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Setting up the metropolis:

Unpacking the historical spatial cultures of London and Manhattan

Garyfalia Palaiologou
Space Syntax Laboratory, The Bartlett School of Architecture, UCL
g.palaiologou@ucl.ac.uk

Laura Vaughan
Space Syntax Laboratory, The Bartlett School of Architecture, UCL
l.vaughan@ucl.ac.uk

Abstract

London and Manhattan constitute unique urban configurations which have claimed and conquered the metropolitan vision. This paper travels back in time to look for the foundations of these cities' architectural and urban morphology. The study is focused on the architecture of the everyday, the vernacular buildings which collectively form the character of a city's historical built environment. It discusses how both preconceived frameworks and emergent architectural decisions and societal rules have shaped the two cities throughout their spatial histories. Drawing evidence from historical and empirical data the analysis presented in this paper builds on space syntax research which investigates morphological processes in urban configurations. The paper looks at two contrasting cases of urban grids to contribute to the understanding of the way different spatial arrangements influence city form.

The urban past of London and Manhattan is considered in terms of planning intentions, architecture, urban form and the embodied socio-cultural models and ideals. The approach emphasises the way architectural and urban scales were configured together to produce each city's historical morphological identity and spatial culture. This stems from an effort to form a parallel understanding of both the building unit and the urban realm where this is situated. In this perspective, the discussion provides an overview on the one hand, of the building aggregation rules of the London terraced house and the Manhattan row house schemes; and on the other hand, the structure of the urban grid in each case. The aim is to shed light on the interplay of these two elements, underlining the challenge for any urban design approach: to tackle both buildings and streets along the lines of a unifying and diachronic spatial logic.

The study considers the syntactical and morphological properties of urban space, looking at the building, the block and the city scales. The paper aims to highlight that both for London and Manhattan there exist inherent cross-scale organisational consistencies that hold the spatial cultures of each city together.

Keywords

London, Manhattan, spatial culture, urban past, space syntax.

1. Introduction

This paper is an effort to link the architectural, morphological and syntactical origins of London and Manhattan. These metropolises started off from a modest urban past whereby ordinary row housing settlements generated complex realities which are still evolving towards unforeseeable futures (Figure 1). This study aims to consider these building typologies from an urban-scale perspective; that is, to discuss the role that these ordinary urban buildings play as components of the city realm. The discussion addresses the notion of *structure* in its broader sense; in that *"[f]rom abstraction to concrete realisation, structure joins discrete ideas or elements into a coherent entity"* (quoting Balmond, Gausa et al., 2003, p.575). This wider concept of structure is considered here to suggest the underlying logic which holds ideas and elements together over time, producing varying urban situations.

In his article 'Space, culture and urban design in late modernism and after', Peponis (1989) makes an important note on the reasons why the ordinary settlements remain a puzzle for architecture. The author suggests that before designing the city it is necessary to look beyond the visible outcomes of the socio-spatial phenomena and instead to focus on the processes that actually generate those outcomes. Peponis argues that reflections on urban phenomena can only provide a practical contribution to design once social and cultural meaning is understood in terms of the physical properties of architectural and urban form (*ibid.,* p.94-95).

Leslie Martin's (1972) reflections on city planning and urban design discuss how towns, 'organic' or 'constructed', are basically framed by the simple rules of building arrangements which produce patterns of social behaviour. Martin characterises these rules as 'simple formal situations' and these are the grid of streets, the pattern of plots and the buildings. Since the 1970s (Hillier et al., 1976), space syntax theory has been addressing the formation of society 'through the prism of space' (Hillier & Netto, 2002). From the ideas articulated by space syntax theory, the concept of 'spatial culture' (Hillier, 1989) elaborates further our understanding of the ways spatial arrangements relate to the production of social meanings. Spatial culture refers to the way a settlement orders its space to configure *'the principles for ordering social relations'* (*ibid.*, p.6). More than that, space syntax theory introduced an understanding of spatial arrangements as *configurations*, capturing the relational aspects of spatial layouts. Amongst other things, space syntax analytical techniques allowed the analysis of large-scale spatial systems such as cities to address how these work as coherent structures, as network entities (Hillier, 1996). To link ideas discussed in Martin's 'The grid as generator' with the syntactical approach, this paper looks at the morphological and syntactical properties of the historical building and spatial cultures of London and Manhattan.

The London terraced houses, as well as row houses in Manhattan, present characteristics adherent to all architectural scales – from the building, to the block and the street. These building types were conceived both as individual units, as well as urban components of the block front and of the street domain as a whole. The English terraced house largely informed the New York row house typology (Davis, 2006, p.151). However, cultural differences coming from the specific socio-spatial context of Manhattan have shaped a particularly American interpretation of the English terrace over time. It is of interest in this context to discuss the way typological genotypes can develop, generate and grow into entirely different urban configurations.

In the following sections both the building interior and the amalgamation of the house unit within the row and its surroundings are presented. The paper first presents the London case (section 2) and then that of Manhattan (section 3). In section 4, the key ideas from the historical overview are summarised to show how both urban settings present a spatial logic which is faithful to their cultural profile across all spatial scales and across form, configuration, and ideas embedded in space. Section 5 compares and contrasts the two building and spatial cultures by analysing the historical street networks as well as the current networks in relation to empirical data about building types and uses. The study focuses on two case studies from within the sample – one from each urban setting – in terms of how their current state of building densification and function has evolved from the uniform house type of the past, showing the influence of the grids and aggregation rules on built form.

A London terraced house

A Manhattan row house

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Manhattan - Background map: © 2011 Department of Information Technology and Telecommunications, NYC.

Figure 1: The London and Manhattan urban morphologies.

2. London

Since the Georgian era (1714-1830), the London terraced housing culture is characterised by spatial and architectural formalities. These apply both to the terraced house (building scale), as well as to the agglomeration of terraced housing units to form a row (block scale), namely to the 'terrace'. With its morphological and social unity, the terrace could be considered as a single building. Architectural style and the construction process may have changed over time, but standardisation has always been part of the terraced house building practice. The following sections discuss the spatial culture of the terraced housing schemes in London, to then consider the principles that shaped the built form alongside the spatial logic of the street network.

The building unit

The English cultural ideals of 'dwelling' have been embodied for many centuries in the terraced house. Amongst other English cities, London has been the pioneer in developing a building culture of standardising the English terraced house (Guillery, 2004). Since the late eighteenth century, back-to-back terraces were gradually replacing the small wooden houses of working-class settlers, traders and artisans (*ibid.*). The appeal of the family-owned residence and the massive spread of terraced houses increased further post industrialisation, under the influences of the 'live away from work' concept (Davidoff & Hall, 1987; Dennis, 2008).

