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Abstract

The concept of the 'live centre' is central to Hillier's theory of Centrality as a Process, which states that patterns of pedestrian movement are influenced by the urban grid, leading to the emergence of networks of linked centres containing retail and other movement-driven activities. Planners and geographers, coming from a different perspective, have also traditionally prioritised retail as the key measure of urban vitality and determinant of a centre's position in the urban hierarchy.

Our research into the suburban town centres of Greater London challenges the prevailing retail-centric view by proposing that the sources of vitality in local places stem from the diverse socio-economic and cultural activities that take place beyond the main retail hub; we refer to this extended area as the 'active centre'. Our evidence indicates that active suburban town centres are sustained by local industry and the provision of a wide range of professional and community services in addition to office and retail employment. Such centres are enlivened by activities occurring at overlapping scales, the outcome of journeys of different lengths, which are most likely to be repeated where network accessibility is most effective.

In this article we present a study of twenty-six outer London suburban town centres using an algorithm developed in a GIS that allows mapped land use data to be analysed in relation to space syntax measures of network accessibility. We combine this data-driven analysis with the results of an ethnographic study of three suburban town centres in which patterns of movement to and through the centres were analysed to provide a more detailed description of the type, range and scale of journeys that define the effective area of an active centre. We conclude that the spatial signature of suburban town centres is bound up in how they have been shaped to take advantage of differing scales of movement and encounter over time

Keywords: Space Syntax, GIS, Centrality, live centre, active centre, suburban town centres

1. Background

Previous research into the spatial form of cities has identified the phenomenon of the 'deformed wheel'; part of the generic structure of cities that is required to move people into and out of the centre, with quieter residential areas in the interstices of the 'spokes' (or radial routes) of the wheel. It has been argued that this pattern enables the creation of a natural interface between inhabitants and strangers. Smaller scale deformed linear structures have been observed within local areas too, and frequently these are found to be traces of an older settlement. It has been conjectured that the manner in which

the smaller scale grid is knitted into the super-grid helps shape the relation between local places and the entire city; between city parts and wholes (Hillier and Penn, 1996) and the relationship in turn between society and space (Hillier and Vaughan, 2007). This pattern of relations between local and larger scale has also been conjectured as being subject to the way in which the grid changes over time: the original settlement may in some cases grow into a larger one of the same character, whilst in others it may take on a different (perhaps more exclusive) role (Hillier, 2001). The manner in which settlement centres are transformed in their function through time, Hillier argues, is bound up in a process of settlement formation, the impact of its form on patterns of movement, and the way in which movement in turn influences the distribution of land use and lastly the way in which land use itself shapes the formation of a centre as an attractor in its own right.

Hillier's theory of 'Centrality as a Process' (1999) maintains that 'live centres', namely the functions of retail, markets, catering, entertainment and other activities, benefit from movement in particular since 'the spatial processes governing live centrality appear to invoke spatial requirements over and above those related to other central functions such as administration, office employment or religion' (Hillier, 1999, p. 107). He also notes the importance of the less movement-dependent activities in benefiting from proximity to the live centre. Lastly, the importance of understanding the formation of centres as part of a temporal process of change in spatial configuration - and thus in turn - movement patterns, contributes to this theory.

The significance of retail activity to town centres is also reflected in the priority given to retail in the academic literature and in UK policy. This is reflected in there being more data on larger stores, than on the singular shops found in smaller centres. While the importance of retail to lively town centres is undoubted, the reduction of the town centre's role to one of its viability as a retail hub is problematic. Where retail indices are used to rank centres within an urban hierarchy the result is that smaller centres with fewer international and national chains inevitably begin to fall beneath the policy radar (Griffiths, et al., 2008). By viewing town centres exclusively in terms of their retail potential, the hierarchical representation is perpetuated, not simply in terms of the number of shops but in terms of what a town centre essentially is. This is because a rank-ordering of centres by retail area does not simply have the socio-economic effect of privileging size (comparing from the top-down) but also, from a morphological perspective, fixes notions of convexity and linearity at a single scale (as properties of large centres and small centres respectively), due to the common character of retail to follow a linear pattern.

