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Reclaiming the virtual community for spatial cultures: Functional generality and cultural specificity at the interface of building and street

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This paper engages with the formation of spatial cultures at a micro-morphological level to advance a general argument for the need to further study the contribution of building morphology to the collective realm of the quotidian city. It suggests how the macro-scale approach in analysing spatiotemporal phenomena in urban space lacks a sensitivity to historical urban processes at the micro-scale where the generic and culturally specific aspects of the diachronic city interact to give rise to actual communities. This recalibration of scales, it is claimed, is an epistemological prerequisite for urban design theories to engage productively with the social theory of space.

The paper problematizes the idea of the building-street interface and its implications for conditioning urban encounters at the threshold of architectural and urban scales. The argument develops the space syntax concept of 'virtual community' as a means to understand how the theoretical capacity for individual buildings to aggregate into a streetscape becomes culturally particular at the level of users' co-presence in physical space. It looks at the rules of built form aggregation and their implications for shaping the building-street interface in terms of probabilistic encounters over historical time. The argument is then illustrated through an analysis of the historical building-street connectivity as a cultural articulation of spatial-morphogenetic processes. Two urban settings are examined: terraced house morphologies in London and row houses in Manhattan. It is proposed that a micro-morphological approach to the description and analysis of the building-street interface helps to supply a 'missing link' in theorising the space-society relationship as part of a broader project of rethinking what 'design' means in an urban context.

Keywords: spatial cultures, virtual community, micro-morphology, building-street interface, probabilistic encounters

1. Introduction

A central proposition in space syntax theory is that twentieth century urbanism dismissed linearity as the principal organising element in urban form in preference for convexity – that is, open space – in the arrangement of buildings and blocks. This preference, it is claimed, was driven by an ideological purpose: the creation of ideal urban communities as a response to a shortage of housing and the environmental and social injustices of industrial society. The irony, as Hillier and colleagues have argued in

a succession of theoretical and empirical studies, is that the history of many such modernist housing projects contributed to the lack of opportunity for forming the communities that they sought to create (Hillier, 1986; Hanson and Hillier, 1987; Hillier, 1996, p.138-170). Controversially, Hillier and Hanson (1987) argue this is because the very possibility of community relies on the effects that built form exercise on the organisation of social life. These effects cannot be indefinitely postponed by the ideological or socio-economic imperatives that apply at the time

of a building's genesis. Crucially, the architectural principles of community refer not to actual social practices, interactions or encounters that take place in space, as for example in Giddens' (1979, p.56) notion of 'situated practices' in the reproduction of social structure (so called 'structuration'). Rather, for Hillier and Hanson the architectural effect (they are unconcerned with what anthropologists call architectural 'affect') is experienced virtually as a set of intuitions or anticipations about the likelihood of being co-present with other people in a given urban space. Or, to look at this another way, with the extent to which the sense of where the 'quiet areas' and 'busy areas' are located in relation to one another is predictable, even in the absence of local area knowledge. For Hillier and Hanson, the consequence of modernism in urban design has been to disrupt the structure of the virtual community – and with it the human sense of the basic intelligibility of urban space that Hillier proposes as a necessary, if not sufficient, condition of community (Hillier, 1996, p.212-14).

The notion of 'intelligibility' is important and intimately connected with the fundamentally linear structure of urban space in space syntax theory. For Hillier, streets are essential in constituting the 'background' and 'foreground' networks of cities that differentiate between relatively segregated residential spaces and relatively integrated central spaces, while also creating 'interfaces' between them that generate the essential 'mixing' of people and activities on which urban life depends. It is through this intelligible linear structure that the virtual community functions to mix local and non-local populations in a way that, Hillier argues, is intuitive and generic. In empirical research, intelligibility (and its sister concept 'synergy') refers to the extent to which the global structure of a city is easily accessible from a given local position. There are undoubtedly issues with this theorisation. Griffiths (2015, 2016a) has argued that the concept of virtual

community implies a temporal as much as a spatial co-presence. There is also a strong tendency to conceive the virtual community in terms of spatial cognition, which lends itself both to a reductionist definition of intelligibility in terms of brain function and a reciprocal lack of emphasis on the virtual community as a culturally-specific articulation of generic architectural possibility. All these critiques are touched on in the argument presented here.

Yet if we seek to develop the concept of virtual community in order to engage broadly with the social theory of space, something further is missing. While streets are periodically acknowledged as the staple generator of urban life (c.f. Jacobs, 1961; Alexander, 1966; Hillier and Hanson, 1984; Campbell and Cowan, 2002; Marshall, 2004; Gehl, 2010; Anderson, 1986), urban buildings remain largely detached from the concept of the street (Palaologou, 2015). A consequence of this detachment has been the notable absence of an effective conceptualisation of the way streets relate to buildings, and how these elements combine to constitute the street 'interface'. The failure to adequately conceptualise the building-street relationship has, in its turn, undermined the theoretical understanding of the street domain as a generative element in the life of cities. A consequence of this neglect, it is argued, has contributed to the calcification of the 'virtual community' in the space syntax literature itself, which rather struggles to escape the context of its origins in studies of housing estates to achieve a broader theoretical prominence. Two reasons are given for this: first, the notion of 'virtuality' has been adopted in other knowledge domains (for example that of 'smart cities' (Renninger and Shumar, 2002; Barber, 2013) that could not have been anticipated when Hillier and Hanson were writing their formative theoretical contributions, lending a rather antiquated feel to the concept in this context; and secondly, the appropriation of intelligibility as a graph variable captured by its r^2 value in the bivariate correlation

of integration and connectivity – an emphasis that fails to acknowledge its broader conceptual connotations, for example in Heidegger's and Habermas' theories of language and communicative practice (Heidegger, 1953; Habermas, 1984; see also Netto, 2008).

It is the lack of an adequate conceptual framing for the syntactical notion of intelligibility at the micro-morphological scale that is our principal concern here. Specifically, we argue that the lack of precise empirical articulation of the complex historical interface of buildings, streets and the city, the scale at which virtual communities emerge and sustain actual communities, has served to privilege analysis of the abstract materiality of spatial relations (what Peponis 1993 calls the 'generality of architectural function') over the concrete materiality of historically and geographically specific spatial cultures. A consequence has been that syntactical research into the key societal dynamic between architectural function and meaning – implicit in the idea of 'spatial culture' – has been skewed in favour of the former (Hillier, 1989; Griffiths and von Lünen, 2016). Indeed, the very use of the term 'interface', in this context suggests a preference for the generic, topological and synchronic definition of the building-street relation, over one that prioritises the complex, morphological transitions typical of historical built environments.

A micro-morphological approach to the description and analysis of the building-street interface helps develop the virtual community concept by problematizing the implicit integration of the generic (spatial-virtual) and the *explicit*, specific (historical-cultural) aspects of the space-society relationship. Whilst the need to understand the contribution of buildings to spatial cultures is a latent theme, our main concern is the spatial articulation of encounter-fields in micro-morphological situations as expressions of cultural agency. The conceptual argument, developed in Sections 2 and 3 will then be applied

to detailed empirical work conducted on neighbourhoods in Islington, London, and Manhattan, New York, in Section 4. In conclusion, some reflections on the implications for spatial cultures theory of a micro-morphological approach to virtual community are offered.