Georgian (c.1720-1830) and Victorian (c.1837–1901) terraced houses accommodated households of different sizes. The socio-economic status of the dwellers had an impact on varying characteristics of the housing unit, affecting user comfort and privacy, as well as matters of sanitary provision. The ordinary terraced house had two storeys with two primary rooms in each. Larger houses had an increase in height with additional storeys, as well as rear extensions which added depth to the domestic layout. These larger units also included a basement, usually given over to the servant quarters.
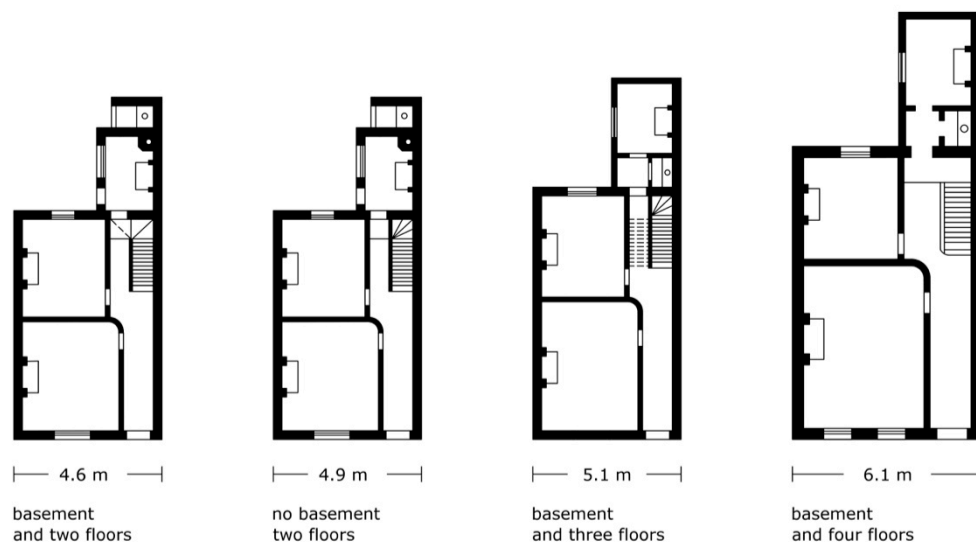

4.6 m	4.9 m	5.1 m	6.1 m
basement and two floors	no basement two floors	basement and three floors	basement and four floors

Figure 2: The four classes of London houses: ground floor plans.

The plans are redrawn after Muthesious (1982, p.81).

The terraced house layout (Figure 2) organises activities according to a strong spatial programme (c.f. Hillier & Penn, 1991, p.33; Hillier, 1996, p.198; Sailer, 2007, p.068-02; Koch & Steen, 2012, p. 8146:2) meaning that movement from one space to another is structured in a hierarchical,

sequential manner leaving little choice to the users on how to move about and use the domestic interior. Functions are assigned to specific spaces which are accessed separately via the circulation core of the house, the hall (Evans, 1978; Muthesius, 1982; Hanson, 1998) and they are not connected to each other directly. The main rooms work only as destinations, as occupancy spaces in the layout. Hanson and Hillier (in Hanson, 1998, p.130) explain that this setting forms a *'transition integrated' complex*, where the spatial configuration emphasises separations of the main domestic functions. Privacy within a domestic space is found to be a feature embedded in the spatial design of terraced houses.

The terrace

The nineteenth century terraced house architecture was used symbolically for the 'the reinforcement of cultural identity' (Davis, 2006, p.90). The London 'terrace' – namely a row of terraced houses – comprises a unique case of vernacular building showing a strong architectural and morphological unity (Muthesius, 1982, p.14). In the Georgian period, the terrace was treated as one unified architectural object, both when referring to the grand terraces which incorporated the principles of palatial (in some cases Classical British style which was based on the 16th century Palladian style) architecture and of a classical morphological order, and to the modest working class versions (Summerson, 1945; Muthesius, 1982). Terraced houses appear sewn together, along the same building line, in a manner such that the visual separation of the individual housing units is obscured: horizontal decorative elements run across the whole terrace façade, whilst the emphasis on the centre and ends of the terrace front and the crown-body-base horizontal zoning are indicative unifying architectural gestures (Nousa, 2014; Ashton, 2012). The architectural unity persisted in the more playful terrace fronts of the Victorian period which followed. The fact that houses belonging to the same terrace operate together as an autonomous building is supported by the social unity of the inhabitants. It was customary that inhabitants of the housing units of a terrace had a similar social status (c.f. Chapman, 1955; Bourdieu, 1979; McKibbin, 1998; Gunn, 2004). Overall, the formalities of the terrace morphology and its social context highlight the unity of the block front as an urban component, with the individual houses being treated as sub-components.

Notably, in the case of the London building culture, architectural formalities extend beyond the terrace itself to the way building complexes are set up. The early London 'estates', namely areas speculatively built by developers (Davis, 2006, p.55), present an urban morphology of strong geometry. Long straight lines, squares and crescents define both the street pattern and the building shapes based on austere design principles for the building aggregation rules. Quadrant rows around crescents and rectangular squares are an example of this neo-classical symbolic geometry. In other words, 'symbolic use of space' (Hillier, 1989, p.12) is a characteristic of the London terrace morphologies that runs across both the residential streets and those streets which form part of the administrative and economic foreground. Whilst physical and spatial order is applied on the design of those London Regency estates evenly, each estate is differentiated from the next due to a number of factors: the topology, the appropriate landscaping, the estate size and the area covered as well as the speculative building intentions. As a result, when looking at the overall geometry of the London street configuration, this appears to be random and heterogeneous, shaped by diverse localities and the spatial product of set of local rules that create a city that is defined as being in its current state *'more by fortune than design'* (Hebbert, 1998).

