Ottoman empires survived virtually intact into the late-nineteenth and early-twentieth centuries. When demolished they acquired land uses, principally parkland and institutional uses, that solidified the fringe-belt character of the old fortification zone – and their clear-cut limits bequeathed the IFBs of these two towns unusually straight-sided margins (Figures 6 and 7). In strong contrast, Como (Italy) possesses an IFB distinguished by its extreme narrowness, both intramural and extramural components clinging tightly to the still-surviving medieval wall (Figure 4). The proximity of nearby mountain slopes may in part account for this compressed fringe-belt character. And in contrast to Como, the IFB of Bromsgrove, a town in Central England too small for a medieval wall, is loose and extensive (Figure 6).

As IFBs respond to changes in the CBD and the rest of the city, individual land uses change, and a study of Falkirk reveals this pattern (Figure 7). Reflecting the pressure on near-centrally located land, community (institutional) buildings increased fourfold from inception to 1961, manufacturing plants also increased, and many parcels were absorbed by housing, all at the expense of allotments, public open space, and country houses and villas. Some simple historical mapping of the IFB has also been attempted for Rennes (based on Ducom, 2005c), demonstrating for 1720 the early dominance of religious houses on what M. R. G. Conzen would term *distal extramural* sites out of contact with the fixation line of the town wall (M. R. G. Conzen, 2004, p. 244). Ecclesiastical properties also occupied *intramural* IFB sites (Allain, 2004, p. 95). By 1898 the IFB had clearly expanded (Figure 7), and the fact that some of these plots appear as part of the MFB of Rennes in 2005 (Figure 4) suggests the process of fringe-belt translation (Table 1).

The most detailed examination by far of the IFB dynamics of any city is that of Newcastle upon Tyne by M. R. G. Conzen (1962, 1978). Based on the city's detailed historical map record he traced the evolution of land uses of Newcastle's urban fringe from 1723 onward at

the level of the individual plot. This produced a kinetic picture of fringe-belt formation and alteration as the city, at the centre of one of Britain's major coalfields, industrialized during the eighteenth and nineteenth centuries. As the city's urban fringe became embedded, forming the IFB when the built-up area expanded beyond it, its size and internal character changed continually to accommodate changes in the city core, but also intensified as sympathetic land uses were added. Figure 7 includes three maps from these studies to demonstrate the conceptual complexity of fringe-belt dynamics and composition: the IFB at a moment in time – in this instance, 1900 – detailing the formative and transformative processes that had shaped it to that date; the constituent land uses that composed the IFB in 1900 (its functional structure at that moment in time); and a syncretic map showing the regionalization of the IFB into zones that reflected its fixation, expansion, and consolidation phases, a picture that Conzen considered to show the 'period characteristics' of the fringe belt. This represents the gold standard of fringe-belt analysis, and so far, no IFB of any other city has been studied in this depth. Recent work by Kai Gu, however, has similarly adopted the plot-level of analysis for a study of recent transformations of Auckland's IFB, centred on residential redevelopment and high-grade amenities in relation to revitalization efforts surrounding the CBD (Figure 7).

Middle fringe belts. Middle fringe belts can develop close to the urban core in towns that grew little and slowly at first (for example, Alnwick, Lublin, Krasnoyarsk), but more often they have developed at some remove from the centre. They are also far less associated with fixation lines. Compared to IFBs, MFBs generally are less continuous in space and have fewer contiguous plots: they exhibit a coarser-grained structure of land parcels, more open ground and vegetation cover, and a sparser network of streets.

