Becoming an urban morphologist: Jeremy W. R. Whitehand

Michael P. Conzen
Committee on Geographical Sciences, The University of Chicago, Chicago, Illinois, USA. Email: m-conzen@uchicago.edu
ORCID: http://orcid.org/0000–0003–0511–3154

and

Vítor Oliveira
CITTA Research Centre for Territory Transports and Environment, Rua Roberto Frias s/n, 4200–465 Porto, Portugal. E-mail: vitorm@fe.up.pt.
ORCID: http://orcid.org/0000–0002–7569–3839

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Abstract. *This paper examines the origins underlying J. W. R. Whitehand's emergence as an urban morphologist. Attention is paid to Whitehand's early years, beginning with his initial life experiences, his BA and PhD theses at the University of Reading, and his innovative way of addressing settlements with a distinctive emphasis on buildings. His professional encounter with M. R. G. Conzen in Newcastle in the early 1960s exposed him to a teaching method in which dialectics and fieldwork played a prominent role, and a research framework rich in descriptive and analytical concepts (exemplified in studies of Whitby, Alnwick and Newcastle) that appealed to his interests and opened numerous possibilities for systematic inquiry. Finally, the paper briefly places in context Whitehand's more mature years in Glasgow and Birmingham, highlighting his substantive and institutional contributions to the development of urban morphology as a field of knowledge.*

Keywords: J. W. R. Whitehand, M. R. G. Conzen, urban morphology, historico-geographical approach, fringe belts

The recent retirement of Jeremy Whitehand as founding and long-time editor of *Urban Morphology* presents an opportunity to reflect on his role in shaping the development of the specialized field of knowledge supported by the journal and, in particular, it is especially timely to consider his capacity to originate and influence thought in the field through personal research and through this key channel of communication within it. While urban morphology as a distinct field of knowledge can be traced back in the international sphere over more than a century, its recognition – by this label – as a distinct, organized approach to understanding the physical-spatial composition of the built environment and its intricate interaction with the urban society occupying it, is much younger in the Anglophone literature (Moudon, 1997; Whitehand, 1981). Among urban scholars more generally, interest in

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urban morphology can be said to have broadened among urban scholars during the second half of the twentieth century and it drew recruits from an increasing range of academic disciplines, but its reputation nevertheless remained relatively obscure until the establishment of this journal. We have Whitehand in very large measure to thank for the visibility the field now enjoys. This raises an interesting question: how did Jeremy Whitehand first develop a commitment to the field that would define his career and help cement the gains it has made within the broader sphere of urban science? After all, Whitehand was trained as a professional geographer, and in the period in which he espoused urban morphology as a specialty to pursue, it was a neglected and underrated theme within the increasingly diversifying discipline. It therefore seems intriguing to consider how Whitehand ever became interested in urban morphology in the first place.

The publication of the book *J.W.R. Whitehand and the historico-geographical approach to urban morphology* in 2019 trained a spotlight on the many substantive contributions Whitehand has made, and how his work has seeded advances by others (Oliveira, 2019). The book's preoccupation with the conceptual dimensions of the field allowed mention of his career in only the most abbreviated terms, and takes largely for granted the personal intellectual path that led to it. But the anterior question begs to be asked: considering the outsize role Whitehand would later play in the development of the field, why and how did he discover a passion for urban morphology, and what formative conditions confirmed and intensified that commitment? Inevitably, the answers lie grounded in a concatenation of circumstances that developed with no automatic nor direct relation to the eventual outcome, starting with his earliest life experiences, first from the home environment and later from formal education.

Early years

Jeremy William Richard Whitehand was born in 1938 in Reading, the county town of Berkshire, England, about 60 km west of London.[1] Nothing in his family background points to any unusual interest he may have had as a child or teenager in urban form as such. His parents filled the homes in which he grew up with antique furniture and landscape paintings, often obtained from auction rooms and house auctions, creating a domestic environment of varied art and design in which the general materiality of the cultural past was unconsciously fused with the present. In this there was nothing exceptional for those among his parents' generation who found it possible during the inter-war years to build a stable and cultivated existence in the proximate western hinterland of London, the 'Great Wen'. Before the Second World War, his father's developing managerial career had led the family to move several times within eastern and southern England, but after the war it became more settled, and the first memorable locale for Whitehand was Caversham, in the borough portion of Reading lying just north of the river Thames. The family lived in a semi-detached house in a small private development with an unusually large amount of communal land adjacent, consisting of open spaces dedicated to gardens, vegetable allotments, and a tennis court, all of which the family particularly enjoyed. Like most children in Britain then, Whitehand's time was passed in a geographically restricted orbit, rarely more than a 15 km radius from home. He walked, and later took the bus, to school through a number of distinct areas which, together with home, had significantly more impact on his environmental awareness than the wall maps of the world that hung in his classroom at Wilson School. Nevertheless, his geography teacher, Robert W. Brooker, gave lively lessons that awoke Whitehand's interest in the subject strongly enough to lead him to specialize in geography during his final years at school and later at university.[2] This, combined with an awareness of and curiosity about his physical surroundings perhaps more marked than in many children growing into their middle teenage years, could be considered the first precondition that opened