This article uses street segment analysis to take a detailed 'bottom-up' perspective on urban centrality in which it is suggested that many different forms of activity are interlinked, from the local scale to the urban system overall. The proposition is that smaller centres contain a complex and dense layering of non-residential activity that is enabled by the structuring of space, so that although at the global scale retail activities tend to be strongly linear, a more differentiated pattern emerges at the local scale. Here, the town centre tends to have a rather 'fatter' structure overall, enabling circular

movement that takes in a variety of activities distributed well beyond the 'live' centre. We term this - in contrast to the 'live centre' - the 'active centre'. The concept of the 'active centre' stems from the observation of a large number of cases within and around London which show the importance of all non-residential activity in creating local and larger scale patterns of movement. The suggestion is that the multiplicity of activities contained within suburban town centres - from light industry to the local court building - contribute to their liveliness and to their ability to adapt to social and economic change.

In 'Centrality as Process' local grid conditions are shown to be the key variable associated with the attractiveness of a local centre in the sense that grid intensification helps to sustain circulatory movement beneficial to the development of retail activity in the heart of town centres (Hillier, 1999, p. 116). Conroy Dalton and Dalton (2005) have proposed that in contrast to urban networks, suburban street networks have a spatial signature, distinctive for its 'frequency, length and distribution of the graph network circuits' (Conroy Dalton and Dalton, 2005, abstract). However, notably this distinction is part of a continuum between urbanity and suburbia - the authors do not go along with the typical binary distinction between the city and the suburb. This article builds on these ideas by suggesting that suburban centres can be distinguished from their residential hinterlands by their network characteristics. It proposes that smaller centres emerge as part of a process that benefits movement through and around the whole range of town centre activities: offices, places of production, community activities as well as retail. If this conjecture is correct, then the extended 'active' centre will have a measurable spatial signature that supports it. This article also aims to provide a critical evaluation of the planning literature's mono-scaled, hierarchical approach to urban environments, which tends to privilege the study of larger centres, with the effect of limiting the understanding the role of smaller centres in sustaining the urban system as a whole.

The research uses space syntax methodology to investigate the extent to which the street network of a sample of suburbs in the Greater London area (within the London M25 orbital road and outside of the London inner circular road) structures a range of socio-economic and community activities across different scales of movement. By using space syntax analysis the intention is to test the hypothesis that the dual function of suburban town centres as 'links in a movement system that connects places', and as "destinations, or 'places' in their own right", involves a complex layering of multiple spatio-functional scales of activity (Jones, et al., 2007, p. xi).

The research uses UK Ordnance Survey 'Address Layer 2' data processed in a Geographical Information System (GIS) to display 21 categories of non-residential activity for 26 outer-London cases in order to explore the generic characteristics of local town centres. The cases were chosen from a sample of 113 town centres to represent typical small to medium sized suburban town centres. An 800m buffer around each centre was selected to represent an 'as the crow flies' neighbourhood of approximately 15 to 20 minutes walk from the town centre's core for which the land-use data were captured, whilst an axial segment model of Greater London was used for the spatial analysis. An

algorithm was developed within a GIS in order to automate the attribution of each land-use address to its closest axial segment. The technical details of this procedure are not provided here due to constraints of space, but the authors intend to publish a paper on this in the near future. In the research reported here as well as statistical overview of the twenty-six centres studied, three of the 26 cases are discussed in detail. These three were chosen to represent the geographical and socio-economic variation within the 26 cases sample; an ethnographic study of walking and activity patterns was conducted in them during September 2008.

The paper opens with a discussion of the socio-economic complexity of smaller suburban town centres; it then goes on to consider their scaled characteristics through an analysis of land-use distributions and space syntax segment values. The paper ends with conclusions regarding the spatial character of smaller centres.

2. The complexity of smaller suburban town centres

Supporting evidence for the conception of London as a network of linked centres can be seen in figure 1, which illustrates 'global choice' (lines coloured in a scale from red to blue) overlaid on a density surface (grid squares coloured in a scale from dark to light grey) indicating where retail addresses are at their densest. Examination of figure 1 shows how global choice, the measure of potential through-movement, in this case taking account of a spatial model of Greater London, is evidently a reliable predictor of retail activity, since the warmer end of the colour scale coincides with clusters of dark grey. This distinctive pattern suggests how movement-dependent town centre activities emerge in a distribution that reflects the degree to which paths overlap at the urban scale.