2. The virtual community in space syntax theory and urban morphology

The theory of the virtual community states that for any social interaction between the users of a space to occur, there is an anterior need for the users to be physically co-present. Crucially, the probabilities for physical co-presence are strongly affected by spatial configuration, which leads to certain expectations about the patterns of co-presence likely in different kinds of spaces – what Lefebvre (1991, p.34) might refer to as spatial practice 'lived directly before it is conceptualized'. Lefebvre introduced 'lived' space, or representational space, as a third denominator in the dialectics of material space, adding it to the two other poles of perceived and conceived space (Elden, 2004, p.190-191). Perceived space derives from concrete materiality – from space that has physical, material substance and relates to the modalities of the body. Conceived space resides in abstract materiality – in mental and geometric representations of space. Lefebvre recognises an instrumental element between concrete and abstract space and seeks to integrate them theoretically through the idea of 'lived space', reconciling pure materialism and pure idealism through a dialectic relationship. The instrumentality of space over the modalities of the body can be seen in De Certeau's (1984, p.98) 'rhetoric of walking' as the creation of a spatial language that organises an ensemble of possibilities and restrictions. The novel proposition of space syntax theory is the instantiation of a formative link between *space* and the *body* at an abstract level. It asserts that a *measurable* yet abstract (Weissenborn, 2015) correspondence

¹ Stuart (2014) makes an insightful link between Lefebvre's *habiter* and Heidegger's *wohnen* and explains a fundamental distinction between notions of 'inhabiting' or 'dwelling' (as activities) and that of 'habitat' (as a function) – which is that the space of 'habiter' or 'dwelling' is not cut-off from urban and social space (*ibid.*, 190).

exists between what Penn (2003) calls 'habitable space', structured through its material organisation, and the potential for encounter and co-presence of bodies, to be sustained over time *in the absence of any actual bodies*.

Paradoxically then, the term 'virtual community' expresses the presence of communal life in its absence. In doing so it highlights the difficulties of capturing both the probabilistic effects of structure (spatial intelligibility) and the attributes of building-street morphology that, in their material form, might be said to lend a kind of *cultural* intelligibility which is neither purely artefactual nor semantic in definition. To make this point it is worth returning to where the term 'virtual community' first appeared in Hillier et al. (1987) as the pattern of co-presence of potential users within a space. As an elementary form of co-awareness it represents an as yet unrealised community that is the product of spatial design, rather than of actual interaction among its members. The formation of the virtual community, when considered as the product of spatial *design*, entails socio-cultural agency. Subsequently, the extent to which space is representative and/or constitutive of *particular* social/cultural meanings remains indeterminate; implying that space works ambiguously as both medium and mediator of meaning. We then need to distinguish between: (a) co-presence generated by random morphological relations between spatial elements (akin to Peponis' general function (1993, p.54)); and (b) co-presence which is the product of the description-retrieval process (akin to Hillier et al.'s virtual community).

The distinction is between the virtual community as a general function of probabilistic co-presence and as a source of culturally specific production. The field of probabilistic co-presence generated by a spatial layout through random morphological rules is a general function of space. But, as advocates of parametric design might consider, random aggregations do not produce virtual communities; they

produce probabilistic occupancy/co-presence. A virtual community exists only when *cultural meaning* is embedded in the apparently random morphological rules through which society overcomes space and those configurational descriptions 'retrieved' and embodied through everyday practice. This cultural definition of the virtual community questions the value of referring to purely spatial effects at all, since it suggests why artefactual processes in the inhabitable world of space cannot be separated from a primary elementary cultural orientation – a position that acknowledges the critique of space syntax that it makes totalising inferences concerning social processes from material urban conditions (see Westin, 2015).

This is not, however, to claim society or culture to be anterior to the artefactual process. Rather it asserts a more elastic field in which the agencies of material and social dynamics that shape culture are not easy to distinguish. At the micro-morphological scale, the space-culture relation becomes indivisible analytically. On this basis we can distinguish between potential patterns of space habitation (see Bordieu's *habitus*, 1984; also, in Peponis, 1989) and the 'culture of space habitation'¹ conceived as a virtual community. In this way, we can begin to conceptualise the virtual community as a kind of *cultural intelligibility or probability*, emerging from the physical and social city; a mutating informational domain through which historically and geographically specific spatial cultures are perpetuated, mutated and dissipated over time.

Whilst the virtual community might be said to be mediated (or 'perceived') via the syntax of spatial configurations and 'description retrieval' processes (Hillier, 1989), the urban object is formulated and designed through morphological rules (formal formative processes of the architectural/urban object) and cultural meaning (semantic formative processes). Architects operate within the domain of formal possibility – namely, considering mor-

phological properties geometrically – which itself relates to the configuration of spatial attributes (Psarra, 2010, p.22). Whilst there have been several studies which have confirmed the impact of geometrical properties on syntactical properties of space (p.18-21), these focused for many years on the building interior. More recently the argument has been extended to street morphology, for example examining the way block size relates to syntactical properties of the street network (Lim et al., 2015; Peponis et al., 2015) or studies which consider plot or block face morphology, the street network, and land use diversity (Vaughan et al, 2015; Vialard and Carpenter, 2015). Here we are concerned with the realisation of virtual community as an aspect of urban structures rather than building interiors and we aim to contribute in the discussion with two lines of enquiry, the first morphological and the second, syntactical.

The first line of enquiry is to distinguish how *arrangements* are considered in the morphological (i.e. concerned with the geometry of material form) and syntactical (i.e. concerned with abstract relations) tradition to the study of urban form. Urban morphology seeks to understand the general 'components' and elementary 'units' of built form arrangements (Marshall, 2009, p.60-68). Space syntax, by contrast, considers the relational properties of discrete material systems (or configurations) which exist on account of the pre-existing spatio-temporal reality embedded in the structure of the system itself. Given it is experienced in time and space, a syntactical arrangement can be seen as a 'morphogenetic, unfolding scheme' (Hillier and Hanson, 1984, p.205).

In the context of settlement formation, however, there is a 'missing link' between morphology and syntax that is overlooked in much space syntax research. Our hypothesis is that the morphology of the discrete entities which compose a system has an impact on the syntactical properties of the

configuration – i.e. on the spatio-temporal reality embedded in its structure. As Griffiths (2009, 2011, 2016a, 2016b) argues, the configuration internalises temporal descriptions. It is by understanding the historically formative relationship between morphology and the field of probabilistic co-presence it generates that we can begin to address this missing link and reclaim the virtual community from its status as a universal category largely detached from questions of cultural specificity.

In line with Peponis' (1989, p.94-95) argument, we propose that understanding the relation between formal possibility (morphology) and spatio-temporal probability (configuration) provides the essential basis for addressing the relation between design – which involves *both* formulation *and* evaluation (Peponis, 1993) – and the virtual community. This reveals the second, syntactical, line of enquiry to study configuration of spatial arrangements. But it is equally a morphological enquiry in that it entails the study of the fundamental components of urban form and their formal relations: the buildings, the pattern of plots, and the grid of streets (Conzen, 1960; Caniggia and Maffei, 1979; Kropf, 1996). These 'simple formal situations' – i.e. the rules of aggregation of urban form – are for Leslie Martin 'the framework of urbanization' (Martin, 1972, p.311-312). Martin stresses the importance of the *scale* and *pattern* of this framework as the generator of formal possibility in urban systems.

In what follows, we identify early space syntax ideas which relate spatial morphogenesis to social morphogenesis (Weissenborn, 2013, p.066:5). Space syntax research gradually retreated from a focus on spatial culture by prioritising the emergent processes of cities as street networks over their identity as urban configurations constituted by both buildings and streets. This *de facto* schism between buildings and streets had important implications, both theoretically in the interpretation and measurement of the virtual community, and

architecturally, in thinking how to design for it. It minimises the contribution of buildings compared to street networks in constituting the synchronic structure of the virtual community (Section 3); and overlooks the contribution of building morphology to the diachronic structure of the virtual community (Section 4).