The street grid

Julienne Hanson's doctoral thesis (1989), *Order and Structure in Urban Space*, unravels the role of morphological and historical processes in shaping the London urban grid. Looking at the diachronic structure of the City of London, Hanson's research picks up the street grid continuities and changes observed over the Roman, Saxon, Medieval and Early Modern London historical periods. Since then, the city's historical core has grown dramatically outwards, merging with the suburban outskirts whilst maintaining the 'deformed wheel model' structure of spatially prominent integrated streets in the foreground and primarily residential streets in the background network (c.f. Hillier & Hanson, 1984, p.115; Hanson, 1989, p.20; Hillier, 1989, p.10; Hillier & Vaughan, 2007, p.217). The suburban settlements have grasped along and around the foreground street lines (Hillier et al., 2012, p.187),

both absorbing urban change and sustaining their individual specificities of local life (c.f. Vaughan et al., 2009; Griffiths et al., 2010; Vaughan et al., 2013). Considering these diachronic street network processes a main characteristic of the London grid structure is noted: the city's spatial history caters for the physical merging of the morphologically diverse urban districts (Hanson, 1989, p.329) and holds them together via the strong foreground street lines.

Hillier et al. (2012) reflect on the present London street grid via a space syntax analysis which picks up a city's structure based on the configurational properties of the street network – beyond the reading of the geometrical order of the city grid. The authors confirm the structural primacy of the *whole* urban configuration through the strong foreground network which predominates over the city background *parts*. London belies a hidden geometry which is found at the configurational level of relations between lines: the foreground network is distinguished from the background, both morphologically and syntactically. Morphologically the foreground is made up of long streets, with a geometry that is close to linear. Syntactically, those streets consist better connected up arteries and present greater chances to be part of a higher number of city routes.

In a sense, the structure of the London street network, similar to the domestic layout, presents a spatial programming – in that the 'interfaces' between users both at the building and urban scales (which are produced and reproduced through probabilistic movement distribution in spatial systems; Hillier & Penn, 1991, p.33; Hiller, 1996, p.198), are structured following a configurational order: the street network is organised over time according to a functional *hierarchy* which favours the spatial significance of some streets over others. The spatial hierarchy is translated into a functional hierarchy, with a notional background network of streets that bears local economic activity and has a larger proportion of residential activities in contrast with the citywide economic functioning of the 'foreground' network.

Following this analysis of the prototypical London terraced house, the next sections look at a contrasting case of urban setting, West Village, Manhattan, which has a strikingly similar building type: row houses, asking the question of how can such similar buildings support different spatial cultures. It tests the hypothesis of whether the means by which similar buildings adapt to different settings is through the application of different aggregation rules. It then goes on to explore how visible order in terms of the grid corresponds (or not) to configurational order for the spatial system, and vice versa (Hanson, 1989). London is contrasted with Manhattan; the discussion shows how in the case of the latter the configurational order is weaker – despite the seemingly strong two-dimensional geometrical order of the building, block and street patterns.

3. Manhattan

In Manhattan the row housing culture, both for the row house (building scale) and the row (block scale), presents greater functional flexibility and architectural informality in comparison to London's terraces. The row is treated as the sum of building units organised based on common morphological principles. Whilst architectural details may vary within the row, architectural style and class variations compose rows with more or less unity. Standardisation is part of the building practice, however, over time individual appropriations were also embedded into the standard row house form. The following paragraphs discuss the Manhattan row housing culture, bringing the ideas that shaped the building unit and the urban block in dialogue with the design of the Manhattan gridiron as an urban object.

The building unit

Similarly to the 'workhomes' in the English building culture (Hollis, 2007; 2011), the early Manhattan row houses fostered both the domestic use and workspaces within their shell. It was after the turn of nineteenth century that the city's unforeseen growth attracted a high influx of immigrants who brought about the demand for new *single-family* housing. During the 1820-30s building boom and until the 1890s, row houses were built in Federal style. The floor plan organisation in those early

Federal row houses reflects its origins in the Georgian terraced house, with variations according to the inhabitants' class and household size (Figure 3).

Figure 3. The row house: floor plans. Redrawn from Lockwood (1972, p.14-19) and Dolkart (2009, p.31).
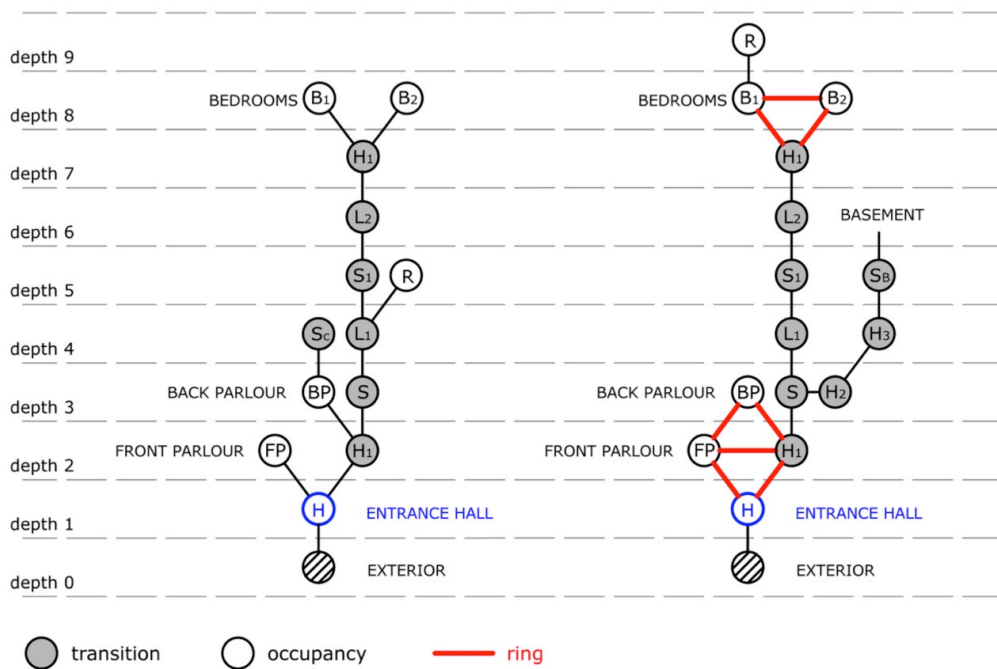

Figure 4. Terraced house and row house: justified graph representations. Showing j-graphs for the ground and first floors of a terraced house (left).