The best-studied case is Birmingham, in which the so-called 'Edwardian' fringe belt (because it matured during an economic slump which began at the end of King Edward VII's reign) rings the inner districts of the city at a distance of 3-5 km from the centre and with a remarkably regular form (Figure 4). Birmingham has the largest and best-formed MFB among the examples presented in Figures 4-7. Berlin's MFB, also reasonably circular, was formed earlier – hence its smaller girth – and Newcastle's reflects its much lower urban rank. Interestingly, the inner orbit of St Petersburg's MFB is comparable in size, although the Russian city is four times larger in population, a reminder of the greater density of its general urban mass. Although MFBs are less subject to pressures for change than IFBs, they do face modification. One motive for the research conducted on Birmingham's belt lay in the pressure to redevelop MFB plots for new housing, thus reducing the openness of the MFB and its not unimportant ecological advantages within the built-up area as a whole (Whitehand and Morton, 2003).

The case of Manchester presents an enigma. M. R. G. Conzen (1978) chose to map the city's fringe-belt plots by age of appearance within the urban area to 1900 rather than assigning them unambiguously to one fringe belt or another (Figure 4). While this provides a different measure of metropolitan fringe-belt dynamics, one is left to wonder how the pattern would look had strict assignments been made. No explanation is offered for this departure in method and its lack of true comparability with other maps calls into question the availability or interpretation of source materials or both. On the face of it, fringe-belt units appear to form as much into radial corridors as into concentric belts, which is at variance with other European cases so far investigated.

Significantly different from these European cases are examples of MFBs in other regions. Baghdad's belt is highly segmented and lopsided, with its great extension to the south-east (Figure 5).[8] The MFB of Lusaka, Zambia's capital founded in 1905, mapped in part by Whitehand in 1993 (Whitehand, 2009), displays considerable width, although this characteristic may not be found on the city's western portion of the belt.[9] Once the OFB of

Lusaka during British colonial rule, the belt contains expansive recreational units reminiscent of the period, as well as the old airport. Madison (USA), on the other hand, has a rather limp and disjointed MFB that calls into question how regular and routine the generation of fringe belts in American cities has been since the middle of the nineteenth century.

Outer fringe belts. By virtue of their position within urban areas, most OFBs are twentieth century in vintage. They form the least cohesive fringe-belt type, and usually consist of large, scattered parcels that only rarely adjoin others. Like MFBs they display only weak associations with fixation lines, although many constituent plots may well abut railway lines, circumferential highways, rivers, and other landscape edges serving a similar function. Once again, the Berlin case stands out, given the extensive reach of the urban area and the mapping effort (Figure 4). The mapping effort was such as to raise questions about the methodology behind the delineation. The Tyneside example demonstrates how the OFBs of one urban centre in a conurbation can coalesce with those of others, and poses the question whether particular parcels belong to a local fringe-belt series rather than to the primary city in the cluster (Figure 4). The Manchester case, though restricted to the situation in 1900, exhibits far-flung fringe-belt parcels well before the twentieth century.

In the case of Rennes the OFB is suitably modest in comparison with those of larger cities, especially when compared to those of Tyneside (Figure 4). It is composed of a few very large plots. Whether this reflects differences between French and British land ownership systems or simply different mapping criteria remains an open question. The OFB of Lleida, in Spain, so referred to because there appears to be no MFB, is more obscure in its pattern and meaning because its author defined its parcels as containing a great deal of housing (Vilagrasa, 1990), which does not accord with the conventional definition of fringe belts (Figure 4).[10] Como's OFB is highly eccentric to the city core, but this is explicable in purely topographic terms.

Two final cases deserve comment. Baghdad's OFB was distinctly sparse and disjointed in 1974. Auckland exhibits a well-developed crescent-shaped OFB draped like a necklace across the city's peninsula. However, the built-up area has far outstripped the space available in the area mapped, raising the question whether Auckland might be developing a fourth fringe belt even more distant from the centre.

A key issue in studying OFBs, and one raised by Ducom and others, is the relationship between supposedly spontaneous forces in their creation and the intervention of planners, as in the case of green belts and other planned open spaces (Ducom, 2003, 2005a). This is a potentially complex aspect of fringe-belt dynamics in the modern world, especially in countries with effective urban planning.