3. The schism of scales: between buildings and streets and the need for a micro-morphology of the urban community

Streets, buildings and the formation of the virtual community

The role of buildings in the formation of the urban virtual community is limited (Hillier, 1989; Hillier et al., 1987). With the notable exception of Hanson (2000), space syntax research since the publication of Hillier (1996) and Hanson (1998) has prioritised the urban scale and complex (i.e. non-residential) building interiors. Here, we seek to highlight the emergence of probabilistic patterns of co-presence as a macro-scale consequence of residential aggregation processes and that the realisation of virtual community as a medium *and* mediator of

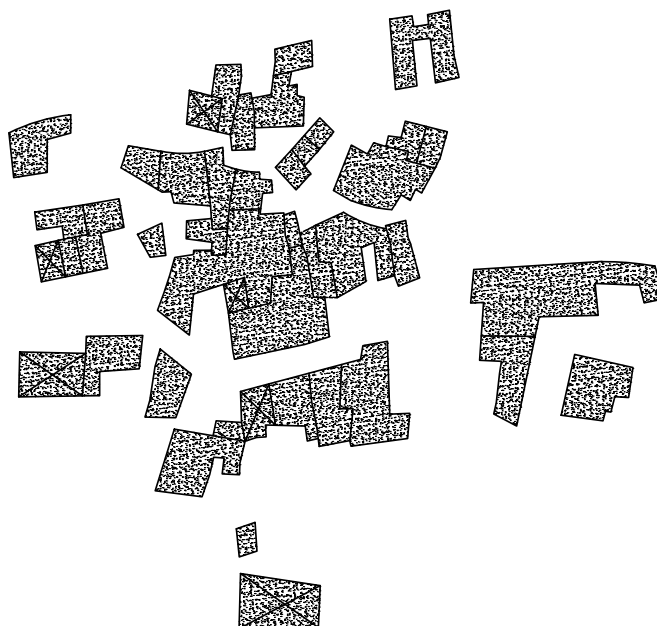
spatial culture is the product, not only of city-wide connections, but also of local micro-morphologies. This core argument then presents the street as a complex entity which interfaces *both* with buildings as well as the street network.

In settlement morphology, two basic components define space: the islands of built form and the open or 'carrier' space. Hillier and Hanson (1984, p.143) note:

'A settlement, as we have seen, is at least an assemblage of primary cells, such that the exterior relations of those cells, by virtue of their spatial arrangement, generate and modulate a system of encounters.'

Buildings, via their connection to the street, structure a field of probabilistic encounter and co-presence which overlaps with the probabilistic movement flows generated by the street network. The node of the building-street connection, namely the building entrance forms a probabilistic location for interior-exterior encounter.

Figure 1a
Example of a 'beady ring' form: Hamlet of Perrotet, 1966. Redrawn from Hillier and Hanson (1984, Fig. 6, p.57).



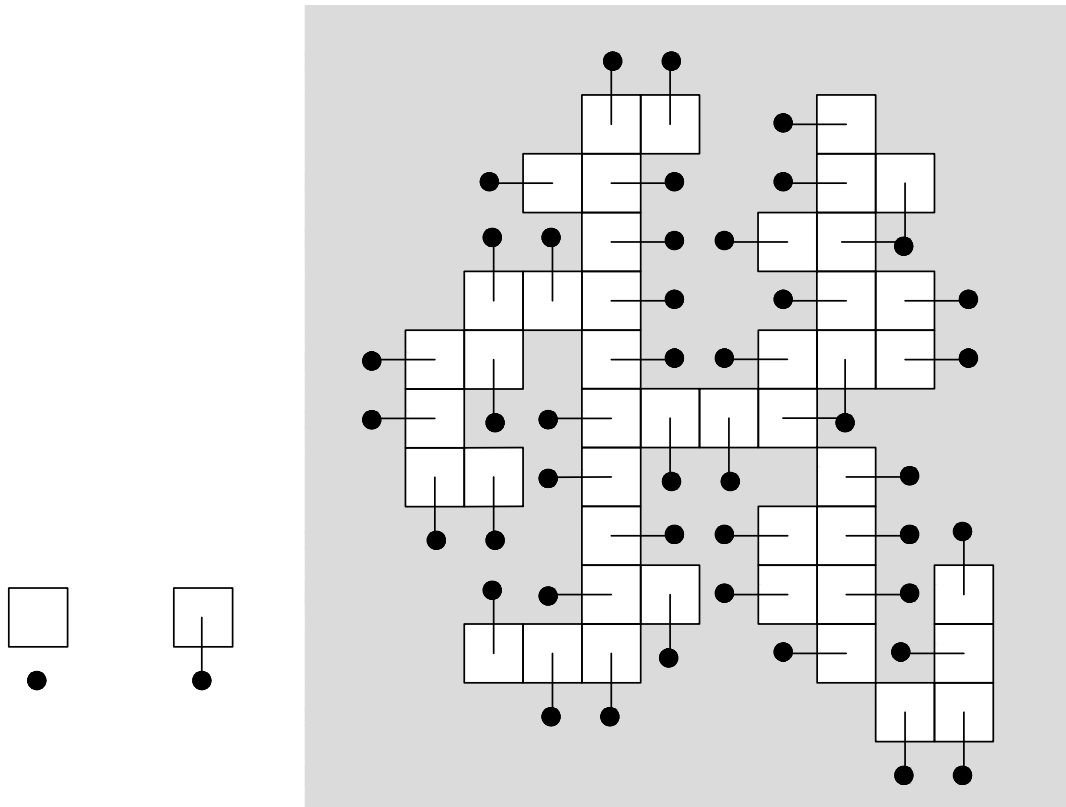


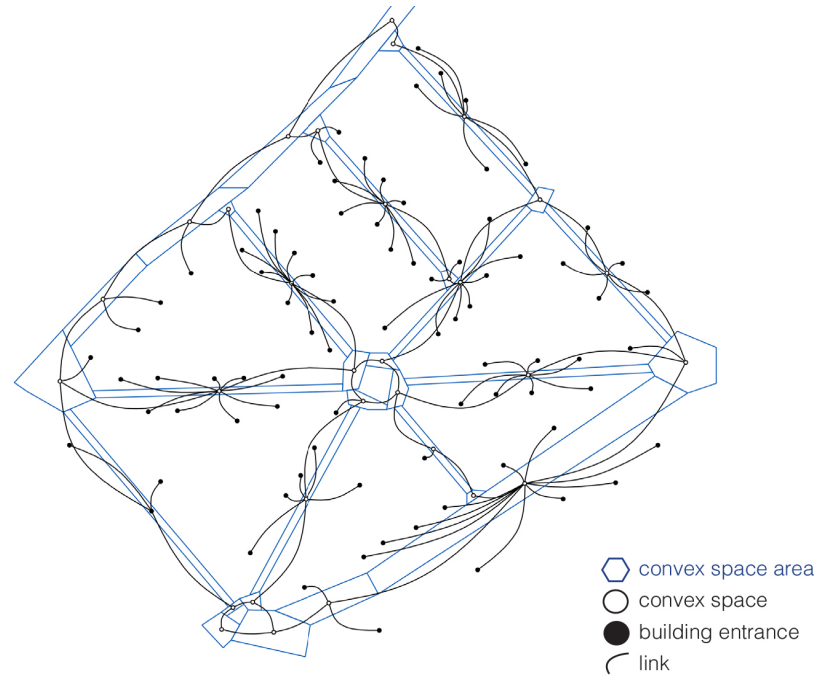
Figure 1b
Figure 1b. The 'elementary cell': computer generated random settlement formation. Based on Hillier (1989, Fig. 4, p.7).