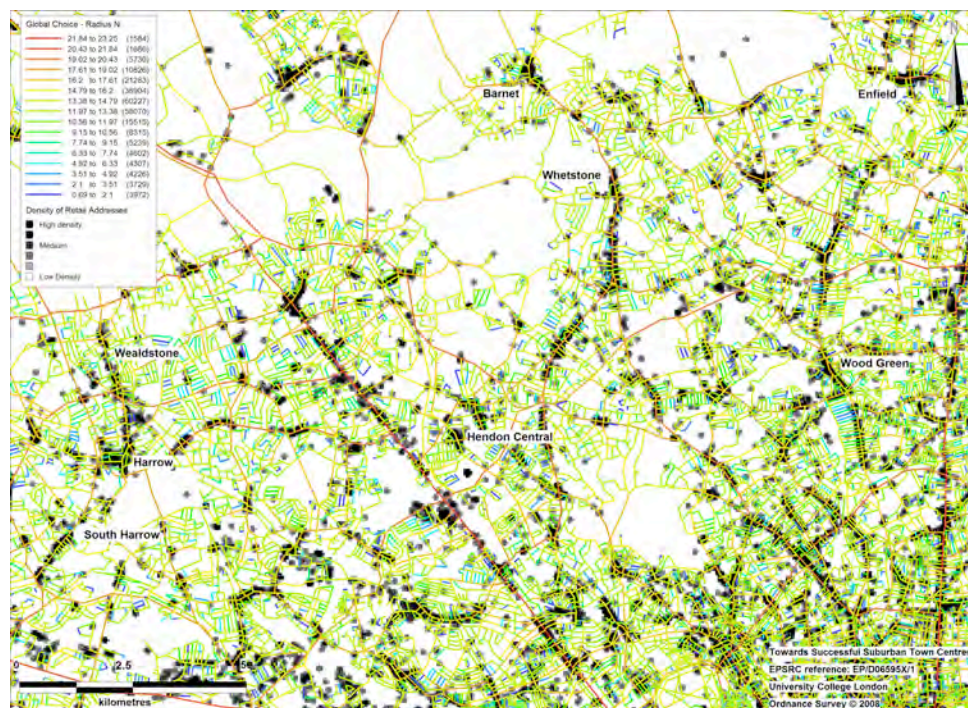


Figure 1. Density of retail activity and global choice in London.

Figure 1 also suggests the strong linearity of this pattern in outer London, especially in the smaller suburban centres which often arose along historical access roads to the metropolitan core. Where the distribution of retail activity is rather more convex than linear, it tends to be the larger suburban centres (such as Harrow, in the left-hand side of the image) that display this pattern. In other words, convexity is seen to be a function of the size of the centre's retail capacity. While larger centres are easily represented in these terms as 'attractors', destinations one might choose to move to and around; smaller centres, by contrast, are represented as places where one might pass through en route to somewhere else. The consequence of a too-exclusive focus on the network's global properties is that larger centres appear as 'natural' destinations while smaller centres appear as highly linear - reduced, effectively, to a shopping strip.

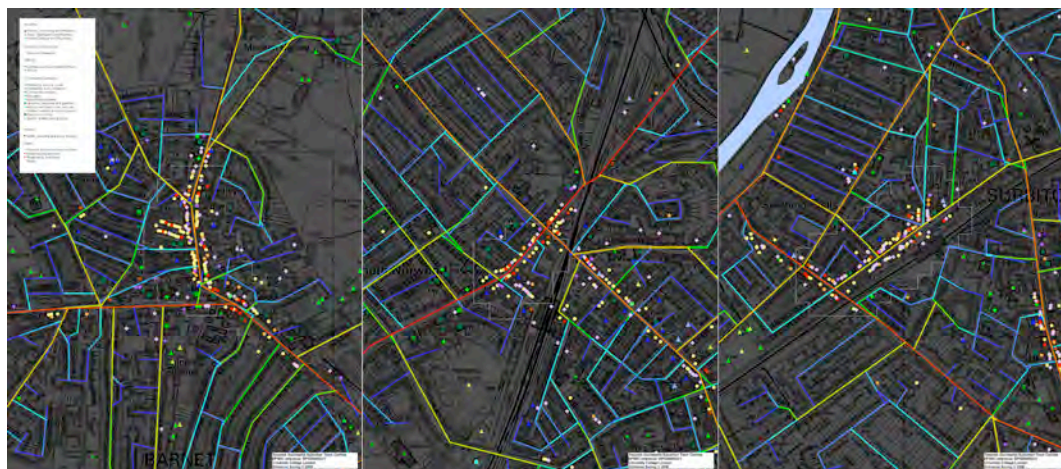


Figure 2. Non-residential activity and segment angular choice radius n calculated for London within the M25, for Chipping Barnet (left), South Norwood (middle) and Surbiton (right). Underlying map is © Ordnance Survey 2008