up possibilities for the path he ultimately followed.

In 1954 the family moved to the urbanizing northern outskirts of Amersham, deep in the central Chiltern Hills, a compact medieval town that had since 1892 seen its hillside turn into a sprawling 'Amersham-on-the-Hill' district as commuters settled there, following completion of a railway line to central London. The Whitehands occupied a large 1920s-built house added as part of a group of five Tudor and neo-Tudor houses, two of which were conversions of Tudor structures. Around them, fields succumbed to small housing developments and the open space gradually shrank, though it did not disappear. Three years of this new daily environment, including the walk to Dr Challoner's Grammar School, less than 1 km away near the railway station, added further to Whitehand's awareness of the differences among places. While his teachers were not particularly fieldwork oriented, one of his last teachers, Philip Ramsden, did encourage him to join the Geographical Association, a group oriented principally to teachers of geography, and which offered day excursions within and beyond the region.

Jeremy Whitehand studied geography as an undergraduate at the University of Reading and, while there, continued to build on his accomplishments at tennis. He travelled to various parts of the country to play in tournaments. Two other members of the University tennis team were geography research students. One of them, Patrick Hamilton, was studying patterns of rural settlement in several southern English counties (Hamilton, 1960). Conversations on journeys to matches, together with the expanding horizons occasioned by travel to tournaments, heightened Whitehand's own interest in the specific character of places. But for his B.A. thesis he chose to stay close to home and examine the district surrounding Amersham and neighbouring Chesham to the north – originally 6 km apart but, by the 1950s, continuously linked by ribbon development (Whitehand, 1960). This topic was a typical kind of regionally focused one for geographers in the late 1950s, surveying a broad range of systematic features that contributed to the district's geographical character. This included topography, climate, soils and vegetation, agriculture and local industry, and the movement of people within and beyond the area.

Significant also, however, was a thesis chapter concerned with 'settlements', which covered the evolution of the two urban centres, especially their absorption of nearby villages, with the aid of maps of housing age (Figure 1) and land use. Within the land use category, residential sites were subdivided into five distinct types of housing: cottages and terrace houses; post-war estate development; medium-sized houses (mostly 3-bedroom semi-detached houses); larger detached houses; and 'residences', generally in their own grounds (Figure 2).[3] This additional and detailed recognition, within a standard class of land and building use (the residential category), of a specifically architectonic dimension as well, was unusual and significant. These maps, together with photographs, were compiled by observation in the field, and added a distinctly morphological flavour to the thesis that was by no means an expected part of the 'regional study' methodological canon at the time. This awareness of housing arose from Whitehand's realization that it served as a critical marker of the countryside's urbanization, and was thus central to its transforming character, and could bear closer examination. So, in adopting a widely accepted geographical study model as the vehicle for his thesis – the local survey – he applied it, quite naturally, to a locality with which he was thoroughly familiar, his home territory. And, among ten photographs illustrating house types, the example he used to represent a typical 'residence' was his own home, discretely giving no hint of its identity. If choosing such an intimate case study might seem slightly unadventurous, it served to portray an environment regarding which, now in his early 20s, he could demonstrate objective and systematic understanding. Furthermore, volunteering inductive mapping of house types hinted at the emergence of an urban morphological sensitivity.

Figure 1. Growth phases of Amersham (source: Whitehand, 1960, Figure 57).

Figure 2. Example of a 'residence' at Amersham-on-the-Hill (source: Whitehand, 1960, Figure 62).