This is not a new idea within space syntax theory. The simplest spatial and social structure was described in *The Social Logic of Space* (Hillier and Hanson, 1984, p.18) as the 'elementary cell' with an inside space, an outside space and a connection between the two: the entrance. The numerous ways in which elementary cells aggregate to form the 'beady ring' structure of settlements (Hillier, 1989, p.7) is *defined* by the relation of building entrances to open space, i.e., the settlement is an aggregation of building cells with their entrances left free to face open space (Figure 1). This describes a genotypical spatial property of settlements (*ibid.*, p.9); a general function of space. It defines the field of probabilistic encounter and co-presence that speaks to the spa-

tial morphogenesis of urban form. From this, it can be conjectured that the potential of people coming and going through entrances structures a field of co-presence other than the one generated by the street configuration considered in isolation (Hillier, 1996, p.135, 141). Whereas the actual space where the encounter occurs is the threshold between the building and the street, it is understood that open space is either the origin or the destination of the encounter. It follows that building morphology has a role in shaping the virtual community in terms of the field of probabilistic co-presence at the street domain via either the configuration of nodes of probabilistic interior-exterior encounters, or the configuration of building entrances.

Figure 2

The 'interface map':
showing street domain
'constituted' by building
entrances.



¹ For example: 'neighbourliness score', 'constitutedness', 'interface decomposition score'.

² There have been few other space syntax studies which have considered the way building morphology constitutes local encounters in the street domain. However, these studies mainly emphasise aspects of crime and safety (Shu, 2000a, 2000b; Hanson and Zako, 2007; van Nes and López, 2007). Recently, a study that builds on Hanson's pre-syntax measures from a morphological perspective exploring the associations between formal possibility and bottom-up adaptation was presented by Kostourou (2016) in the ISUF 2016 23rd International Conference: Resilient City.

In her formative paper 'Urban Transformations', Hanson (2000) extensively addressed the role of building morphology in the formation of the virtual community. Drawing on her range of specialised so-called 'pre-syntax' methods for the description of spatial configuration of building morphology she explained the importance of 'street based housing'.² Hanson developed a powerful syntactical representation, the 'interface map' first introduced in *The Social Logic of Space* (Hillier and Hanson, 1984, p.102, 104) to show the configuration of building entrances in relation to the street network (Figure 2).³ Her results showed how housing estate morphologies 'produced observable, quantifiable perturbations in the field of co-presence that we call the virtual community' (Hanson, 2000, p.120). The point that Hanson did not make explicitly, but that we emphasise here, is that the complexity of description of building-street relation necessitates a higher degree of understanding of how such interfaces were embedded in specific historical and cultural contexts. At the micro-scale it is no longer sufficient

to talk of a generic field of probabilistic co-presence; at the street-building interface, configurational-morphological logics are continually shifting over time within very specific contexts of social practice, for example in the articulation of 'private' and 'public', or 'sacred' and 'profane' spaces.

The negotiation of such binaries is associated with both the physical and cultural possibility of building morphology. Steadman (2014) in his book *Building Types and Built Forms* shows the interdependence of formal geometric possibility and generic building functions (light, access, ventilation), alongside technological and behavioural/cultural constraints. Koch (2014) in his discussion on 'Changing building typologies' elaborates on the way transformations of homes or stores – seen as both 'socio-cultural sites and architectural interfaces' (*ibid.*, p.177) occurring within the same physical structure – are appropriated *by* or *for* changing uses and everyday rituals. In the examples discussed by Koch, the street-building interface is structured over time in culturally specific manners, by the continu-

ous weaving between private and public realm, the formation of interiors, the changing role of buildings, and evolving public practices.

The space syntax 'theory of natural movement' (Hillier et al., 1993) was introduced some years earlier than Hanson's study on modernist housing estates. It develops a perspective that draws on Newtonian inertia to state that, all things being equal, movement will be predictably generated by the grid configuration on an ongoing basis (*ibid.*, p.32). Natural movement is largely responsible for orientating much urban scale research towards generic movement patterns, rather than culturally-specific ways in which co-presence – concretised as actual patterns of movement, rest and encounter (to use Seamon's 1979 triumvirate) – makes 'natural' movement socially meaningful (and less 'natural', perhaps). With hindsight one can see how the radical implications of natural movement theory came at a cost – privileging the generic city as a totalising 'probabilistic space machine' over the complex and culturally specific street-building interface; the lived space in which individual action becomes social practice (Netto, 2015, 2016).

An exclusive emphasis of the macro-urban scale is unhelpful in understanding the historical development of spatial cultures. No matter how tangible or restrained the field of probabilistic co-presence generated by the built form is (Hillier and Hanson, p.19), this does not imply that its impact on the socio-spatial entity of the street domain is any the less important theoretically. Understanding the ways building morphology configures the encounter field is also of critical importance for architects and urban designers aiming to address city building within the scope of contributing to the social sustainability of urban places (Marcus and Legeby, 2012; Legeby, 2013). Interestingly, a similar argument is made by Liebst (2015) in arguing for a micro-sociology of Hillier's theory of urban movement better able to articulate the complexity of urban social dynam-

ics than the dominant macro-economic emphasis implicit in concepts like the urban 'movement economy' (Hillier, 1996).

Making the necessary theoretical steps requires acknowledgement that the micro-scale is of equal importance to the macro-scale in understanding the social life of cities. Giddens (1984, p. 139-144) argues that social structure should not be prioritised over located situated practices. Giddens, however, is essentially an organicist thinker and there is an implication in structuration theory that the micro largely mirrors the macro in reproducing social structure. This risks endorsing a binary 'micro-macro' conceptualisation of the social that excludes temporality, the potential of situated practice to morph and mutate in an ongoing and contingent negotiation of change and continuity. From an urban design perspective it leads to a schism between practitioners working on the design scale (micro) and the strategic (macro) scale (Marshall and Caliskan, 2011, p.413). The proper description of the *interface* of these two scales then, has important implications both for the social theory of space and urban design. Such an interface cannot be regarded as a static, generic field, but constitutes a complex and multi-faceted transitional time-space in which configurational (relational) and morphological (material) elements of cultural norms are practised and contested through quotidian routines. More than a universal probabilistic field of co-presence, the street-building 'interface' as constitutive of virtual community is key to the temporal description of the urban object and articulating historicity of urban life in different contexts. This raises the problem of spatial description that is addressed in the following section.

II. The micro-morphological description of the virtual community

Micro-scale analysis looks at the properties of the smallest, elementary city component: syntactically this is the building, the 'elementary cell' (Hillier and

⁴ For instance, inhabitants and visitors/strangers; c.f. Hillier and Hanson, 1984, p.17 on settlement space, p.147 on buildings; Hillier and Penn, 1991, p.33; Hillier, 1996, p.198; Hanson, 1998, p.6).

⁵ Quoted from Peponis's Plenary Session in the 8th International Space Syntax Symposium, January 2012, Santiago, Chile: (e-source) <http://vimeo.com/35709228>.

Hanson, 1984, p.18, 59). In urban morphology it refers to the examination of building morphology properties at the level of the individual building (or plot); namely, the city's *micro-morphology* (Whitehand, 2001, p.106).

Our concern here is with the micro-structure of the virtual community, defined by spatial relations at the micro-morphological level. The Conzenian school approaches this scale through the description of morphogenetic boundaries; for example, in denoting clusters of equivalent morphological change recorded across neighbouring plots leading to collective building transformations (c.f. Conzen, 1960; Whitehand et al., 1999; Whitehand, 2001). Here, we aim to show how micro-morphological description has a structural agency at the street interface in the production of virtual community.

It is first worth clarifying some useful terminology used to describe the building-street relation. An inside space, an outside space and their relation are distinguished as follows:

- A *boundary* signifies separation. Boundaries have the fundamental property of disconnecting and, simultaneously, of defining two domains: an enclosed space (interior) and a surrounding space (exterior) (Hillier and Hanson, 1984, p.144).
- A *threshold* signifies potential transition (i.e. accessibility). Thresholds are those sections of the boundary where there is potential accessibility between the enclosed and surrounding domains.
- An *interface* signifies potential interaction (i.e. accessibility, visibility, contextual). Interfaces are those areas where the two domains meet/overlap – physically and/or contextually – and potentially interact.