A framework for comparative study

In summary, a number of distinctions have been identified among the diverse cases reviewed here that may be useful in developing a comparative framework for further analysis. They can be listed under the rubrics of age, location, size, and cultural context, along with some related issues for further research.

How do fringe belts in historic towns compare with those in towns and cities of recent vintage? Older cities often have more fringe belts than younger ones, but this is not a universal rule; it depends on size and growth history, including period of major development. Older towns are likely to exhibit more fringe-belt modifications owing to their age, but in some cases these are more resistant to obliteration. Three issues suggest themselves: first, in pre-industrial cities, did urban size make any significant difference in the number and character of IFBs (for example, in Rome, compared with Como, or Alnwick)? Secondly, in cities of recent vintage and rapid growth are fringe belts less likely to form because of modern conditions? Thirdly, what generalizations can be made about fixation lines in

fringe-belt development?

What characteristics distinguish fringe belts deep inside a single area from those at or near its current edge? IFBs are inherently more complex than MFBs and OFBs because of longer gestation and vulnerability to CBD redevelopment pressures. As one moves outwards through a fringe-belt series, plots become larger and more fragmented, less tied to fixation lines, and fringe-belt morphology becomes harder to delineate in practice. Under what conditions might these generalizations not apply?

Not all towns and cities grow to enormous size. What differences emerge between the fringe belts of congenitally small towns and those of much larger places? Urban size by itself is not a predictor of number and character of fringe belts. Small towns have developed three fringe belts (for example, Alnwick) and some large cities seemingly only two (for example, Krasnoyarsk). Are there, therefore, any urban size thresholds that influence the emergence and character of fringe belts?

What differences between the fringe belts of different cities can be ascribed to contrasting cultural contexts? That is the largest question raised by this review, the surface of which has only been scratched in this preliminary attempt at a global comparison of urban fringe belts. Many features of fringe belts have been examined that can be fitted into normative models of fringe-belt behaviour across time and space, and further modelling should continue along such lines. Furthermore, similarities and differences attributable to geographical site circumstances must also be taken into account. But there remain many explanatory possibilities that depend on weighing the significance of cultural factors. One obvious illustration concerns the diverse pattern of political and social power relations in different parts of the world that have shaped the disposition of rural and urban property, a few of which have been alluded to here in passing. The most glaring question concerns differences between absolutist power structures and comparatively open democratic socio-political regimes, not only in their effects at any historical moment but also in their embedded, cumulative effects over time. A correlative theme is the great variety of systems of rural and urban land tenure that affect development decisions, land-use choices, and locational dynamics, all bearing on whether, when, and how fringe belts might emerge and how they might change. Such general questions have been raised in the context of comparing urban forms among the different regional societies of Europe (M. R. G. Conzen, 2004, pp. 197-235), between societies in Japan and China and those of the West (M. R. G. Conzen, 2004, pp. 168-95; Gaubatz, 2007; Satoh, 2008; Whitehand and Gu, 2003, 2006), between the Islamic city and the West (Wirth, 1992); between Europe and Latin America (Rego and Meneguetti, 2008); and between Europe and the United States (M. P. Conzen, 2001). But little of this discussion has focused on urban fringe belts.

A case of cultural values?

There is space for only one case of problematic cultural difference to be introduced, and that only briefly. Despite the three examples of fringe belts drawn from research in the United States, the problem of fringe belts in America lies with scale: they are exceedingly hard to identify and map with confidence in any really large metropolitan setting. Chicago will serve as illustration.