Yet interestingly, when we look at some smaller centres close up we find that this hierarchical pattern begins to break down, even at the macro scale. Figure 2 shows three suburban centres, also at global choice radius n . Here we note that not only is much of the main retail activity in fact not on the route with the highest value (the lines coloured red), but when other categories of activity are taken into account, a more convex and more complex description of the relationship between built form and socio-economic activity is required. In fact a preliminary statistical analysis showed little self-evident relationship between categories of land-use and the space syntax measure of choice.

One implication of the research question addressed by this paper is that suburban town centres are more complex and diverse than previously thought. A previous study of the outer-London suburb of Borehamwood found that this relatively small settlement contained within it a surprisingly varied range of communal, economic and social activities, belying the stereotype of suburban town centres as purely serving the local needs of their residential hinterland (Vaughan, 2006). The study found that a variety of groups used the town centre at different times of the day and week, suggesting that such places frequently comprise a dense layering of economic and social activities which work at a variety of spatial scales (in other words, serving a variety of overlapping catchment areas) to serve

a range of social groups. Subsequent research has suggested that the reason for this is that suburbs that have succeeded in persisting in the same location through time are able to adapt to social and economic change (Haklay, et al., 2008). This temporal component is important to the argument that it does not make sense to privilege one scale of provision over any other, since centres operate at different scales simultaneously and also might shift their importance from one scale to another over time.

One example of the complex array of land uses present in the sample of 26 centres is Church Street (Figure 3), two turnings away from Rickmansworth high street (in the UK the main street of a centre is commonly termed the 'high street'), in the north-western edge of Greater London. Data from a local business directory show that it contains over thirty different categories of land use in addition to those traditionally to be expected on a suburban high street (e.g. Agricultural Machinery Dealers, Computer Services, Pharmaceutical Manufacturers, Social Club and Waste Disposal Services). This combination of activities naturally generates a richer pattern of movement, one which requires trips of varying length at varying frequency throughout the day and week. This is borne out by analysis of commuter movements extracted from the 2001 Census data (see www.sstc.ucl.ac.uk/profiler), which confirms the large range of journeys, within Rickmansworth, between Rickmansworth and London and from Greater London into Rickmansworth that one might expect from these activities (for example, of the about 8300 reporting Rickmansworth as their place of work, a large proportion travel in from the neighbourhood itself, with others commuting in from surrounding districts).

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Figure 3. Church Street, Rickmansworth contains within it a wide variety of retail and other functions

The significance of smaller centres as places of diverse activities is illustrated by a map of all non-residential activity within one of the suburban cases (Figure 4). Although shops and other retail activities are broadly linear in their patterning, other movement-generating functions, such as medical and healthcare facilities, community services, and libraries and so on are distributed effectively so as to create a semi-circular pattern of movement. A questionnaire survey was conducted in three of the cases in order to gather data on people's routes and journey purposes within the suburban town centres. The resulting image illustrates the circuitous pattern traced by locals moving around the

area on foot (Figure 4 inset). Moreover, the 192 respondents to the survey stated their intention to carry out additional or alternative activities to shopping, such as: business meeting; visit to doctor or dentist; visit the gym, leisure centre or sports club; visit the library; go to the park, allotments or recreation ground; pay bills or go to the post office; visit family or friends; or indeed were in the centre because they work there.