The difficulty of the term 'interface' derives from its association with both tangible (concrete, physical) and intangible (semiotic, contextual) connectivity (Bobic, 2014). In other words, the existence of

an interface suggests an impact on the form and function of the overlapping/interacting domains. The study of building-street interfaces assumes an understanding of both the building and the street entities and signifies the multi-faceted ways in which buildings contribute to public realm and *vice versa*. In the space syntax literature, the definition of the *interface* is sometimes ambiguous. Mostly it refers to the way the arrangement of spatial boundaries structures the way different user groups⁴ experience the non-discursive (intuitive) properties of space (see Peponis, 2012), and the probabilistic encounter and co-presence between different groups. Koch (2013) advances our understanding of how architecture performs as a conceptual interface materialised in the spatio-temporal passage from the building exterior into the internal configuration.

Here we develop the term 'interface' to address elementary connectivity relations between the inside-outside domains in terms of the ways in which building morphology shape the field of probabilistic encounter and co-presence at the street domain. This is not to suggest that the contribution of building morphology to the structure of the street interface should be reduced to simply quantitative connectivity and probabilistic encounters, rather it is an effort to begin tackling the problem starting from basic spatial relations and their significance for the syntax of the building-street dialogue. In this respect, *we consider the interface as an entity which has a spatial form itself* – rather than as an amorphous, derivative, spatial effect. Peponis has proposed a more tangible definition of spatial interfaces (in buildings):

[...] the creation of different spatial conditions and their relationship, whether this is defined at one location or threshold, or across multiple locations distributed over a design as a whole.⁵

This description primarily focuses on morphological properties of buildings and their spatial configuration, such that the idea of 'interface' acquires material substance and becomes the object both of cultural description and design practice. It means the notion of a 'spatial' interface is acknowledged at different scales, as a location, a space or a series of locations. Here we consider the following spatial interface scales between buildings and streets, at the street domain:

- *Building-street interface*: the space from the building façade (including the three-dimensional surface of the building façade and the activity behind it – if the activity is visible or implied otherwise) to the street domain (including the pavement configuration and its micro-morphology⁶).
- *Block-street interface*: the aggregate of building-street interfaces facing the same street segment side.
- *Street interface*: as the aggregate of building-street interfaces facing the same street, including both sides of the street and the open space between.

In order to develop a methodology for examining how the morphological rules of aggregation of urban form (such as scale and pattern) structure the *street interface*, it is necessary to specify the morphological unit which will be the object of study. In their account of building aggregates (p.118-160), Caniggia and Maffei (1979; 2001) describe the pertinent strip

as 'the area inherent to each route that contains the building lots that face it and are served by it' (p.125). Similarly, we consider as a single unit the array of 'built plots' which face the same street. This involves distinguishing parts within the island of block area, based on the direction of building fronts (i.e., according to the block sides). In this way, buildings are conceptually linked to the street domain. The morphological unit of study in this case is the block front, and the block-street interface. Analytically this dovetails well with the street segment as the primary unit of syntactic urban configuration analysis. Respectively, every block front can be related to the properties of the street segment it is facing.

A second issue approaches building morphology in a syntactical manner, considering how the patterns of probabilistic encounter and co-presence that define the generic structure of the virtual community are the product of spatial configuration. In the Conzenian tradition (Conzen, 1969, p.3-5), the concept of the plan-unit is used to distinguish between varying settings of the three plan-elements: the streets, the plots and the block-plans (i.e., the building layout situated in the block layout). This idea of looking simultaneously at the building interior in relation to the block layout and the street pattern entails a reading of the streetscape which considers the ground level as a continuous entity, linking buildings to streets. This micro-morphological idea is advanced in order to explore syntactically the *street interface* (as the aggregate of building-street

⁶ For instance, as part of the pavement micro-morphology we could include an array of trees.



Figure 3
Spatial interface scales
at the street domain:
building-street; block-
street; street. Source:
Palaiologou, 2015.

⁷ The sum of the widths of building façades which face the same street segment.

⁸ Building morphology relates back to limitations of geometry and generic function (such as light and ventilation), technology and users' behavioural constraints, as is clearly illustrated by Steadman's analysis of built forms (Steadman, 2014). Steadman draws on the example of four building types to show how the simple requirement for day lighting has an impact on the configuration of access and circulation patterns (*ibid.*, chapter 2, p.23-50).

⁹ See Hanson, 2000; Hanson and Zako, 2007; Zako and Hanson 2009.

interfaces), and morphogenetically to identify how building morphology relates to the articulation, density, proximity and diversity of building-street connections, and finally, to consider the production of interior-exterior encounters as culturally as much as generically defined.

From the viewpoint of describing systematically the degree of building-street connectivity as a spatial-morphogenetic and culturally-specific property of street interfaces, there is the requirement to identify the properties of block frontages (our unit of analysis as explained earlier) which relate to the presence of building thresholds alongside pavements and sidewalks. The description involves examining (a) the elementary/syntactical properties of building morphology which generate the probabilistic patterns of co-presence at the street domain (i.e. of the building-street interface), and (b) the configuration of *accessibility* relations between the building interior and the street domain. The key variables to consider are the count and the physical proximity of building thresholds. Two primary factors to be taken into account are: (i) the block front length⁷ in relation to street segment length, and (ii) the frequency of building entrances alongside a street segment. Figure 4 illustrates simple measures which calculate these block-street interface properties.

Accordingly, we identify as follows the morphological properties which affect the arrangement of building thresholds across a block front⁸ (and respectively, across the street-segment side) in terms of the *immediacy* and *density* of building thresholds:

1. The situation of the building within the plot: the distance of the building line to the plot line/street domain impacts on the immediacy of the building-street connection.⁹
2. The distinction between direct and indirect building thresholds which create diverse micro-situations in terms of sidewalk occupancy.

3. The unit of the aggregate; namely, relations of scale – or otherwise described, the part/whole relation of the plot and the block/block-side. This relates to the proximity and density of building-street connections.

The way buildings contribute to the virtual community of the urban realm is, of course, more complex and requires research about multiple other building characteristics, including interior-exterior inter-visibility, building height, floor-space capacity (see here, for instance, Berghauser Pont and Haupt's work), occupier density and pavement/sidewalk width and the daily cycle of building use. All these factors which relate to building morphology and impact on the micro-morphology of the probabilistic field of co-presence remain underexplored.

Finally, the micro-morphology of the virtual community as a product of building morphology needs also to be addressed diachronically, raising the question of temporal description of syntactical elements and of historical processes acting in the urban realm. The purpose of this research is to provide insight into the way the generic rules which structure the syntax of building aggregation in urban space contribute to the emergence of cultural specificity. Pursuing this question, the following section (4) examines the building morphology of terraced houses in Islington, London and row house complexes in Manhattan, New York, in order to address the question of how similar buildings types can be so arranged to form distinctive spatial cultures. The research tests the hypotheses that cultural specificity can be traced to the syntax of building morphology; and that aggregation rules contribute to the emergence of more or less probabilistic structures of the building-street interface.