Whitehand stayed on at the University of Reading to pursue a PhD in geography (1960–63), and his doctoral research evolved almost seamlessly out of his bachelor's interest, focusing now exclusively on areal settlement patterns but at the much grander scale of the Chiltern Hills region as a whole. The essence of 'settlement study' in the late 1950s and early 1960s was to examine the regional distribution of agglomerated settlements, from villages to towns of varying size, stressing their differential composition and regional pattern (Whitehand, 1964). This led, in Whitehand's case, to about 70 regional-scale maps, many showing by proportionally-sized and divided pie-graph symbols the contrasting pattern of characteristics across his study area. This included such features as building types distinguished according to broad chronology and function (for example, small and large pre-Victorian, Victorian, and modern-era dwellings, as well as old and modern industrial buildings) (Figure 3). In addition, Whitehand made and analysed maps depicting all 69 Chiltern settlements of 250 or more dwellings following a similar classification, this time with the addition of old and modern shops (Figure 4). Overall, the study contained 151 maps (both regional and very local), bound in a separate large-format atlas volume. Whitehand's study reflects his belief at the time that understanding settlement morphology had previously focused too much on street plans (thanks to easily available printed map information) and not enough on building types, hence his attention to the latter, and

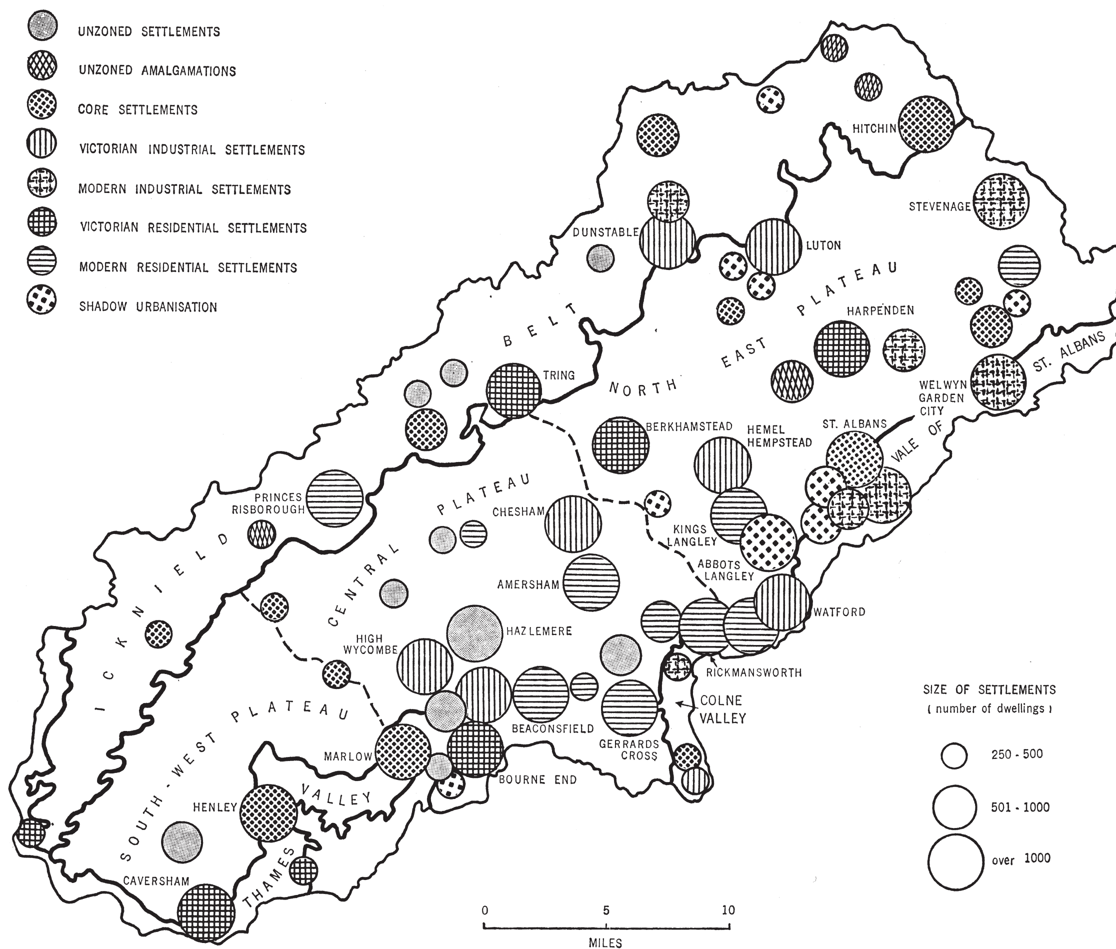

Figure 3. A morphological classification of settlements in the Chilterns (source: Whitehand, 1967a, Figure 4).