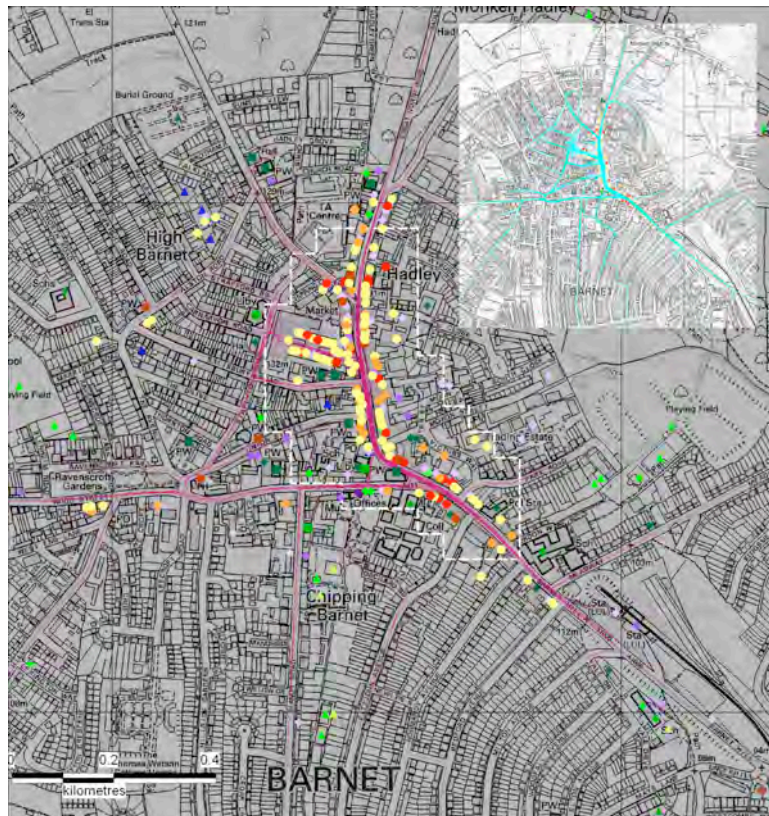


Figure 4. All non-residential activity and (inset) all locals' movement traces, Chipping Barnet. See figure 2 for legend of activity functions

3. Analysis

Analysis of land-use distributions across the sample of 26 London centres has found that although their importance as manufacturing hubs during the first half of the twentieth century has almost disappeared, both in larger and smaller suburban centres, local business and small-scale manufacturing are still present and indicative of their continuing importance as a place of work (Griffiths, et al., 2007) (figure 5). These much smaller suburban town centres are frequently found to have productive activities in courtyards or back streets one turning away from the high street (rather than in an industrial district away from it), helping to create an interdependence of activities that generates movement and takes advantage of the services and workforce available within the reach of the town centre. It was also clear that frequently these activities were not captured by the hierarchical (retail-centric) approach to defining suburban town centres, since such a large amount of activities were repeatedly found to appear outside of the recognised town centre boundary, whilst in some case streets containing non-residential land-uses did not appear in the national gazetteer. A method of creating a spatial statistical picture of all possible non-residential activity in and around such centres is at the heart of the study described here.



Figure 5. Printing press and other light industrial activity one step behind the high street, Chipping Barnet

3.1. Defining 'Live' and 'Active' suburban town centres

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The initial stage of analysing non-residential activity was to use a GIS to capture all address points within an 800 metre boundary of three detailed case studies of suburban town centres and then to attribute the data points to the axial segment adjacent to their street address.

The first attempt at defining 'live' as opposed to 'active' segments according to how diverse were the retail and other classes contained within them was dismissed early on, since it soon became clear that the numerous categories of land uses involved meant that any practical definition would be either so reductive or so vague as to raise as many problems as it solved. Moreover, bearing in mind the possibility of frequent change of land use that is common to such locations, detailed calculations of relative proportions by segment would be unlikely to be generally applicable for long.

The conjecture was that streets - and particularly street segments - are likely to contain a variety of non-retail uses, even when the most retail-intensive segments in the sample are considered. This is based on two sets of facts. First, of all the segments in the three detailed cases, a surprisingly low proportion (42-49%), were found to be purely residential. It is notable that the suburbs are far less 'purely' residential than was expected, even bearing in mind that this captures cases of a single non-residential activity, such as a school, on a residential road. Second, it is evident that within the sample all segments with retail contained other uses. Although the degree of mixing differs from one use type to another, listing these according to proportion gives a result that seems intuitively to make sense according to the types of activity most likely to co-mingle (Table 1). The table shows that segments containing shops are most likely to also contain offices, financial services, and to a lesser degree restaurants. What might seem surprising is the finding that shops and industrial activities often co-exist, highlighting that the assumption that they need to be separated is somewhat artificial. On the other hand, shops continue to be an important factor in the location of other less obvious 'live' centre activities, namely medical facilities, places of workshop, pubs and schools.

| | |
|----------------------------------|-----|
| Libraries or museums | 1% |
| Indoor entertainment | 2% |
| Education (schools and colleges) | 4% |
| Pubs | 5% |
| Places of worship | 6% |
| Medical or health facilities | 7% |
| Industrial activity | 14% |
| Restaurants | 15% |
| Financial activities | 24% |
| Offices | 40% |