While both the English terraced and North American row house layouts organise domestic functions in a similar manner across floors, the *configuration* in each case is fundamentally different (Figure 4). Namely, spaces in each dwelling type are connected up to each other in a different way. The typical terraced house configuration sets up a spatial complex where the rooms are linked to a circulation

zone (the corridor) but not to each other. In other words, rooms have only one entrance/exit each and they serve as destinations used for programmed occupancy. Functions are separated and user privacy predominates. Hanson and Hillier (in Hanson, 1998, p.130) describe this kind of spatial configuration as a 'transition integrated' complex, to highlight that the spatial significance is appointed on circulation rather than occupancy. The row house on the other hand presents the opposite configurational set up: it is a 'space-integrated complex' where the spatial significance is appointed on rooms. The main rooms of the house (the white circles in the justified graph representations in Figure 4, instead of the grey ones which symbolise transition spaces) are linked together (with two or more entrances per room) and consequently they serve both for occupancy and circulation (notice the rings marked in red in Figure 4; a ring signifies that there is choice in the potential routes *from* and *to* one space); namely, permeability through the main family spaces is enhanced, raising the chances that a room will be used frequently. Overall, while the functional grouping of relevant activities on different floors is similar for the two building types, the domestic lives within a London terraced house follow the spatial pattern of a strongly programmed interior in terms of potential routes *to* and *through* the main rooms, in sharp contrast to the weakly programmed family dwelling found in the Manhattan row house where the main rooms are interlinked.

The row

The previous section commented on the way the row house typology allowed for probabilities in the building scale via the weakly programmed interior configuration; this section discusses how row houses work probabilistically at the block scale as well.

The aggregation rules for the Manhattan row range from flexible to more uniform depending on the construction date and the architectural style, as well as on social class and speculative building (namely, how many building units within the row were built at the same time by the same developer; in speculative practice developers were building row houses before securing buyers). For instance, the Federal block front presents informality. As Lockwood notes (1972, p.32): *"New York row houses usually were slow to reflect national architectural ideals"*. In early row houses, speculative building did not necessarily extend to the whole length of a block front; only two or three row houses are normally built at a time, leading to width and height variations within the same row. On the other hand, later styles (such as the Greek Revival and other grandiose styles that followed during the Brownstone era) applied architectural formalities to ordinary row houses. However even in these more uniform block fronts, the row composition in Manhattan is treated differently than in London. The block front is treated as an accumulation of single row houses with architectural consistencies. The emphasis on vertical elements (such as entrance stoops, porticos and pilasters) distinguishes row houses visually as individual units. This intention to maintain individuality within the row survives throughout the urban history of the row house typology.

Whilst being more playful and less uniform the Manhattan row still presents morphological regularity and unity. Order here is implicit – in contrast to the London terrace where order is aesthetically and architecturally apparent. This order does not aim to compromise architectural freedom when composing a solid block front; rather, it works as an underlying organising template. This implicit morphological rhythm that governs the Manhattan row is based on a two-dimensional gridiron which organises the built volume: the 1807-11 Commissioners' Plan.

The street grid

The 1807-11 Commissioners' Plan provisioned an orthogonal template to guide future street development in Manhattan. The plan ran northwards and uniformly across the whole Island, establishing regularity across all scales of the gridiron: across the street network, the block islands and the plot pattern of fixed dimensions (both in width and depth) which organised the built volume in a systematic manner (Ballon, 2012, p.87).

Despite the strong two-dimensional order of the Commissioners' Plan the grid configuration does not support a spatial hierarchy as seen in London. Hillier et al. (2012) explain that the Manhattan

street syntax slightly favours the street line of Broadway but still not to a much greater extent than other streets in the district. Here, the foreground-background distinction in the street network is toned down – and so is the spatial differentiation of the various urban districts. In all, the city is treated as 'urban object' where the structure of the *whole* predominates over the *parts* through the preconceived grid.

Effectively, the Manhattan gridiron has generated architectural emergence and diversity in the Island over time (Koolhaas, 1994). Here, an hierarchy in the street layout can be traced more in the shape of urban form – in the morphological properties of factors such as street widths and their associated building heights (Ballon, 2012, p.87), rather than in the marked topological and configurational prominence of some street over others. At this point it is of interest to recall Jane Jacobs's (1961) observations regarding physical characteristics of the built form that might influence the potential for street permeability: the author argues that short blocks allow for greater frequency in pedestrian flows, increase the use of sidewalks and consequently, generate greater socio-economic mixture. Jacobs's argument has been tested against data collected from the West Village in Manhattan in a former publication (Palaiologou and Vaughan, 2014), showing how block size (and respectively street segment length) have an influence on land use allocation. The mixing of varying uses in close proximity to other uses in an interdependent fashion helps support everyday rituals to be carried out by diverse users and thus, contribute to livelier streets (Jacobs, 1961, p.153). Overall, the urban grid in Manhattan constitutes a street network with greater permeability throughout – or in Hanson and Hillier's words (1987), a 'probabilistic' spatial system rather than a hierarchical one, for both building morphology and function. In a way, similar to what discussed earlier for London in terms of cross-scale consistencies, the Manhattan global organisation presents a consistency with the organisational principles of the row house domestic interior: both are weakly programmed spatially.

So far, the discussion considered together the architectural and urban scales of the historical London and Manhattan. The next step (section 5) is to explore how these urban configurations and building morphologies have changed over time.

4. Of time and space: distinct urban configurations

So far we have shown that London and Manhattan present different urban profiles historically. The spatial structure (street network) and the physical properties (built form) have both contributed to shaping the unique streetscape of each city. This section briefly outlines a comparative overview of streetscape properties in two case studies – one in each city – in order to unravel the differences in the way the historical terraced and row housing settings have developed in each case. These differences are captured by looking at properties of the built form at a high-resolution level of analysis. Analysis records building entrances and the associated land uses, as well as the length of building façades and block fronts. These features are then considered in relation to the syntactical (space syntax) properties of the studied streets. Additionally, a study of the historical properties of the street networks offers insights into whether the contrasting differences between the two urban grids have influenced aspects of built form change and of the functional organisation of the streetscape over time.

The study focuses on two specific areas: Islington in London and the West Village in Manhattan (Figure 5). In both areas much of the historical terraces and row houses have survived under the aegis of conservation policies. At the same time, Islington and West Village have undergone significant built form transformations, during periods of decline and later of reclamation. The West Village is a unique case within Manhattan where urbanisation has not extruded vertically, but is instead confined to a building height similar to Islington. Therefore, the two case studies are comparable, providing a chance to investigate the evolution of the two relevant historical urban morphologies, the terrace and the row, under differing spatial circumstances and challenges.

The analysis in Islington focused on the area around Upper Street – Islington's historical thoroughfare. The case study area covers less than half a square kilometre more than the West Village and yet, it contains twice the number of segments. This illustrates the fragmented and irregular street pattern of the London city grid in contrast to Manhattan's orthogonal street gridiron.

Islington's irregular street morphology is also evident in the high presence of very short segments which are numbered almost three times more than seen in the West Village (Figure 6).