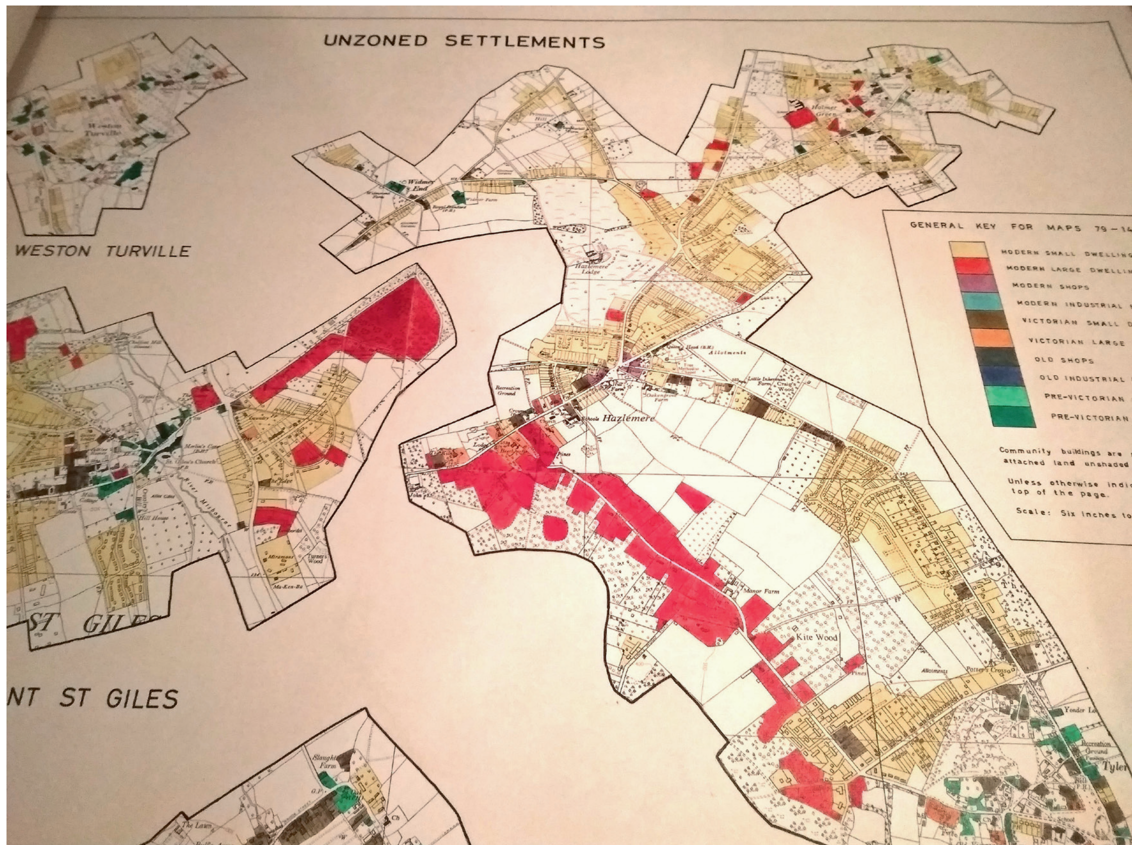

Figure 4. Classification of settlements according to building types (source: Whitehand, 1964, atlas vol.).

their composition in the townscape (Figure 5). His comparative study at the regional scale was also a reaction to the plethora of work on individual places that left their significance in the larger picture clouded.

Whitehand's doctoral thesis supervisor, Peter Wood, an historical geographer, allowed Whitehand much freedom in shaping his own research topic. Nonetheless, knowing of Whitehand's interests, in early 1961 Wood drew his attention to a new book entitled *Alnwick, Northumberland: a study in town-plan analysis*, by M. R. G. Conzen, published months before in the prestigious monograph series of the Institute of British Geographers (M. R. G. Conzen, 1960). Subsequently, Whitehand would become familiar with other studies by Conzen on the townscape of Whitby, a small coastal town in Yorkshire, and on the historico-geographical development of Newcastle upon Tyne (M. R. G. Conzen, 1958, 1962). Such studies were of interest to Whitehand in a general way, but for the time being that was all. Meanwhile, independently, his thesis work showed his growing internally-generated interest in urban forms. It was a reaction to the dearth of regional-scale comparative study of settlement forms, and as such was quite singular. Whitehand found an opportunity to publish a summary of this unusual study as an invited contribution to a festschrift for the professorial head of the Reading geography department (Whitehand, 1965). This can be regarded as his first publication in the field of urban morphology. Writing retrospectively of his transition from postgraduate student to full-time academic, Whitehand acknowledged in a recent communication, 'the urban morphological emphasis was already unequivocal in the PhD thesis'. But then he added that 'the research that followed was very

Figure 5. 'Narrow compact high street, Tring' (source: Whitehand, 1964, Plate 5).

shortly to become unequivocally Conzenian' (Whitehand, 2019a).