Table 1 - The percentage of segments with one or more shops (n=251) hosting non-retail functions

Table 2 shows street segments with four or more shops, demonstrating that the focus of co-presence of non-retail activities continues to be offices and restaurants even in more retail-focused locations, as would be expected. What is however striking is the relatively high proportion of retail-focused segments with industrial activity (this includes small factories and storage; with the caveat that there are relatively small numbers involved, a maximum of three addresses in any of the segments involved). It is also evident that non-'live' centre activities are present alongside the 'live' centre activities of shopping, offices and restaurants.

| | |
|----------------------------------|-----|
| Indoor entertainment | 0 |
| Libraries or museums | 4% |
| Education (schools and colleges) | 4% |
| Places of worship | 4% |
| Medical or health facilities | 9% |
| Pubs | 11% |
| Industrial activity | 22% |
| Restaurants | 33% |
| Financial activities | 66% |
| Offices | 70% |

Table 2 - The percentage of segments with four or more shops (n=24) hosting non-retail functions

In the first instance of defining live and active segments simple calculations were made by calculating the proportion of non-residential addresses to all addresses per segment, but also giving an importance to the topological relationship between each segment and its neighbour. The expectation was that segments conforming to the Hillier (1999) definition of 'live' centre would have a high intensity of activity, and would also have two adjacent segments with a high proportion of non-residential activity. The broader town centre area was expected to have what were termed as 'active' segments, in which non-residential activity would be 50% or over, with one adjacent segment with the same characteristics.

The initial results showed that a threshold of 50% was not appropriate for identifying live centres in two of the cases, Surbiton or South Norwood. The reason for this was not variation in segments lengths in the centres (which are similar) but the concentration of residential flats located above ground floor activity on the segments associated to the live centres. The concentrations of these flats acted as a negative influence in the proportion calculations - reducing the importance of the ground floor activity.

Following this discovery the GIS algorithm was adapted to take into account the 'vertical adjacency' relationship of activity. Vertical adjacency was defined as the number of addresses associated with one spatial location (defined by its national grid coordinates). We argued that the way the town centre is constituted by activity at the ground floor level means it needed to be given greater weighting in the algorithm by reducing any cases of more than one residential address in the same spatial location to a value of one.

Following the successful aggregation of residential activity to take account of the vertical adjacency the data was reprocessed to enable the identification of live segments and active segments. The algorithm was generally very effective in automatically capturing non-residential activity observed on the ground (Figure 6). There were a few exceptions to this though, especially where interruptions to activity had occurred due to the presence of a railway bridge, or the conversion into residences on one side of what was once a shopping street (this highlights the complexity that is at play in this study and future research will consider side-to-side differences). In the cases where the algorithm was least likely to predict observed clusters of activity it was notable that there was both a weakness between the relationship of socioeconomic activity and its corresponding morphological structure and an ecological impact on the activity due to its size and the street layout. In particular, the lack of "liveliness" in the case of South Norwood was evidently influenced by the absence of circularity in the grid of its built environment.



Figure 6. Percentage of non-residential activity by segment, South Norwood.
Underlying map is © Ordnance Survey 2008

3.2. The scaled nature of centres

The definitions of active and live segments provide a range of socio-economic/topological descriptions of activity in the centres which can be further enriched by analysis at the smallest spatial scales. The next step in the analysis was to visually inspect the spatial distribution of land use activities in order to identify patterns in the data (Figure 7). It was soon evident that whilst normally an intensive focus of activity occurred in the sample cases along a single street, there were some smaller clusters either a turning away from the high street or in minor concentrations of activity distributed elsewhere.



Figure 7. Non-residential activity and segment angular choice in South Norwood (top-left: radius 400; top-right: radius 800; bottom-left: radius 1600; bottom-right: radius 2000). Underlying map is © Ordnance Survey 2008

The series of scales shown in Figure 7 indicates how different parts of the town centre are located on streets that are prominent at different scales; the main high street, running south-west to north-east, is prominent at the two higher scales (choice $r=1600\text{m}$ and $r=2000\text{m}$), whilst Portland Road running perpendicular to it in a south-easterly direction, emerges at lower scales ($r=400\text{m}$ and $r=800\text{m}$); it is notable in this context that the two streets are distinguished by a markedly different range of land uses. This illustration demonstrates that any single measure of choice is unlikely to prove sufficient to explain the distribution of land uses in a local centre. Bearing in mind the fact that centres emerge as part of a process of change and adaptation, they are unlikely to be reliant on a single catchment area.