London - Background map: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service.
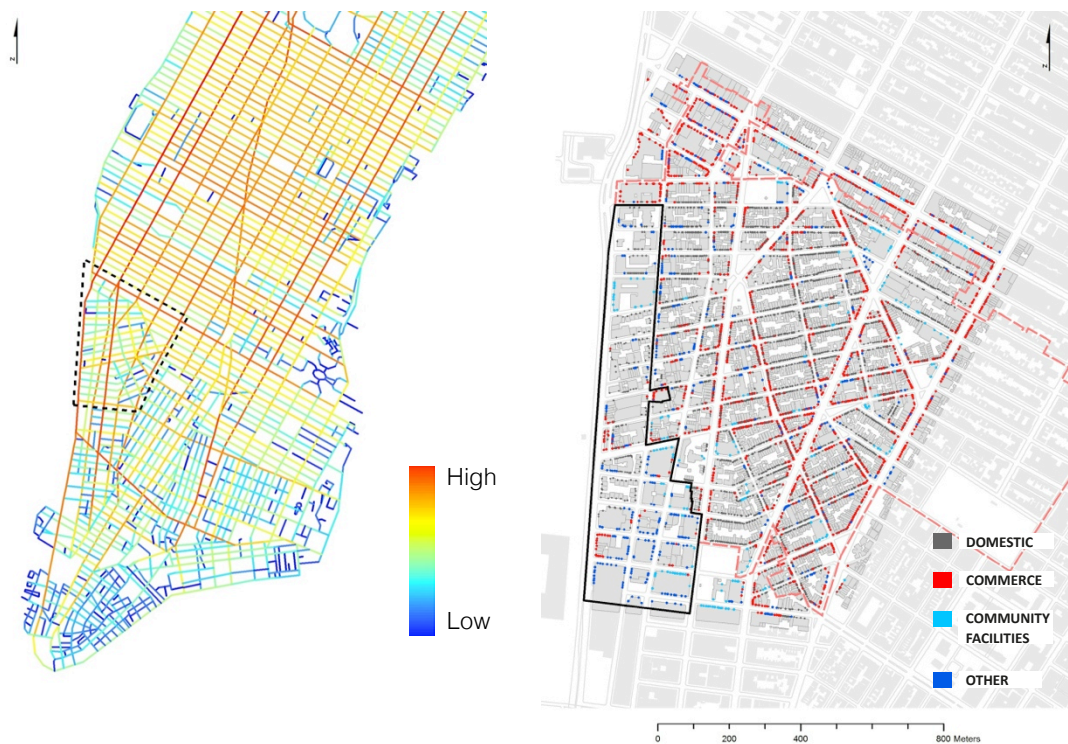
Manhattan - Background map: © 2011 Department of Information Technology and Telecommunications, NYC.

Figure 5. Islington, London (top) and West Village, Manhattan (below).

Showing street segment angular maps for the measure of combined integration and choice, radius 2500 m (left); and mapped building entrances and uses (right).
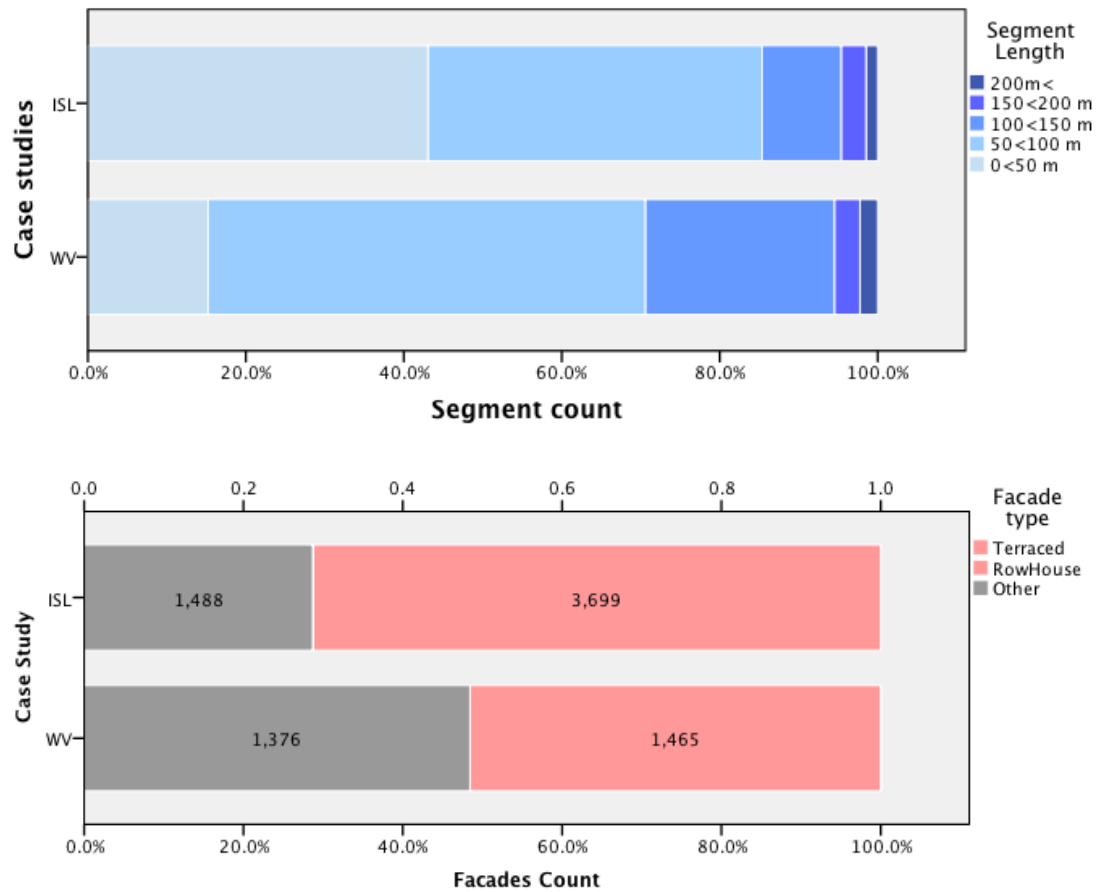
Figure 6: Islington, London (top) and West Village, Manhattan (below). Showing segment count and segment length (top) and the presence of historic building types (bellow).

The second graph in Figure 6 illustrates the surviving presence of historical building types in Islington and the West Village. It is understood that the West Village has been a far more challenging setting for the low-rise ordinary row houses to manage escaping demolition. Despite the fact that in both case study areas conservation areas were designated in 1969 onwards, terraced houses comprise approximately 25 per cent more of the building stock in Islington than the equivalent proportion for row houses in West Village.