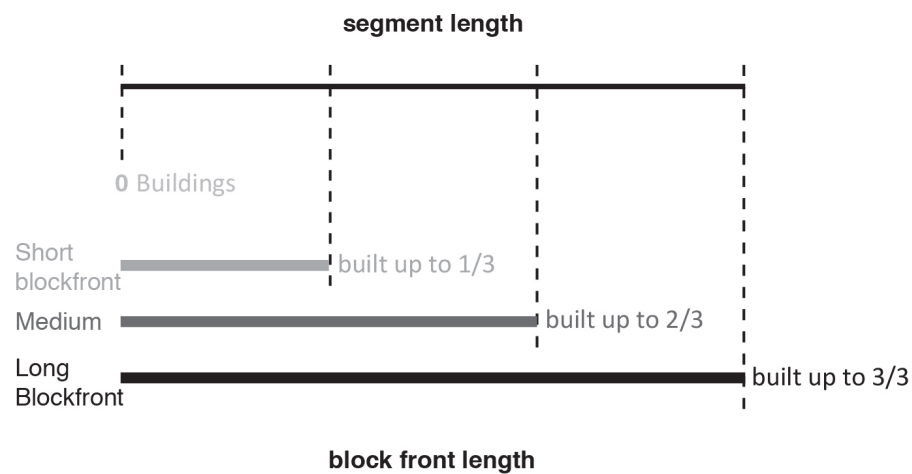
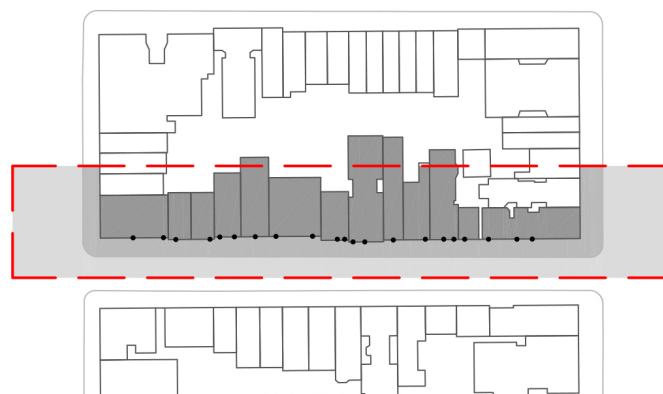


Figure 4
The block-street interface: relations of proximity, density and interior-exterior accessibility. Source: Palaiologou, 2015.



Door encounter rate = total façade length/number of thresholds
Threshold frequency = segment length/number of thresholds



● *direct* building threshold
 ● *indirect* building threshold

4. Learning from the ordinary - learning from history

This section takes an illustrative study which considers the terraced house and row house block fronts from the perspective of their comparative fields of probabilistic encounter and co-presence, before turning to how the micro-morphology of these buildings in relation to the street network describe distinctive spatial cultures. This second stage of the argument relates to the cultural meaning invested in built form and, in turn, generated by built form – but also raises the question of the extent to which such

absolute distinctions between configurational (non-discursive) and material (discursive) descriptions remain valid at the micro-morphological scale. While the study overall is narrow, it illustrates potential difference in spatial cultures depending on a very simple property of the interface between building and street: the degree of building-street connectivity and the ‘conditioning’ (Koch, 2015) of interior-exterior encounters. This property is fundamentally linked to the structure of the virtual community at the micro-scale as an agency for cultural diversity.

Figure 5
London terraced houses (top) and Manhattan row houses (bottom).
(Photo: Garyfalia Palailogou)



A principal characteristic of both the terraced house and row house block front morphology is the articulation of narrow building units of similar/identical proportions to compose a block front. The urban terraced and row houses are street facing building units which started off as single-family houses. Built on its own piece of land, each house/building unit has its own connection to the street. Assuming an entrance per building unit, in the final aggregate there are typically building-street connections occurring across the whole length of the

block front. In addition to the frequency of potential interior-exterior encounters, the terraced/row house morphology supports diversity in the configuration of the building-street interface. The degree up to which these houses open up towards the public domain depends on a number of factors: the size of the building, its construction period and architectural style, as well as the social class of its residents, ownership and speculative building (namely, how many building units in the block front were built at the same time by the same developer¹⁰).

¹⁰ In speculative practice, developers build houses before securing buyers.



Figure 6
Terraced houses and row
houses: sidewalk micro-
morphology.
(Photo: Garyfalia
Palaologou)

A significant difference with regards to the building-street relation rides upon the presence or absence of a basement. Where a basement exists, the need for a basement window to provide daylight and fresh air creates a complex micro-morphology for the terraced/row house fronts featuring small 'areas' (or 'areaways', as called in the American type) and 'stoops' (a flight of steps leading to the building entrance) (Figure 6). These micro-morphologies move the building entrance away from the sidewalk. Configurationally, this means that, on the one hand, the interior-exterior accessibility becomes indirect, but on the other hand, that another entrance (one leading to the basement) is added in the configuration. Depending on the culture of the morphological rules (rigid or informal), the sequences of direct and indirect entrances may range from being entirely repetitive up to completely random. In either case, there is an underlying template in the pattern of plots, which maintains an order on the block façade and organises both uniformity and emergence – namely, it assures a morphological unity (explicit or implicit) of the block front. Being part of a unifying template at the block scale and at the same time always connected to the street domain, the terraced/row house supports a strong relation with its neighbouring environment. Hence we establish (i) that the terraced/row building morphology configures the field of probabilistic interior-exterior encounters through the repetition of narrow plots (and respectively, of narrow building façades); (ii) the existence of one main entrance for each plot; and (iii) the possibility to have both direct and indirect interior-exterior accessibility.

Secondly, we assess the contribution of building morphology to the virtual community. Particularly, we examine how cultural specificity emerges historically from the generic rules which articulate building morphology, and how these control the probabilistic building-street interface over time. The Georgian (c.1714-1830) London terrace (a 'ter-

race' is a row of terraced houses) is an example of vernacular building culture which adopted austere principles of morphological order inspired by classical architecture. Davis (2006, p.90) notes that the cultural symbolism invested on the architecture of the London terrace was used for 'the reinforcement of cultural identity'. The strongest morphological characteristic is that built form aggregation rules emphasise the terrace as one entity. Each terraced house is treated primarily as a component of the block front, rather than as a distinct building unit. Terraced houses appear sewn together, conforming to the same building line, in a manner such that the visual separation of the individual buildings is obscured. This is achieved with the use of uniform aesthetical details for the entire terrace block front: typically, terraces display horizontal decorative elements which extend across the whole terrace façade, such as the crown-body-base horizontal zoning; similarly, often there is an emphasis on the centre and ends of the terrace front (Nousa, 2014; Ashton, 2012) – another indication of the primacy of the block-scale morphology over the building scale. In the Victorian terraces (c.1837-1901) which succeeded the Georgian and Regency periods, whilst the individual terraced houses become distinguished due to bay windows, the same uniform result was achieved overall on the block front via the repetition of identical façades.

The formal properties of the terrace morphology, which treat the block front as a single entity and the terraced houses as sub-entities, extend to the social context of the terrace. For example, it was customary that residents of similar social status occupied houses belonging to the same terrace (c.f. Bourdieu, 1979; McKibbin, 1998). Charles Booth's investigators, who walked the streets with local policemen in the late 1890s to observe their working and living conditions, provide us with a hint of this relationship:



North of the Board School on the east side of Canonbury Road is a nest of small courts with one or two storied houses [...] Respectable working class but once a bad family got in would rapidly become a slum of the worst sort [...] (Booth, 1886-1903, District 14).