While a detailed effort to study the question of fringe belts in the Chicago region awaits future attention, superficial evidence suggests that fringe-belt features as recognized in the standard definition of the term are not arranged in belt-like form (Figure 8). If anything, they form radial corridors related to shorelines, rivers, and other transport axes. Some elements may appear part of belt segments, but even these can be misleading, given the glacial ridge and marsh terrain that influences large recreational preserves in the Chicago area. Admittedly, the data in Figure 8 are of categorical land-use distributions that include small units that in any European setting would be dismissed from consideration of fringe-belt

membership. Also, the pattern does not distinguish sites by period of creation. Nevertheless, the pattern is extremely 'messy' at best. Distinguishing units by age and minimum size might clarify the picture somewhat, but the problem is more fundamental.

Chicago's growth from a fur-traders' hamlet in 1830 to a metropolis of 1 million residents by 1890 and 3 million by 1930 (not to mention further growth to a metropolitan size of 8 million today), simply confounds the principle of boom-slump fluctuations basic to the fringe-belt model. While fluctuations in Chicago's building cycles have been closely studied (Hoyt, 1933) and widely popularized by scholars, they have not resulted in clear pauses in the pace of outward expansion of residential and non-residential construction that would produce unmistakeable fringe belts. In spatial growth terms Chicago's record has been 'boom-boom' virtually all the way. The short-lived economic slumps have had little effect in sequestering the urban fringe from free-market and undisciplined spatial expansion that has operated on a scale that simply muddles the expected patterns. The provisional conclusion is that the nature of large American urban land markets, with few if any obstacles to expansion on the ground and an avid expectation of it by landowners in the fringe, leads to a thoroughly mixed advance of urban land uses into the fringe. The difference between land markets in the US and Europe and their social underpinnings needs more examination in relation to the fringe-belt question, but it is suggested here that growth history with regard to America's 'shock cities', lack of historical impediments to expansion, rapid technological changes in local transport, and more, results in complex urban land development configurations that defy easy identification of fringe belts.

Closing remarks

Are fringe belts important in the morphology of cities? In a descriptive sense, they account for significant differences in the texture of the built environment at the whole-city scale, and allow less constrained movement than tightly built-up residential and commercial areas. They are important in two respects for the quality of urban life: they provide large and sometimes majestic open spaces that have significance for urban heritage, and they provide invaluable ecological benefits for the articulation of natural systems in otherwise very dense human settlements.

For scholars, fringe belts are signatures of the pulsations of urban growth, and a reflection of urban space needs beyond those of the residential and retail sectors. For planners, they merit recognition for their cultural and natural attributes and beg the question whether they should be regulated given their broad social value? And for designers, they present opportunities to design and redesign at lower densities, to design in more mixed environments, and face the challenge of retaining their inherent character.

The studies reviewed here only point to the need for energetic future research on urban fringe belts. The questions seeking answers fall, it seems, into two broad groups. The first concerns progress towards better normative modelling of fringe belts, and this involves measurement and conceptualization. At the operational level, there is a need to be more explicit about the specific criteria used in including particular land uses in fringe belts, and about how they are mapped. The current record is full of quite possibly mismatched research. More studies could usefully be carried out at the plot level, particularly in light of the needs of conservation planning, but also for purposes of conceptual rigour. Development of a 'scatter quotient' to measure fringe-belt fragmentation might be a useful investigative tool.

With regard to conceptualization, it would be helpful to have studies focused on distinguishing fringe belts in cities of contrasting economic and functional specialization (for example, how do fringe belts differ between industrial, administrative, and educational towns). Alternatively, what role has technology played in the long-term evolution of fringe belts? This applies obviously to transport, but also to industrial,