TABLE 1 Case studies	Area km²	Segments	Total Segment Length (km)	Mean Segment Length (m)	Façades	Doors
Islington	1.8	635	37.7	59.4	5462	7391
West Village	1.4	341	28.6	84.0	2847	5504

**Table 1:** Case studies – street interface.

An analysis of the number of building entrances surveyed in the two case studies (i.e., 'Doors' in Table 2) in relation to the number of façades recorded in the areas indicates differences in the streetscape has developed over time in each case. Considering that both areas were originally built up with single-family middle class houses, it can be postulated that the original ratio of building entrances to façades would be one entrance per building façade for both areas. However, the

surveyed data show that the current doors/façades ratio has grown differently in the two areas: 1.4 doors per façade for Islington, while for the West Village this increases to 1.9. Table 2 shows that the West Village presents a higher percentage of non-domestic uses; doorways related to non-domestic uses are twice the number counted in Islington.

| TABLE 2 Case studies	Façades	Doors	Domestic	Non Domestic	Direct	Blank
Islington	5462	7391	5766 78.0%	1625 22.0%	4980 67.4%	454 6.1%
West Village	2847	5504	2900 52.7%	2604 47.3%	4362 79.2%	557 10.1%

Table 2: Case studies – building thresholds.

The properties of the street network in terms of its spatial accessibility explain how the West Village has become more urban in its profile than Islington – in that it presents 'large numbers of different activities involving people going about their business in different ways' (see Hillier, 1996 about the meaning of the 'urban buzz', p.126). The *normalised measures* allow for space syntax (syntactical – namely values arising from the configurational properties of spatial systems) values to be compared across different spatial systems (Hillier et al., 2012). Figure 7 shows a plot, for the same modelled area, of syntactical values for the measures of *normalised integration* (NAIN) and *choice* (NACH) at a walkable scale (radius 800m), as well as for the areas' wider surroundings (radius 2.5km). It is noted that the correlations between choice and integration are higher for the West Village than Islington. Also, the West Village streets show higher values of integration overall, especially at larger scales. This indicates a greater prominence for the Village streets overall to serve as destinations for pedestrian movement. This last finding supports the contention by Hillier et al. (*ibid.*) that there is a generic difference between the London and the Manhattan structures, explaining that higher integration signifies a background street network which is better connected up to the foreground city structure.
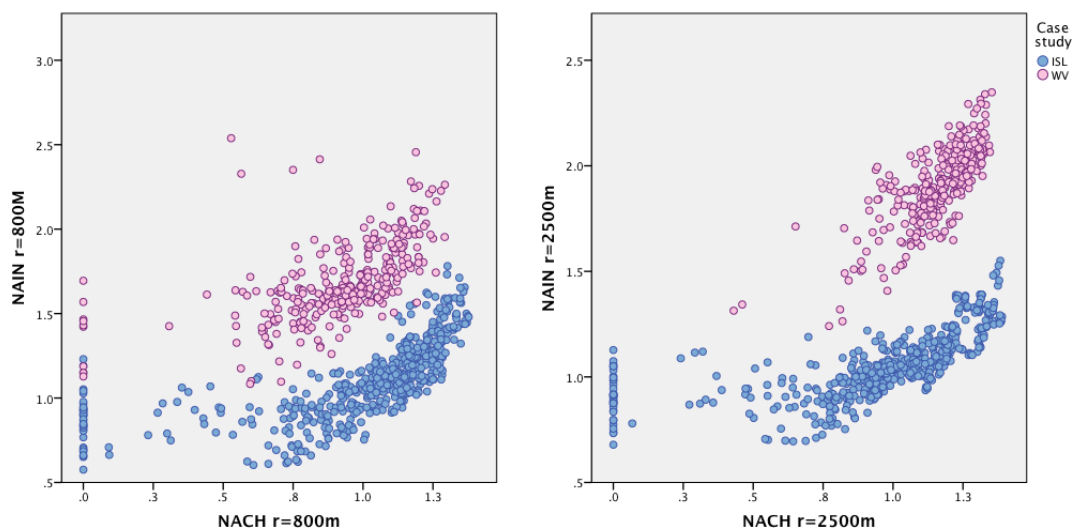
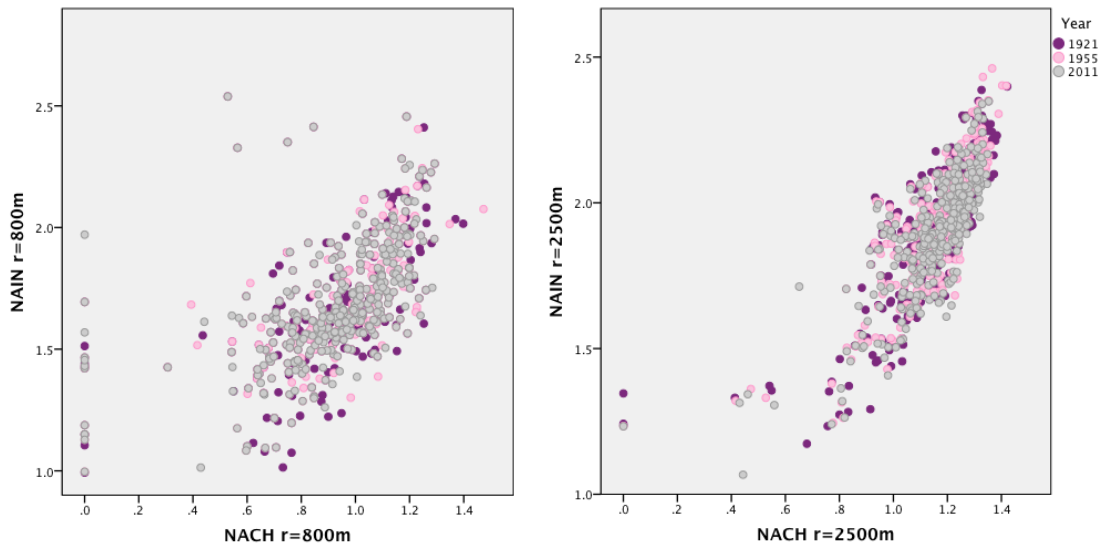*Normalised choice (x) and integration (y) for radius 800 meters.*

Normalised choice (x) and integration (y) for radius 2500 meters.