In the analysis so far it is clear that land-use distribution within and around the town centre relates to the spatial configuration of the three centres considered. Statistical analysis of the three town centres in comparison with each of their 2km hinterlands (using values drawn from the Greater London map) found that in all scales of choice the 'live' segments, which had 40% or higher proportion of non-residential addresses and *two* neighbours with the same characteristic, had significantly higher mean values. It was notable that of the three, Barnet had the highest significance (Barnet: $p<.0001$, $n=28$; South Norwood: $n=12$, Surbiton: $n=15$). Similar results were found for segment angular integration, with 'live' segments being significantly more integrated than average for the centres and their hinterlands.

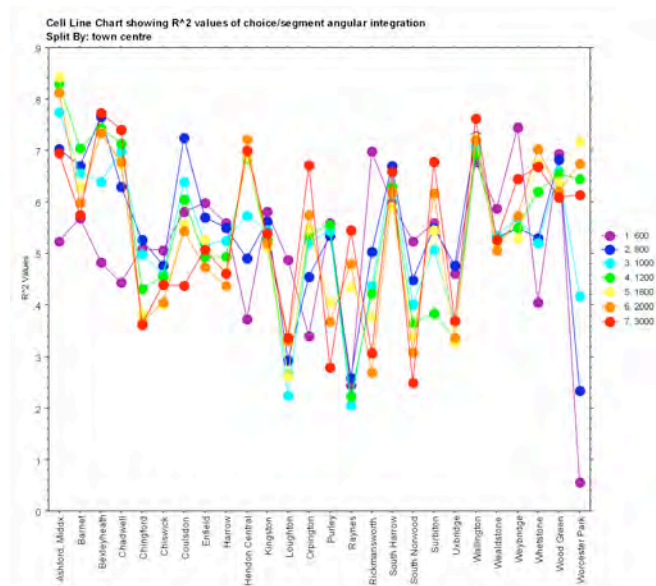
Streets defined as 'active' (namely, those segments which had 40% or higher proportion of non-residential addresses and *one* neighbour with the same characteristic) had similar results, with the exception of Barnet, for which Choice was not significantly different at *any* scale (this may be due to the small number of street segments in the sample (Barnet: n=8; South Norwood: n=32; Surbiton: n=31). These findings suggest that the broader conception of live and active centres has a statistically measurable signature on the ground. Segments with a pronounced presence of broad town centre activity are evidently benefiting from their presence on routes to and through their locales at many scales of distance.

3.3. Overlapping paths and routes

Another conjecture that was explored was the notion that the sub-centres considered by this project would feature the characteristics of *axial* intelligibility (i.e. a high correspondence between local and global integration), observed in the more centrally located cases examined in Hillier (1999). An attempt to replicate the analysis using *segment* angular analysis, by correlating small radius (200, 400 and 600) and global integration for all the live and active segments in each of the centres did not show any distinctive pattern. In contrast, analysis of the relationship between choice and integration at the same radius (choice radius-400 against integration radius 400 and so on) came up with some intriguing results (Figure 8). Each of the three town centres was found to have a correspondence between accessibility (integration) and path overlap (choice) at different ranges of radius. In other words, the street segments which comprise the extended town centre are important for these two types of configuration at particular scales of activity.

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Figure 8. Cell line chart showing R² values of regression between Choice and Segment Angular Integration at radii (i.e. distances of potential movement) from 600 to 3000 metres for the twenty-six town centres.



Analysis of the 26 centres shows that this pattern of correspondence between through and to movement potentials repeats itself, with different groups of centres having a peak overlap at particular scales. This is illustrated by Figure 8, which plots R² values of integration/choice at radii (i.e. distances of potential movement) from 600 to 3000 metres for all the suburban cases. It shows in the

case of Ashford and Worcester Park for example, that radius 1600 is where the correspondence between choice and integration is highest (R^2 is 0.85 and 0.72, respectively), whilst Rickmansworth and Weybridge correspond most closely at the much more localised scale of radius 600. These results point to the fact that in some cases the live and active segments are on a more localised structure, whilst in others, such as Barnet, main roads form part of the centre. It is also notable that 'live' centres are effectively continuous and active centres are more discontinuous - both with different relations to scale. This should not be taken to mean that a single radius expresses some particular quality of the most central segments; rather it implies the scale at which the relation between different spaces in and around the centre is most apparent.