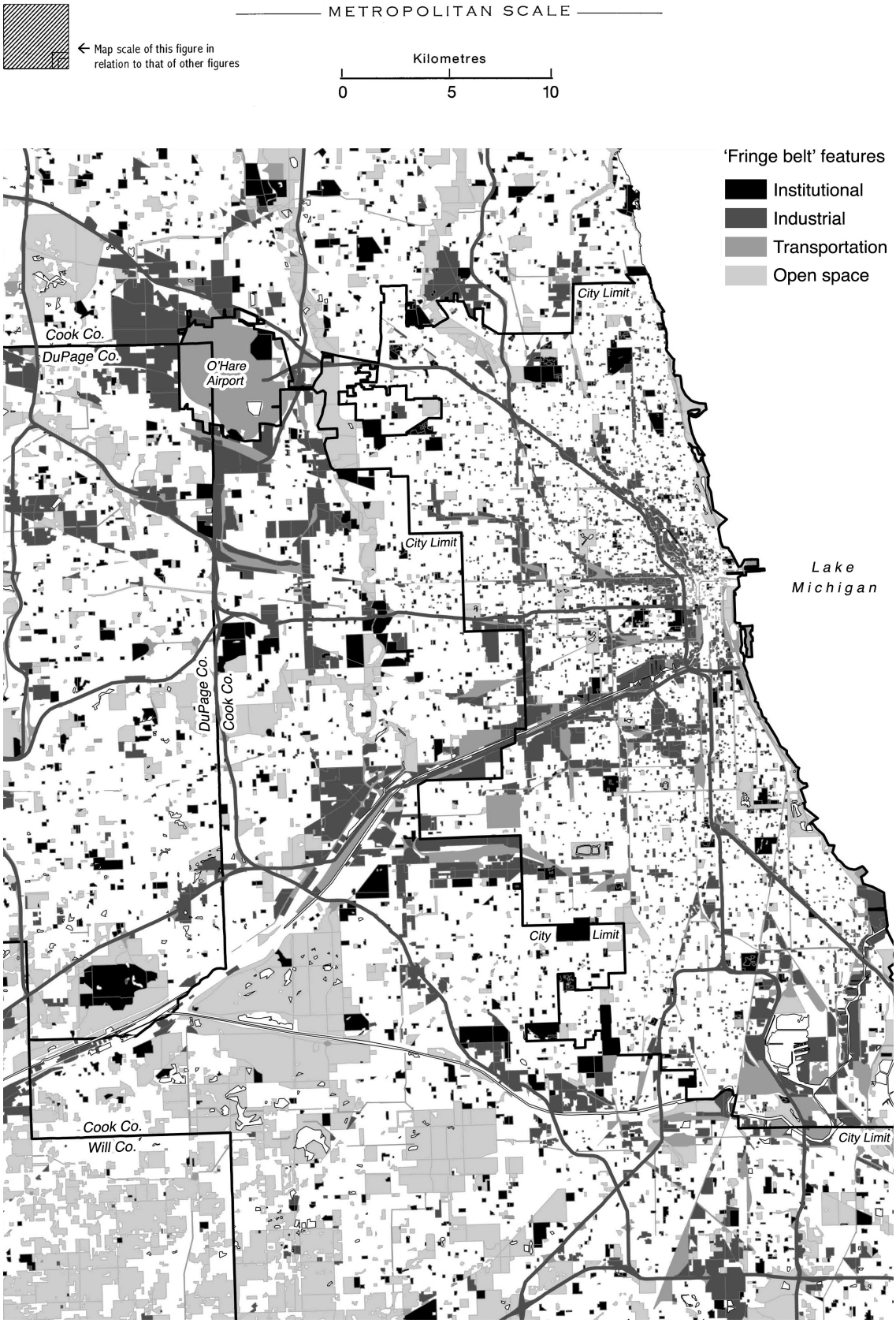

Figure 8. Land uses of typical fringe-belt character in the core of metropolitan Chicago, 1990.

communications, and leisure technology. What generalizations can be made about the main determinants of fringe-belt survival and transformation within the urban mass over time? Also, are there generalizations to be made about the characteristic relationship between fringe belts and fixation lines and 'seams' within the city? More work is needed to clarify the empirical relationship between economic cycles and the building of fringe belts: by no means all slumps produce a fringe belt, though they may add to existing ones in ways that should be more fully understood. And, of course, there is the American enigma to resolve. Is it more widespread, particularly in a post-modern, globalized world? There seems much scope for the conceptual advancement of the fringe-belt idea.