Booth's account can, of course, be explained in socio-economic terms but there is also an explanation in terms of the architecture of the terraced house itself. The built form of terraced houses, similar to many other ordinary building types around the world (see Davis 2006, p.135), shifted according to varying functional and socio-economic requirements. The first factor to consider in this respect is size. The size of the terraced house, and therefore of the whole terrace, was directly related to the economic capacity of the people it was built for: the smaller the building unit, the lower the economic class. As mentioned earlier, building size also had an impact on the building-street relation affecting both the configuration of the building threshold and the openness of the house to the street domain (Palaologou and Vaughan, 2015). In general, smaller houses are better connected to the public domain. For instance, the working-class terraced house – more modest in height and often without a basement – has a direct entrance to the street and the windows exhibit



Figure 7
London terrace: block front uniformity.
(Photo: Garyfalia Palaologou)

the house interior at street level (Hanson, 1998, p.109-133). The morphological and social unity of the terrace meant that the block configuration did not encourage piecemeal change – whether physical or social, since changes at the building scale would most likely affect the whole block front. This does not mean that building scale adaptations or changes were not in use, only that they needed to be in line with the neighbouring physical and socio-economic context. Figure 8 shows an example of a terrace which changed over time to incorporate non-domestic uses on the ground floor. Morphological and functional adaptations at the building scale are found to spread in repetitive manner across the entire block front.

Similar to the terraced house, the aggregation rules for the Manhattan row houses range from flexible to more uniform depending on the construction period and the architectural style, as well as on social class and speculative building. But overall, compared to the terrace configuration, the row presents greater autonomy at the building scale, which translates into greater potential for piecemeal change (Figure 9). Early row houses were built following the guidelines of the Federal style (c.1791-1801) which derived from the English Georgian style. The style was appropriated to respond to the needs of New York. In the Federal block front – in contrast to the London counterpart – we do not

Figure 8a

Chapel Street, Islington, London: historical building footprints showing terrace transformations on the ground level, c.1875 (top) and c.1910 (below).

Historical background maps: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service.



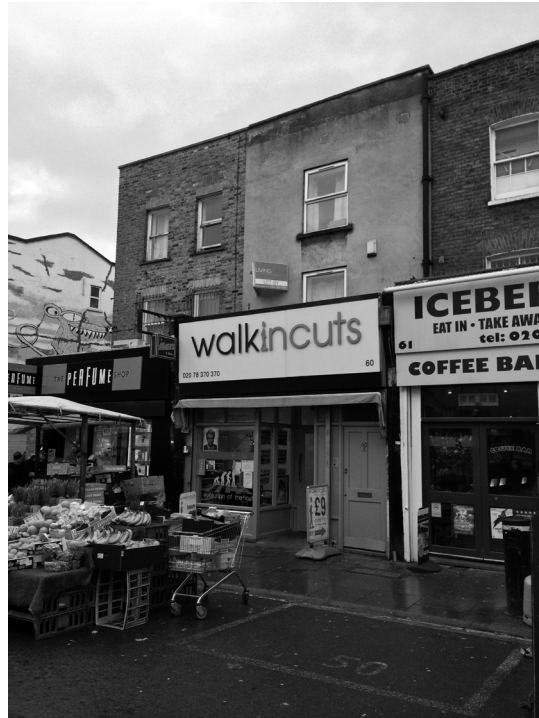


Figure 8b
Chapel Street, Islington,
London: terraced house
façade extensions/
appropriations for com-
mercial use. (Photo:
Garyfalia Palaiologou)

Figure 8c

Chapel Street, Islington, London: historical non-domestic building uses for building footprints shown in Figure 8a. Data retrieved from London Post Office Commercial and Professional Directories c.1852, 1895 and 1915; Publisher: Kelly's Directories Ltd.

Building No	1852	1895	1915
Chapel St., North side			
3	Cooksley John, slater (p.677)	-	Reynolds & Mundy, butchers (p.1181)
4	-	Benjamin Solomon, miscellaneous dealer (p.819)	Benjamin Solomon, linendraper (p.743)
5	-	Hussey Thomas, paperhanger (p.1124)	-
7	Oseman William, bricklayer (p.910)	-	-
8	-	Konskier Nathan, job draper (p.1167)	Sandow Ryman, milliner (p.1208)
10	Robinson George, prof. of music (p.956)	Phillips Loo, wardrobe dealer (p.1311)	Reynolds & Mundy, butchers (p.1181)
11	Heath Francis, coach painter (p.787)	-	Morgan Timothy, provision merchant (p.1103)
12	-	West George, wardrobe dealer (p.1512)	West Rebecca (Mrs.), wardrobe dealer (p.1316)
13	-	-	Kilby Grace (Mrs.), corset maker (p.1023)
14	-	Frayling George Augustus, milliner (p.1017)	Davies Alfred William, cheesemonger (p.852)
15	-	-	Wiles Margaret (Mrs.), wardrobe dlr. (p.1325)
17	-	-	Finer Max, linendraper (p.898)
18	-	-	Sanders Bros. corn mers. (p.1208)
19	-	-	Lawrence Stephen Charles, pawnbroker (p.1038)
20	-	Odell George, greengrocer (p.1282)	Hancock Albert Charles, herbalist (p.952)
21	-	-	Stokes Mary Elizabeth (Mrs.), butcher (p.1257)
22	-	Marchant George, tobacconist (p.1220)	Sinevitz Moss, cloth cap dealer (p.1230)
23	-	Tromer Bertha (Mrs.), draper (p.1472)	-
24	-	Hayden Hannah (Mrs.), china & glass dlr. (p.1085)	-
25	-	Parrish George, miscellaneous dealer (p.1295)	-
Chapel St., South side			
77	Tasker Joseph, cheesemonger (p. 1016)	Steer Geo. oilman (p.1432)	-
78	-	Ventris Alfred Matthew, beer retailer (p.1485)	Cawthorne William, beer retailer (p.804)
79	-	Wienberg, Batty & Co. milliners (p.1523)	Piper Reuben William, tripe dresser (p.1156)
80	Tower John Geo. upholsterer (p.1029)	Ball Fredk. Chas. furniture dealer (p.799)	Baldwin Henry John china & glass dlr. (p.733)
81	-	Taylor Alfred, wardrobe dealer (p.1452)	Conway Edward, butcher (p.831)
82	-	Richards Thomas, furniture dealer (p.1348)	Dinnis George, cheesemonger (p.863)
83	-	Richards Thomas, furniture dealer (p.1348)	-
84	-	Edwards Alfred, herbalist (p.980)	Cohen Henry, boot dealer (p.823)
85	-	Abrahams Matilda (Mrs.), miscellaneous dlr. (p.767)	Goldsmith Abraham, wardrobe dealer (p.929)
86	Yamold, Philip, tailor (p.1081)	Harrington Edward, confectioner (p.1074)	Goldsmith Abraham, clothier (p.929)
87	-	-	Goldsmith Abraham, furrier (p.929)
88	-	Wells Edward, miscellaneous dealer (p.1509)	Rosenfeldt Lewis, hatter (p.1193)
90	-	Owen Agnes (Mrs.), wardrobe dealer (p.1287)	Hussey Thomas, paperhanger (p.993)
91	-	Swales Charlotte (Mrs.), baker (p.1446)	Sinevitz Moss, cloth cap dealer (p.1230)
92	-	Canner Rose (Mrs.), wardrobe dealer (p.916)	-
93	-	Kendall William, pork butcher (p.1156)	Goebbels Cornelius, pork butcher (p.928)



Figure 9

Terraced and row houses: domestic and non-domestic use on the ground floor –clusters and incidents of change in building use. Islington, London (top); The West Village, Manhattan (bottom). London - Background map: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service. Manhattan - Background map: © 2011 Department of Information Technology and Telecommunications, NYC.

Figure 10
The West Village,
Manhattan: Federal
row houses – building
morphology variations
within the row block
front. (Photo: Garyfalia
Palaologou)



see the intention of national symbolism. Lockwood (1972, p.32) notes how 'New York row houses usually were slow to reflect national architectural ideals'. Early rows were not necessarily built all at once. Builders were normally completing only two or three row houses at a time, leading to width and height variations within the same block front and eventually to diversity at the micro-scale – i.e. at the stoop and sidewalk configuration, façade decorations and so forth (Figure 10). Even in the more formal styles that succeeded the Federal era which had more uniform block fronts, the row composition in Manhattan is treated differently than in London. Whereas terraced houses are carefully joined to resemble one building, row houses are discretely identified as entities forming part of a whole (Figure 11). The block front is the accumulation of single row houses with architectural consistencies.