Figure 7: Case studies – the segment values for the *normalised measures of choice and integration*. Showing Islington in blue colour and West Village in pink.
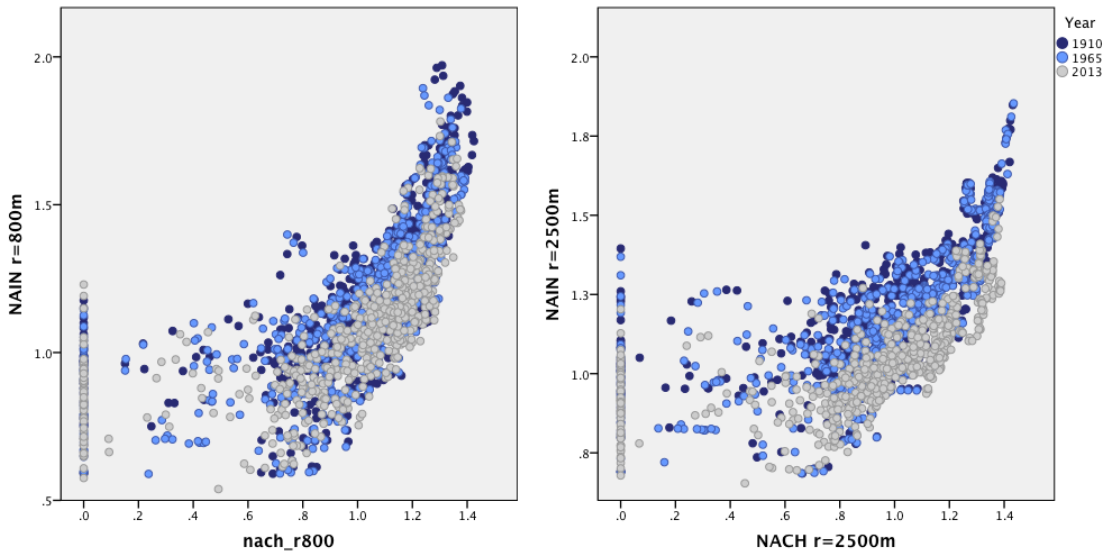
Normalised choice (x) and integration (y) for radius 800 meters – Islington.

Normalised choice (x) and integration (y) for radius 2500 meters – Islington.

Normalised choice (x) and integration (y) for radius 800 meters – West Village.

Normalised choice (x) and integration (y) for radius 2500 meters – West Village.

Figure 8: Case studies – the segment values for the *normalised measures of choice and integration* over time; for early, mid-twentieth century and present years.

Further light is shed on the grid particularities in each case when looking at the space syntax values for Islington and Manhattan historically. Space syntax models were created for three historical periods (Figure 8: c.1910, 1965 and 2013 for Islington – upper pair of graphs; c.1921, 1955 and 2011 for West Village – lower pair of graphs). The graphs in Figure 8 show the syntactical values for the historical networks calculated for two analysis catchments: the local scale, radius 800 meters (left), and the neighbourhood surroundings, radius 2500 meters (right) and for each case study in turn. The historical analysis of the street networks shows that West Village kept a similar configurational profile over time. This is not too surprising considering the geographical constraints of the land and the preconceived blueprint of Manhattan, where little change occurred across the grid overall. In the case of London, the horizontal expansion has favoured the grid densification, allowing for configurational shifts to appear in the background street network (Vaughan et al., 2013). Notably, the 2013 values for the area are lower in terms of integration than those found in the earlier periods.

Building densification

In order to measure building densification in the streetscape of the two areas, the extent to which *street segment sides* are built up was calculated by the *block front / segment length* ratio (*bf/sl* ratio) – where the block front length is the sum of building façade widths. The graph in Figure 9 categorises street segment sides in four general bands: street sides almost entirely built up (between two thirds and the entirety of the segment length is covered alongside); those sides built up approximately half way through (up to two thirds); those mostly left uncovered (up to one third); and finally street sides with no presence of buildings. This last band includes those street sides adjacent to parks, squares, or junctions. Such segments are more frequent in Islington, since there is greater occurrence in junctions within irregular street patterns than in the orthogonal geometry seen in Manhattan. Additionally, the Islington landscape architecture – with neoclassical influences – presents more squares and green spaces than the West Village. Overall, in the latter case study street sides with a high building densification compose almost 15% more of the streetscape than in Islington.
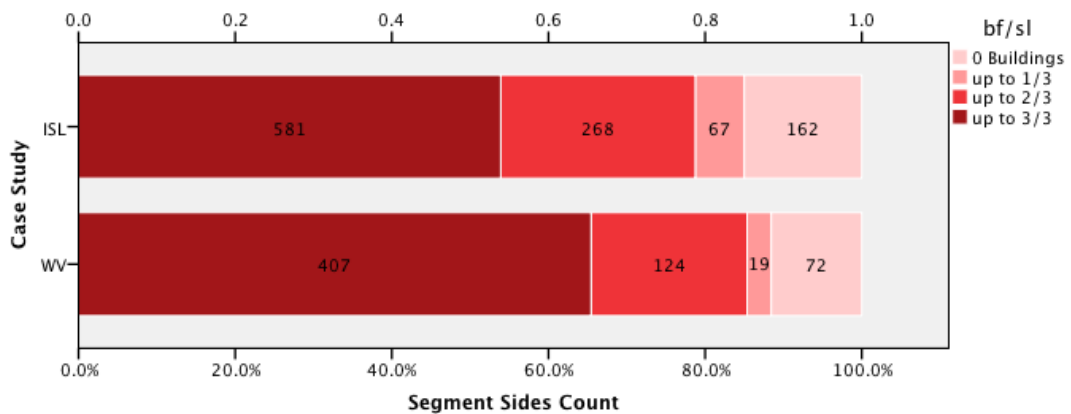

Figure 9: Case studies – block front length / segment length for street sides.
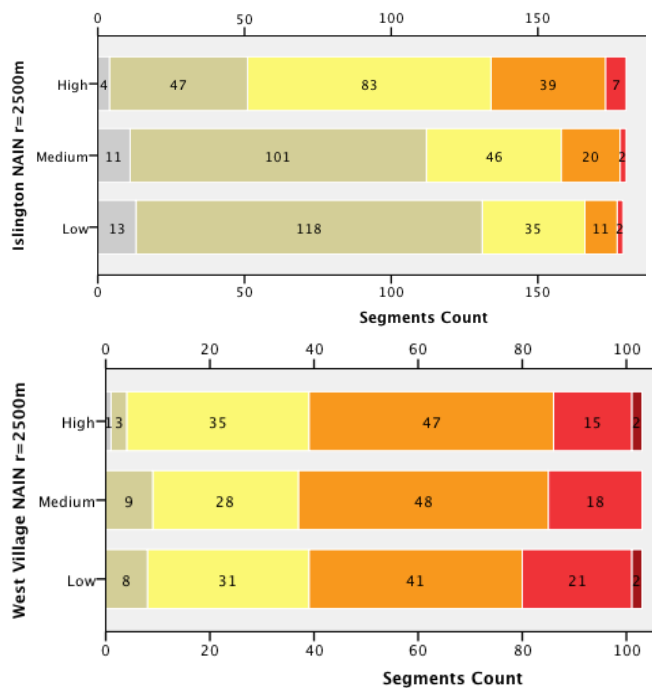
Mixing of uses