The Newcastle years (1963–66)

Although Whitehand's thesis was not submitted until 1964, he went on the job market in 1963 after three years of research. This was a time when British universities were expanding their academic programmes, making it auspicious to be a candidate for a post. There were few positions he felt were 'relevant to his interests', but he interviewed for an available junior demonstratorship at the University of Newcastle, and was appointed by the head of department, John House, to lecture in human geography and contribute to practical courses.

Although Whitehand's three years in Newcastle would prove pivotal in the development of his morphological interests, drawing him more completely into the internal spatial complexities and research challenges of large cities, he did carry forward for a while his impulse to explore general settlement morphology at the regional scale (Whitehand, 1967a). As an outgrowth of his Chilterns study, he examined the even larger orbit of which it was a part and published a study of London's 'cocktail belt'. This he defined as the widely scattered distribution of clustered acreages of large detached houses with spacious gardens, which formed a broad semi-rural aureole defining the north-west and south-west fringes of the Greater London region, functionally tied to the city by white-collar occupations and commuter rail lines. Mapping the pattern of this land-use phenomenon across south-east England, he drew attention to the striking spatial correlation between the region's outcroppings of sand and gravel *and* the social practice of rounding off the commuter's return home at day's end with a rather class-specific beverage. While this association could be well accounted for by the mundane availability of land for generous residential acreage on poorer soils, the gently mischievous humour embedded in Whitehand's choice of terminology gave the study a certain celebrity, and Amersham is one of the prominently labelled concentrations on Whitehand's key map. A second experiment in regional urban morphology that stemmed arguably from Whitehand's doctoral days was

a co-authored paper classifying Scottish town plans, published a few years later (Whitehand and Alauddin, 1969). Rather than mapping a single morphological type across a region to highlight typologically uniform recurrence, the Scottish study spotlighted regional heterogeneity of plan forms. This pair of studies shows Whitehand's continued interest in comparative settlement classification but, as it turned out, his time in Newcastle would quickly open up large new horizons.

Whitehand's junior position at Newcastle entailed engaging with students on a broad front in human geography, yet he was free to pursue his research interests as he saw fit. At first the presence in the department of M. R. G. Conzen, then Reader in Historical Geography, though soon to be the second Professor of Geography, was for Whitehand, the Demonstrator, purely coincidental, and so, for that matter, it was too in reverse. But within a very short space of time each found the other admirably congenial, doubtless aided by the short staircase and landing that separated their respective offices. Conzen's wide range of urban and historical interests meant that they shared common ground in subject matter, and their personalities were compatible. Conzen's approach to dialectics with students made a permanent impression on the newcomer (Whitehand, 2018). And it extended also to university colleagues. More than half a century later, Whitehand recalled their weekday visits for lunch in the University's staff club. Upon arrival at the door of the dining room and having spotted two vacant seats near prospective lunch-time companions, Conzen would alert Whitehand very discretely with such comments as: 'Ah! today the Professor of Greek', and, claiming the chairs, would affably engage their table companion with innocent queries about his research, leading incrementally to more taxing ones, in which the changing complexions of the colleague were part of the experience (Whitehand, 2020). The author of London's cocktail belt had met his mischievous match.

Before long Whitehand was assisting Conzen with his courses, especially those involving fieldwork, and the teaching skills of the elder colleague passed effortlessly to the younger. In addition to leading student field courses, the two spent time together exploring towns and cities where academic conferences were held, even in winter months when daylight was short. This proved no disincentive to 'Con', wherever there was at least some streetlight. Whitehand remembered one joint evening inspection of building façades after dark in a Georgian square in Bristol, 'much to the frustration of a 'lady of the night' who was seeking customers, and whose territory this was'! (Whitehand, 2020). In Whitehand's first academic year in Newcastle, looking back, he credits the special chemistry with Conzen and his students in the field with accelerating his understanding of Conzen's intellectual approach, beyond simply reading his publications and even in one-to-one discussions.