The second group of questions concerns progress towards better understanding of cultural and cross-cultural influences in fringe-belt formation and behaviour. How best can we interpret the development of fringe belts cross-culturally in terms of the social uses made of them? How have different planning regimes changed or maintained fringe belts in cities around the world, particularly in relation to 'green belts'? And last, but not least, it would be enlightening to know what differences in fringe-belt evolution result from national-regional cultural orientations rather than from abstract economic forces, and how to determine this.

Urban fringe-belt research has advanced to a point where comparative work seems not only possible but also very desirable. Methods of study, however, need to be more explicitly stated in the interest of comparability: through this better conceptualizations will follow. If research can become more articulated and coherent, perhaps its findings will more easily find their way into social planning policies and urban growth management.

Notes

1. Revised version of a keynote paper delivered at the Fifteenth International Seminar on Urban Form, Artimino, Italy, 21-23 November 2008. The author thanks Jeremy Whitehand for comments on a draft of this manuscript, Kai Gu for making available detailed maps from his Auckland research, and Daphne Yin for help in assembling many of the maps in Figures 4-8.
2. For a succinct discussion of these in relation to economic growth, see Berry (1991).
3. The term 'fringe belt' has entered the technical vocabulary of several languages: *Stadt-randzone* (German, see Heineberg, 2006a, 2006b); *ceinture péripherique, ceinture limitrophe,* and *ceinture de frange urbaine* (French, see M. P. Conzen, 2001-2; Ducom, 2003; Allain, 2004); *cinta de franja* (Portuguese, see Gonçalves-Fernandes, 1992); *franja periférica* (Spanish); *vaxtarbelti* (Icelandic, see Kristjánsdóttir, 2002); *cintura de frangia* or *area periurbana* (Italian, see Sinding-Larsen, 2009, pp. 67-9), and *chengshi bianyuan dai* (Chinese, see Gu, 2001, p. 37).
4. Sources for studies listed in Table 2 and not featured in Figures 4-7 are as follows: Ludlow, Conway, and Whithorn (M. R. G. Conzen, 1966); Glasgow (Whitehand, 1972; Whitehand and Morton, 2006); Arundel and Warwick (Slater, 1977); Aberystwyth (Carter and Wheatley, 1979); Sligo (Sligo County Council, 2004); Nantes and Tours (Ducom, 2005b); Haarlem (Suurenbroek, 2004); Reykjavik (Kristjánsdóttir, 2007); Upplands Väsby (Whitehand, 2009); Cambridge, Massachusetts (Krim, 1977); Lantzville, British Columbia (Whitehand, 2009); and Ouro Preto (M. P. Conzen, 2007).
5. Extensive evidence for the crucial link between fringe belts and construction cycles is presented in Whitehand's book (1987). Ducom's (2005c) study of three French cities (Nantes, Rennes, and Tours) stands out among the work of others for its inclusion of time-series construction data for these towns.
6. Sources for the maps in Figures 4-7 are as follows: *Figure 4* – Berlin (Louis, 1936); Rennes (Ducom, 2005b); Birmingham (Whitehand and Morton, 2006); Tyneside (Whitehand, 1967); Manchester (M. R. G. Conzen, 1978); Lleida (Vilagrasa, 1990); Como (M. P. Conzen, 2004); *Figure 5* – Madison, Wisconsin (M. P. Conzen, 1968); Auckland (Gu, 2008a); St Petersburg (White-