Figure 8 demonstrates that through- and to- movement overlaps at differing scales in different centres. We can understand this pattern by exploring the morphological evolution of one of the cases studied. Figure 9 shows the Surbiton area through four historical periods. It is clear that as the availability of passing movement changes with the evolution of the street network; it in turns adapts its configuration to serve land uses of different types according to the most beneficial catchment distances. So whilst in 1800 we can see that the original settlement of Surbiton (on the north-western edge of the map) is connected to the larger scale network through roads leading to the south-west (on the edge of the river Thames) and to the south-east, by the time the railway has arrived in 1890, new connections have been created to serve a different set of scales of movement and activity. Indeed, spatial analysis of Surbiton demonstrates that the smaller scale of analysis highlights the original centre, with larger scales of analysis shifting the focus to the newly formed centre around the railway centre. This emergent process has continued until today, where the streets which were important for local and larger scale are now changing their character as different scale connections change their degree of importance.



Figure 9. Surbiton through 200 years of spatial, social and economic. Image shows four Ordnance Survey maps from c. 1800 (top-left), c. 1890 (top-right), c. 1950 (bottom-left) and c. 2000 (bottom-right). © Ordnance Survey 2008.

4. Conclusions

This article has attempted to go beyond the well-established relationship between movement and socio-economic activity in the field of space syntax and begin to understand the complexity of the spatial distribution of socio-economic activity and the role it places in sustaining the local town centre economically: through the provision of diverse workplaces and environmentally: through the minimising of unnecessary journeys by car.

Analysis of 'live' and 'active' street segments has led to a discussion of syntax methodology in relation to the positive effects of town centre activity beyond the retail core. This article has provided evidence for the existence of an underlying spatial signature to smaller suburban town centres that is the outcome of local grid conditions emerging from a process of overlapping networks of movement at a variety of scales and for a variety of purposes over time. The results reported here support the contention that the success of local centres is conditional on their adaptability to shifts in society and the economy. We suggest this is the case, since the 26 cases, which were selected to exemplify the 'typical' older London suburb have evidently managed to adjust to the considerable changes that the UK economy and society have undergone over the past 150 years. We believe that this adaptability is bound up in their built form characteristics. At the building scale this adaptability means that there is relative ease in switching of ownership and function, whilst at the urban scale there is a relative lack of dependence on a singular source of activity. We conclude that the adaptability of local centres can play an important role in supporting a wider range of locally generated activity than the retail functions with which they are most commonly associated and propose that this feature of adaptability is a sign of the potential for suburban town centres to be economically and environmentally sustainable.

We also note the feature of street layouts that allow for circularity of pedestrian and vehicular movement that occurs in many of the more vibrant of our cases, which warrants further investigation to see if this is an urban design characteristic that helps promote local vitality by bringing people into mutual contact in greater frequency. Although the importance of retail in suburban town centres cannot be overlooked, the *by-product* activity generated by the co-location of a diverse range of activities is clearly vital to the sustenance of smaller centres. It is also not purely an economic function - the fact that additional activities are supported within the locality of the suburb ensures that more time is spent locally, supporting the suburban *virtual community*: its '*potential field* of probabilistic co-presence and encounter', (Hillier, et al., 1987, p. 248). This article suggests that the potential embedded in the street network is the critical element for sustaining the vitality of local centres. The extensive and varied - as well as - routine nature of activity in areas such as the ones studied here seeds daily/weekly/periodic movement and engagement of individuals with their locality. Arguably, the routine nature of the 'place ballet' played out in suburban centres, contributes to their longevity - as explained by David Seamon (2007, p. iii-04): 'One ingredient of place ballet is familiarity arising

from routine, since regular actions of individuals meet together in space, which becomes a place of familiarity and perhaps attachment.' We therefore further propose that suburban town centre have the potential to be socially sustainable, since:

'Mutuality and resonance, in their many forms, are the stuff of most human exchange. We chat pleasantly about the weather, share a joke we heard with our hairdresser, pass an hour over coffee gossiping with a friend. These mostly unremarkable events soon fade into the dustbin of memory, yet without them life is apt to feel empty and cold.' (Josselson, 1995, p.152)

5. Acknowledgements

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