This paper has already proposed that in London the spatial structure of the city applies a configurational hierarchy to streets, while the Manhattan grid accounts for relevant syntactical prominence and permeability amongst the foreground and background streets. It is of interest to examine in turn, whether these syntactical observations show similar degrees of distinction between the foreground and background network structures in terms of *function*. In the West Village street segments have grown functionally more diverse; only 6.3% of street segments are occupied entirely by the same land use, while mono-functional segments in Islington rise to 49.3%. The study looks at degree of a segment's land use diversity (measured in this instance by a simple count of the number of different land uses that appear across the segment length) in relation to the segment's configurational properties (Figure 10) in order to examine closely the relation between the street syntax and the spatial apportioning of functional diversity within the case study areas. The graphs show how in the case of Islington use diversity per segment increases for the higher bands of syntactical values – namely, it is in line with a segment's prominence in accessibility potentials. In the West Village, it is seen that the mixing of uses is similarly apportioned throughout segments of *low*, *middle* and *high* syntactical values – in other words functional mixing is spread across the area's streets. These results are in line with the descriptions of Hillier et al. (2012) discussed earlier, which describe the London and Manhattan street networks as possessing economically driven configurations.

Each graph shows on top the mixing of uses on street segments for the top third of normalised choice (top) and integration (below) 2500 values for the case study area; in the middle: the mixing of uses for the middle third of normalised 2500 values; and at the bottom, the mixing of uses for the lowest third of normalised 2500 values.
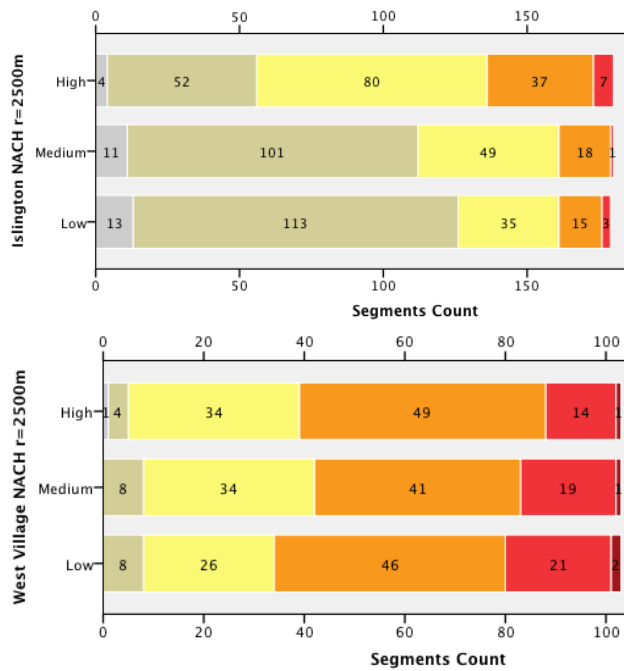
Showing Islington, London (top) and West Village (bellow).

Showing Islington, London (top) and West Village (bellow).

Figure 10: Case studies – the *mixing of uses* in relation to *normalised integration R 2500 m* values.

5. A metropolitan affair

In *The Social Logic of Space* Hillier and Hanson (1984, p.48) discuss architecture as a *morphic language*. This suggestion considers architecture as the ordering of entities into varying arrangements based on a spatial syntax in a way that 'social knowables' are formed. Hillier and Hanson explain that *'[e]ach society constructs an 'ethnic domain' by arranging space according to certain principles'* (*ibid.*). Hillier addresses further the relation between architecture and society in 'The architecture of the urban object' (Hillier, 1989). The author acknowledges a twofold formative process by suggesting three types of law which confine urban form (*ibid.*, p.6): laws of the urban form itself; laws that are assigned by society to the urban form; and finally, laws that pass on from the urban form to the functioning of society. These laws accumulatively generate complex processes of urban growth.

Davis (2006, p.99) makes an insightful observation in this regard. The author writes that the historical ideas that shaped the London building culture originate in the concept of *classification*. Davis traces those ideas back to the Act for Rebuilding the City of London of 1667 (for instance in the classification of houses and streets): *"These architectural ideas are essentially Enlightenment ideas, in which formal classification begins to fragment a formerly unified picture of the world."* (*ibid.*). In the light of these ideas, this paper discussed how in the London building culture the concept of classification is applied to spatial, morphological and functional hierarchies. On the other hand, the Manhattan cultural ideals framed a powerful street network that prioritised street functionality and utility in the city. Ballon (2012, p.17) notes: *"In 1803 the Common Council condemned streets that 'served only their private advantage, without a just regard for the welfare of others, and to the almost total neglect of public convenience and general usefulness.'"* In Manhattan the grid has been conceived as a template where streets and buildings are the components of spatial equality and permeability.

Griffiths (2009) adds to the rationale regarding urban formation that both the *diachronic* and *synchronic* descriptions need to be considered when trying to understand urban space. Diachronic processes refer to the way a city grows over time; the *synchronic* random effects are generated by the spatial configuration and relate to spatio-temporal phenomena (*ibid.*). The discussion in this paper considered the built form as the carrier of diachronic social meanings that are in contextual dialogue with the synchronic structure of the street network.

This study has given an overview of the cultural ideas behind the metropolitan development of London and Manhattan. It has shown how the ordinary vernacular settings of the terraced and row houses have been formed by collaborative social, morphological and configurational frameworks. These frameworks activate both temporal and historical emergent processes shaping distinct urban cultures. The analysis has revealed how in both cases, the visions contained in the urban form were shaped by both programme and emergence, which have transformed the terraced and row building morphologies into unique urban configurations at all scales of urban form and in turn, as discussed, into the unique cultural manifestations of the two contrasting cities. The power of a few simple rules of configuration and aggregation has been to shape the past, present and futures of these urbanities.

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