This pattern of interaction had special influence on Whitehand when it came to the urban morphology of cities, a sphere of inquiry in which Conzen had already been making original published contributions through his research on the coastal town of Whitby, the county town of Alnwick, and the urban core of metropolitan Newcastle. What sank in with Whitehand was the systematic aspect and interlocking nature of so many of Conzen's descriptive and analytical concepts, both of which generated a large specialist vocabulary which struck some urban geographers as downright intimidating. It became clear to Whitehand that Conzen was well advanced in the process of building a coherent, holistic analytical system, building up in scale from the fundamental morphological unit of the individual plot to the whole city-wide panoply of morphological subregions. This was a seductive means by which to understand the full range of physical content and spatial structure of towns and cities in all their evolutionary complexity. It started with the detailed map record and ended with the expressiveness of the townscape itself (M. P. Conzen, 2018). It was conceptually – if we might be permitted to say – streets ahead of any comparable work on urban morphology then available in the English language.

Whitehand spent considerable time at the beginning of his three short years in Newcastle completing his doctoral study, but with that done, he soon took on one of Conzen's most powerful concepts – the urban fringe belt – and especially its historical iteration through urban space in recurrent zones of non-residential character reflecting the pulsations of outward urban growth. In a recent reminiscence, Whitehand recalled that, in addition to 'the very large amount of discussion that I was having with Con, . . . I was not only in Newcastle's inner fringe belt almost daily, but was travelling through its middle fringe belt almost daily, and actually *living* in its outer fringe belt!' (Whitehand, 2020). Before long, Whitehand had completed a field-based mapping of the concatenation of partly 'fused' urban fringe belts that extended through the riverine string of urban foci that make up the linear conurbation of industrial Tyneside (Whitehand, 1966, 1967b), extending Conzen's own work on central Newcastle. Appearing promptly in Britain's leading geographical research journal (Figure 6), there could have been no clearer signal to those with historico-geographical interests in urban form that Jeremy Whitehand was becoming a 'Conzenian' urban morphologist (Whitehand, 2019a).

Mature years

As the possibilities of following up the considerable implications of Conzen's ideas about urban form multiplied, Whitehand found increasing questions to explore and investigations to undertake, many anchored in Conzenian precepts but with fresh critical perspectives to bring to the table. Whitehand matched his mentor in analytical rigour, painstaking research, and fastidious attention to detail, but he also proved in the long