Whilst being more playful and less uniform, the Manhattan row still presents morphological regularity and unity. But here order and unity here are *implicit* – in contrast to the London terrace where uniformity makes order and unity *explicit*. Over time, this has allowed for greater flexibility in building-scale adaptations, and thus, for diversity across the block-street interface of a row (Palaologou and Vaughan, 2014). During the row-house revival movement of the twentieth century (Dolkart, 2009), the architecture of the row recovers the freedom observed in the Federal block fronts. These twentieth century renovations often broke up the block front's continuity, even by encroaching on the building line. Stoops were removed and a new house front was built which extended towards the plot line. In general, the building culture enabled stylistic and functional appropriation and there-



Figure 11
An example of architectural detailing where the row's crown is slightly broken up right above the party-wall line to distinguish row house units. (Photo: Garyfalia Palaiologou)

fore numerous types of changes in the building façades, such as the replacement of stoops with direct entrances, the addition of another entrance, or the opening of a commercial window display. All these changes dismantled the uniformity of the row and brought together a complex and vibrant sidewalk micro-morphology. In terms of probabilistic interior-exterior encounters, the possible sequences of direct/indirect entrances were therefore more

random and diverse (Figure 12). This is because the stoop and areaway configuration allow for small spaces of private/semi-private/semi-public/public occupancy to blend and closely interact with the street domain of pedestrian flows. Considered as a virtual community, this means that in the row house complexes there is greater potential for cultural specificity and diversity to arise at the level of time-space micro-scale.

Building types	Buildings	Doors	Total façade length (km)	Door encounter (m)
Terraced house	3656	3978	21.4	5.4
Row house	1324	2477	9523	3.8

Figure 12

Terraced and row houses: direct and indirect building thresholds. Islington, London (top); The West Village, Manhattan (bottom). London - Background map: © 2013 Crown Copyright. An Ordnance Survey/EDINA supplied service. Manhattan - Background map: © 2011 Department of Information Technology and Telecommunications, NYC.



Comparing the two building cultures and how their building morphology structures the field of probabilistic interior-exterior encounters over time, we discussed how:

- In the terraced house culture of London, the rules of aggregation for the block scale follow architectural formalities. The terrace bears such morphological and social unity, that it could be considered as a single building taking up the whole block front. At the same time, terraces hold a strong connection to the street due to the high frequency of entrances and door-to-door encounters. At the block front uniformity prevails, restraining diversity and emergence at the scale of individual buildings.
- In the row house culture of Manhattan, the rules of aggregation for the block scale present a more flexible structure and a user-specified configuration. The row is essentially the sum of discrete building entities organised by underlying morphological principles. The strongest principle is the pattern of narrow plots. The row is explorative and playful in its building-street interfaces over time, fostering a complex micro-morphology at the sidewalk and thus a more probabilistic streetscape in terms of the building-street/interior-exterior relation. There is implicit unity at the block front which enables diversity and emergence at the scale of individual buildings.

Overall, the interior-exterior encounters supported by the row house aggregates as seen in the West Village context worked more probabilistically over time and in turn allowed for greater emergence to occur at the micro-structure of the virtual community. In these row house block fronts, the morphological rules which organise the field of probabilistic encounter and co-presence are less in number and weaker in principle than the rules controlling the terraces in Islington. These rules lead to morphological and spatial flexibility at the micro-scale

and respectively to randomness in the patterns of habitation at the sidewalk configuration. Notably, Hillier and Hanson (1984, p.198-222; also in Hillier, 1989) point out that the fewer the rules applied for a random settlement-generation process, the higher the probabilities for emergence; and respectively, when more rules are applied, a greater number of building units is then required to increase chances for emergence (Hillier, 1989). This observation is also picked up by Campbell (2011, p.4), who notes that 'limited choice equals infinite possibilities'. Nonetheless, both of these building types and their aggregates show an inherent potential for a strong relation with the street; and they actively structure a field of probabilistic encounter and co-presence on their own. In general, the terraced/row house building is a cultural component, whose value becomes primarily affirmed in its role as part of the collective urban realm. This suggests how a configurational description of the virtual community that does not acknowledge the morphological particularity of the building-street relationship is unlikely to do justice to the cultural specificity of different urban domains.

5. Conclusion: probabilistic built forms

The cases of terraced and row house settings examined in this study are examples of the ways the morphological rules of aggregation of urban form, the 'simple formal situations' as Leslie Martin (1972) calls them, may both generate the medium (configuration) and mediate the meaning (cultural specificity) in the ordering of spatial relations in spatial cultures – considering here in particular the building-street relation and the conditioning of encounters. This has implications for social relations which are produced and reproduced within the spatio-temporal reality of the urban realm. In addition, by looking at those building aggregations over time, the principles which organise building form in each case were found to have an impact on how the building unit relates to the urban realm. Specifically,

¹¹ With 'choreo-' standing for the Greek word *χῶρος* (namely 'chóros', meaning 'space' in English) instead of *χορός* (namely 'chorós', meaning 'dance' in English).

the studied row house complexes were shown to be more probabilistic than the terraced house ones – in the sense that their interface with the street became more complex, dense and diverse as time passed. Detailed micro-morphological description allows the study of configurational probability to be translated into precise spatial narratives of cultural specificity in terms of the nature of the building-street 'interface'. The degree of building-street connectivity is then understood both as a syntactic property of the building morphology inasmuch as it is also a cultural expression of societal norms at the micro-scale.

A discussion then opens on how studies on the contribution of buildings to the public realm in general and of the syntax of building morphology and the way it interfaces with streets in particular, may enable understanding the quotidian social dynamics of spatial cultures at the micro-scale as part of a project of rethinking what architectural 'design' means in an urban context. Hanson and Hillier (1987) introduced the concept of *probabilistic spaces* in their writings about 'The architecture of community'. The authors argue that design should support the *emergence of probabilities* in space-time events – namely, by creating spaces that support an emergent structure of virtual community. While space syntax studies have contributed to the understanding of *probabilistic* spaces, there remains the question of how building morphologies control how such probabilities emerge in the way the buildings interface with the urban realm. Is it apposite, in other words, to speak of *probabilistic built forms*? We argue that this notion is relevant to developing a fuller conceptualisation of the virtual community by advancing a crucial abstract link between the synchronic nature of the encounter field (as Hillier would see it) and the diachronic nature of spatial descriptions defined by the materiality of the urban realm (see Griffiths, 2011). We emphasise the word 'abstract' to highlight that the space of cultural possibility in the dialogue of configurational

description and architectural history is essentially unpredictable. Psarra (2010) suggests architectural possibility is historically generated and appreciated, and in that sense is both configurational and cultural. In arguing that it is 'the understanding of historical reality as it impacts on possibility that opens the way to possibilities that do not yet exist' (p.25), she highlights both the presence of architecture within history and history within architecture. This recalls Lefebvre's (2004) notion of 'rhythmanalysis', to the extent that the spatio-temporal reality of cities (its synchronic 'architecture') can be said to possess its own rhythm, or 'choreography'¹¹ (Peponis, 1997) comprising the *interaction of material forms, socio-economic processes and cultural practices* in a (diachronic) dialogue between past and present. In this spirit, the ambition of this paper has been to reaffirm how Hillier and Hanson's theory of virtual community implicates the dynamic interplay of *both* buildings and streets, and that descriptions of the 'interface between' them cannot sidestep historical definitions of cultural specificity in building and street morphologies, any more than the historical accounts of building or street morphologies can escape interpretation of social space as both a general function and particular expression of a given urban culture.

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