hand, 2009); Paris, Illinois (M. P. Conzen, 2001-2); Lusaka (Whitehand, 2009); Krasnoyarsk (Kukina, 2006a); Baghdad (Al-Ashab, 1974); *Figure 6* – Alnwick (M. R. G. Conzen, 1960); Newcastle upon Tyne (M. R. G. Conzen, 1962; Whitehand, 1967); Clermont-Ferrand (Whitehand, 1987); Falkirk (Barke, 1974); Cirencester (Slater, 1976, 1978); Karlovac (Krajnik, M. O. Šćitaroci, and B. B. O. Šćitaroci, 2008); Lublin (Slater 1989); Koblenz (von der Dollen, 1990); Bromsgrove (Bienstman, 2007); Alkmaar (Bienstman, 2007); Morelia (Rodrigo-Cervantes, 1999); Mineral Point, Wisconsin (M. P. Conzen, 1997); Paris, Illinois (M. P. Conzen, 2001-2); *Figure 7* – Newcastle upon Tyne (M. R. G. Conzen, 1962, 1978); Rennes (Ducom, 2005c); Osijek (Krajnik, M. O. Šćitaroci, and B. B. O. Šćitaroci, 2008); Falkirk (Barke, 1974); Auckland (Gu, 2008b).

7. One example of differences in fringe-belt delineation concerns Newcastle upon Tyne's IFB, in which Whitehand's (1967) mapping departs in several respects from the plot-level mapping of M. R. G. Conzen (1962). Here, there were contrasts in the period studied and the degree to which field work and cartographic research were combined.
8. Khalis Al-Ashab, in his doctoral thesis on Baghdad (supervised by M. R. G. Conzen), argues that the 'shanty towns of rural migrants' should be considered 'a characteristic fringe-belt element found in large cities all over the Third World' (Al-Ashab, 1974, p. 577). Hence, in his delineation of Baghdad's IFB and MFB he includes the *sarifah* (reed and mud hut) settlements among the land uses mapped.
9. Personal communication from Jeremy Whitehand, 19 December, 2008.
10. In light of Al-Ashab's observation about shanty towns – although Lleida certainly cannot be described as a Third-World city – Vilagrasa's inclusion of illegal slum housing as a fringe-belt element would surely find resonance among students of the *barrios* and *favelas* of Latin America.

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Elections to the Council of ISUF

In accordance with the Constitution of ISUF, elections to the Council will take place at the conference to be held in Guangzhou, China, 4-7 September 2009. There will be two vacancies to fill. Nominations should be forwarded to Professor Nicola Marzot, Secretary-General, ISUF, Dipartimento di Architettura, Facoltà di Architettura, Università degli Studi de Ferrara, Via Quartieri 8, 44100 Ferrara, Italy (E-mail: studioperforma.marzot@email.it) by 1 June 2009.

Meetings of the Council of ISUF

The next meetings of the Council and Editorial Board of ISUF will take place on 4-7 September 2009 in Guangzhou, China. Any matters that members of ISUF wish to bring to the attention of the Secretary-General of ISUF, Professor Nicola Marzot, should be communicated to him at the Dipartimento di Architettura, Facoltà di Architettura, Università degli Studi de Ferrara, Via Quartieri 8, 44100 Ferrara, Italy (E-mail: studioperforma.marzot@email.it) by 1 August 2009.

The Codes Project

This project is a compilation of the codes, laws and related documents that have created, or sought to create, particular urban forms. 'Code' is broadly defined: it includes not only legal documents but also social customs – in other words, both legally-binding codes and customs that may not have involved a governing authority. These documents provide a rich resource for urban planners, architects and others. All time periods and all regions of the world are covered.

A website had been set up (http://codesproject.asu.edu/) to which all are invited to contribute. Types of codes that are being contributed include unified development codes, architectural codes (building scale design regulations), building codes (health and safety regulations), state enabling legislation, design guidelines, pattern books and master plans. The website includes an extensive bibliography.

The project is funded by the National Endowment for the Arts, with additional funding by Duany Plater-Zyberk & Co. and the GeoDa Center, Arizona State University. Further information is available from Professor Emily Talen, Arizona State University, PO Box 875302, Tempe AZ 85287-5302, USA (E-mail: etalen@asu.edu).