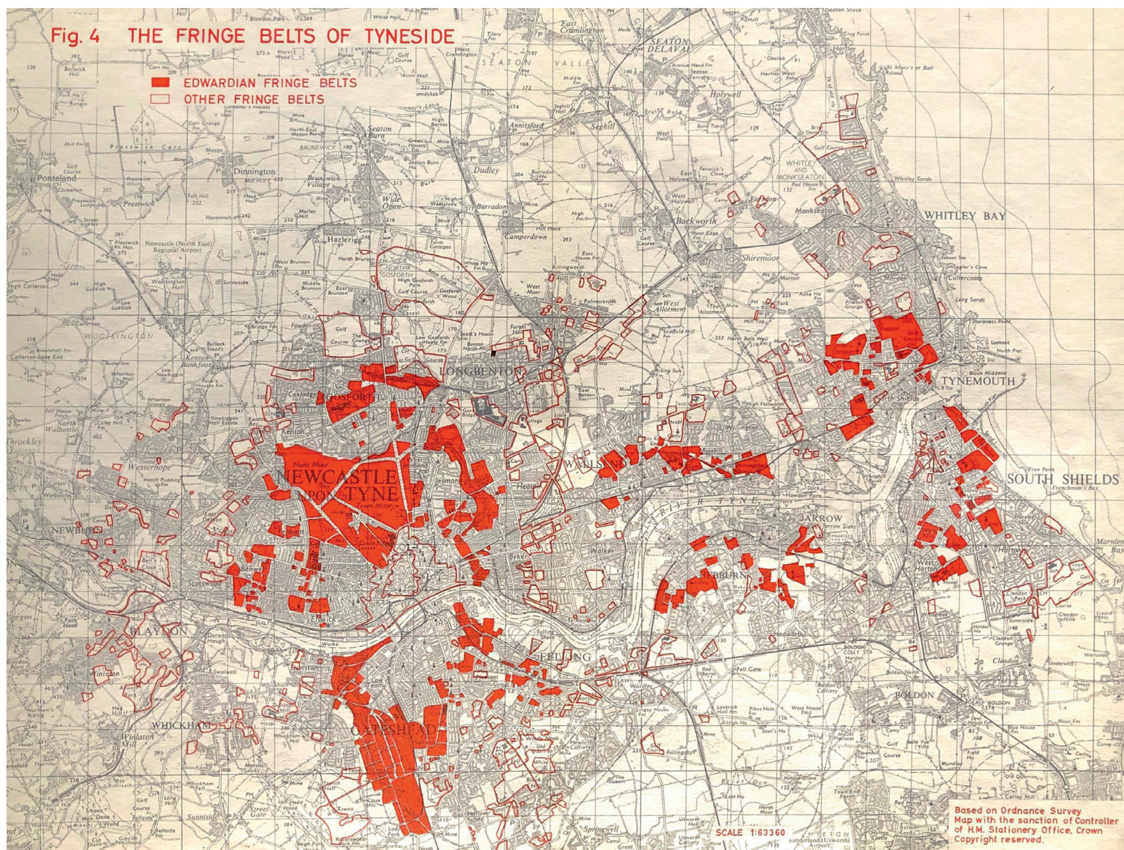

Figure 6. The fringe belts of Tyneside (source: Whitehand, 1966).

run to be by far his superior in time management and practical efficiency, with the result that his record of publications in the field has been little short of spectacular. Following his three years in Newcastle, Whitehand spent five years at the University of Glasgow, after which he moved to the University of Birmingham, where he climbed the academic ladder, ultimately enjoying almost a decade and a half as Professor of Urban Geography before retiring in 2005.

It did not take long for Whitehand's research interests to move beyond urban fringe belts, but not before recasting their study firmly within the framework of economic analysis and especially their relation to business cycles and rent theory (Whitehand, 1972a, 1972b, 1975). He expanded concern for fringe belts to include features such as vegetation, and added green-space studies to the orbit of the original concept (Morton and Whitehand, 1999; Whitehand 2019b). The fringe belt work led, logically enough, to morphological interest in the evolutionary mechanisms of the alternating belts in between – residential zones – and therefore an interest in house-building and the role of developers and other actors. It produced a line of research characterized by the term 'agents of change' (Larkham and Conzen, 2014; Whitehand, 1983). This in turn brought the role of local planning authorities to the fore, as contributors to the larger patterns of development and renewal of the urban fabric (Whitehand and Morton, 2004). This led easily to issues of urban preservation and conservation, again at the level of city districts rather than individual structures, many if not most having their implicit roots in the classic concepts of Conzen. Even when breaking new conceptual ground, Whitehand has shown a remarkable and consistent readiness to credit Conzen for the ongoing relevance of his fundamental work. It goes beyond mere personal modesty in someone who has so dramatically forged his own formidable reputation, and suggests the depth of influence we have sought in this essay to evaluate and set in sufficient context.

Another influence, and possibly interconnected outcome, during Whitehand's path to and through urban morphology, but one beyond the scope of this inquiry, is the future life-partner he spotted during his years in Newcastle. Susan Frederick was a geography student at the University of Newcastle, and they would marry in 1968, two years after she graduated. As a student hearing Conzen's lectures in historical geography, she was exposed to his outlook on all manner of matters geographical, but there can surely be little doubt it was Whitehand himself whose perceptive influence, notwithstanding their joint responsibility for raising a family, confirmed her as a *bona fide* urban morphologist too (for example, Whitehand and Whitehand, 1983).

The characteristics that have underwritten Whitehand's importance in the field of international urban morphology as a scholar and thinker are also central in understanding his role in helping build the intellectual infrastructure of the field. Fully assessing this history is beyond our present purpose, but no individual comes close to Whitehand's organizational record of institution-building. Beginning with his founding of the Urban Morphology Research Group at the University of Birmingham, his participation in the formation and nurturing of the International Seminar on Urban Form, his position as founding editor of *Urban Morphology,* and his successful efforts to establish the M. R. G. Conzen Collection at the University of Birmingham Cadbury Research Library, all speak loudly to Whitehand's personal investments of time and energy in building up the field of urban morphology.

Conclusion

It would be tempting to conclude simply by saying, with reference to Whitehand's research trajectory, 'and the rest is history', but that would be too abrupt. We have sought to throw light on the earliest experiences and decision points that led Jeremy Whitehand to make what turned out to be a lifelong commitment to the field of urban morphology. There is a coherent pattern to Whitehand's intellectual

development, from his childhood experiences, to his university training, his encounter with M.R.G. Conzen, and the passage through his mature academic years, all of which suggest that his embrace of urban morphology was neither wholly accidental nor entirely forced by any single dramatic event.

With regard to Whitehand's earliest experiences and intellectual development, there was relatively little that gave notice of his later unwavering commitment to this particular field. His parents gave him a comfortable home in which to taste the allure and satisfactions of a cultivated upbringing, complete with a solid educational foundation, travel, and athletic engagement. They also instilled in him a bedrock sense of moral sensitivity, obligation to uphold high standards of behaviour toward others, and a drive to employ his talents in ways that would be productive. The orderliness, economy of expression, and unassuming efficiency that became his hallmark were incubated in childhood. If the shape of his career did not begin to emerge until his entry into formal professional employment, its potential was already established by lessons absorbed in early youth.

Whitehand pursued his growing curiosity about settlement forms within the disciplined context of university study. His undergraduate and postgraduate years reveal an unhurried unfolding of keen interest in the way society organizes its survival upon the land within a settlement system viewed geographically – meaning spatially – and with an eye to the resultant moulding of a cultural landscape. Towns and cities fit within this matrix, but were simply the urban components of an extensive settlement network from farm to metropolis, of which latter category the Chilterns possessed scant examples.

Whitehand's move to gritty Newcastle undoubtedly solidified his urban consciousness. Clearly, he took immediately to the inspiring and energetic work of Conzen, and became his close confidant and friendly critic during the latter's complex and advanced period of activity. If ever Whitehand had a serious mentor, it was Conzen, reflected graciously in an untiring stream of subsequent references to his work. Yet Whitehand's own perspective was grounded enough to develop a research programme emphatically of his own making (M. P. Conzen, 2019). While trained in the academic discipline of geography, Whitehand readily embraced the profoundly interdisciplinary character of urban morphology. His own reputation developed on an international scale with a long string of publications and a remarkable record of training research students, such that many in the field have come to regard him as 'Mr Urban Morphology'. And just as Conzen (who died in 2000) had long advocated for international, cross-cultural comparative research in the field, demonstrating this ultimately with a serious interest in the morphological history of Japanese castle towns, so too did Whitehand in his turn extend his authority with studies across Europe, with forays into cities in Russia and Africa, and eventually capping it with a sustained commitment to advance understanding of the urban morphology of China.

Still, the primary aim of this essay has been to examine the *origins* of Whitehand's emergence as an urban morphologist. What stands out in this are the following. First, that the seeds of his lifelong interest in the field can be found in his earliest environmental perceptions and the steps he took to explore and articulate them. These include channelling his curiosity in his material environment into a geographical course of study that sharpened his awareness of the spatial setting of peoples' lives, and his perception of the steady force of ineluctable urbanization that has been transforming their material conditions. Secondly, his fortuitous early professional encounter with Conzen, and the impact that had on him. Thirdly, the firm grasp Whitehand quickly developed of the extensive possibilities that urban morphology possesses as a field enabled him to harness his inherent organizational skills to contribute on a broad front to both the burgeoning of the field's ideas and the infrastructural setting for their exploration. We hope that this reconstruction of Whitehand's early experiences, training, and paths chosen, has gone some way toward

clarifying the opening question: that is, why and how Jeremy Whitehand became an urban morphologist.

Notes

1. In addition to published sources, this essay draws heavily on personal recollections of three kinds: those of the lead author, who has known Jeremy Whitehand since 1963; joint discussions between the authors and Whitehand in December 2018; and subsequent communications from Whitehand with a view to confirming certain historical facts, specified in the references. Interpretations of the historical record and judgments of Whitehand's contributions to the field presented here, however, remain strictly those of the authors alone.
2. Robert William Brooker (1909–84) was no ordinary schoolteacher. Having authored a navigation manual for the British Air Training Corps in 1942 issued by George Harrap & Co., the publisher after the war engaged Brooker to write a number of textbooks for secondary schools, some in the company's 'Charter Geographies' series, several of which appeared when Whitehand was his pupil (Brooker, 1949, 1950; Morris and Brooker, 1953).
3. Interestingly, by using the latest available edition of the English Ordnance Survey 6-inch (=1 mile) map coverage for Chesham and Amersham as his base maps, he was obliged to sketch the generalized ground coverage of all new housing added since the publication of the O.S. maps. This led him to sometimes generalize building outlines, portraying stretches of housing along new and existing roads as connected by a linear bar symbol, even when the house types being represented may have been semi-detached or detached houses. Nevertheless, the legend labels make it clear which category is to be understood by each colour. Of further interest is the fact that Whitehand applied opaque paint colours over all building footprints in order to cover up the diagonal hatching 'fill' that identified structures on the printed map and convey the meaning of his land-use classification at the level of individual buildings, residential and otherwise. This must have required a very delicate paintbrush, digital control – in the old sense of the word – and much patience to execute. For an undergraduate thrown upon his own resources, it was a clever solution to the cartographic challenge of overlaying unique thematic data on a crowded existing base map, thereby preserving the landscape context it offered, the better to fully interpret the resulting patterns.

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