Anti-social Behaviour and Urban Configuration

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Using Space Syntax to Understand Spatial Patterns of Socio-environmental Disorder

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Abstract
This paper explores spatial properties of urban environments in relation to the occurrence of anti-social behaviour (ASB). This is a new approach depart from previous research which considers ASB predominantly from the socio-economic perspective. ASB, in contrast to crime, is a phenomenon which lacks clear formal definition - its borders to 'normal' or acceptable behaviour on the one end of the spectrum and criminal behaviour on its other end are blurred. What is perceived as 'anti-social' by the individual is typically highly subjective and depends on the observer's personal background (age, cultural background, gender etc). Sensitivity to disorder is also dependent on the backdrop of the urban scene - certain behaviour appears acceptable in certain environments whereas in others it is not. Any data set of reported ASB incidents is therefore inherently affected not only by lack of definition / definability of ASB and the reporting and recording practices, but also biased by the type of urban environment in which it takes place. Our findings suggests that, controlling for social differences, that patterns of ASB incidents can be correlated to physical properties of the environment, if we consider the environment in terms of its syntactical properties. We find generic patterns of incidents in different types of spatial layouts. We suggest that these patterns can be explained in the light of co-presence for pedestrians on the street and surveillance from residential entrances on the streets, with ASB withdrawing from both. This links our work to findings in the research on crime, and also to findings in the field of the social sciences: our findings might contribute to an understanding how communities organise in space and become 'socially effective' against disorder and crime.

1. Introduction

Sustainable communities are safe, perceived as safe (low levels of fear) and attractive (low levels of disorder). Since research has suggested that anti-social behaviour (ASB), disorder and crime are not distinct phenomena that coincide within an area, but are inherently related, the phenomenon ASB has received considerable attention. Physical disorder is thought of being a barometer of sustainability of a community.

The broken window theory (Kelling and Wilson, 1982) for example suggests that the occurrence of ASB or other forms of disorder in an area increase the likelihood of further incidents and also attract more serious types of crimes. Visual signs of disorder are thought to raise the level of fear of crime in an area, and, left untreated, lead to further crime and disorder. This link between disorder and crime has had a considerable impact to draw the attention of public policy on ASB, raising questions of factors that influence the occurrence and the fear of ASB, and possible strategies to lower the levels of ASB in particular areas.

Project SEDUC is a research project, which was carried out by Space Syntax Limited as part of the Urban Buzz programme, in partnership with the London Boroughs of Tower Hamlets, Newham and Barking Dagenham. Aim of the project was to analyse the spatial distribution of ASB in two different London Boroughs. The key question was whether spatial factors such as street or estate layout, when controlling for socio-economic differences, can be shown to increase the levels of ASB occurrence and risk.

ASB, similarly to crime, has been considered so far mainly from the perspective of the social sciences, criminology and environmental psychology. Accordingly, besides gross factors such as land use and structural attractors, predominantly socio-economic conditions and social dynamics within groups such as 'collective efficacy' (Sampson et al, 1997) have been assumed to influence levels of ASB. A different style of research, although not incompatible with above ideas, suggests that factors of the urban environment may have an impact on levels of crime and disorder. Especially factors like movement, land use and high and low activity patterns are all thought to be linked in some way to crime (Hillier and Sahbaz, 2008). Since the syntactical model used by Space Syntax has shown to be a good predictor of such patterns of activity and movement in urban networks (Hillier and Iida, 2005), it is suggested (Hillier, 2004) that the model can be used to link crime activity to these patterns, and to identify properties of the urban environment that may have an impact on crime occurrence and risk.

In earlier Space Syntax research on crime (Hillier and Sahbaz, 2008), two aspects of movement and land use in order to prevent crime have been highlighted: the co-presence of pedestrians on the street on the one hand, and the constitutedness of a street: a street 'protected' through continuous and numerous residential entrances. In this study, we will investigate whether these, or other, spatial factors, when controlling for social differences, can be shown to have an impact on the spatial distribution of ASB occurrence and risk.

For this study, data of ASB incidents in two London boroughs was available, covering a time period of two years. Incidents are geocoded; we can thus use incident data alongside Space Syntax measures and other non-spatial social and economic variables in the same spatial model. We will perform two types of analysis, firstly, on the global level, we will analyse global distributions of incidents, and secondly, we will investigate incident patterns at the micro-scale, looking at distributions within certain types of structures, and at the differences between different area types. Finally, we discuss our findings in the light of ideas from the social science, and we assess our findings regarding spatial factors that show to have generic impact of spatial design on the spatial distribution of ASB in the light of how community is thought to be generated in space.

2. Background and related work

The term 'Anti-social behaviour' embraces a wide range of behaviours and incidents that can be described as sub-criminal level incivilities and disorder. However, the term lacks official and generally accepted formal definition and categorization. This leads to methodological and practical difficulties to collect and generate a consistent and objective description of ASB in an area. Due to lack of definition, ASB tends to be underreported (Kershaw et.al, 2008). Furthermore, it is recognized that ASB is context dependent: what is perceived as anti-social depends on the observer, the situation and environment and the offender (Whitehead et al, Wood, 2004). What is perceived as anti-social in a particular place, or when committed by a particular person, might be acceptable behaviour in another context.

These observations should make us cautious that any data set will be highly biased by reporting issues, and affected by the complex relations between offenders, environment and victims, so that gross comparisons between numbers and natures of reported incidents might be difficult to interpret or misleading. Theory though generally agrees (as summarized by e.g. Brantingham and Brantingham, 1993) that ASB and crime are more concentrated in some areas than in others (forming 'hotspots'), although authors disagree on the causal mechanisms behind this.

There is a wide acceptance that ASB may be explained in terms of social processes. Research has been done to identify risk factors in offenders, considering personal characteristics as well as socio-economic circumstances (Farrington, 2005). On the other hand, risk factors have been identified for perceiving ASB (Upson, 2006). Results suggest factors like deprivation, substance misuse, and anti-social familiar backgrounds are significant for ASB.

An attempt to explain patterns of ASB and crime in time and space is provided by Brantingham and Brantingham (1993), who provide a theory that predicts why crime and disorder should cluster in some places and not others. Essentially, the theory considers offender routine activities, their mobility, and how this shapes awareness of opportunities for crime and ASB. The theory emphasizes the complex relationship between environmental properties such as accessibility, activity patterns and individual and collective 'mental models' of places that may, in offenders, generate the template for a perfect 'crime site'. This is, so the authors suggest, the reason why simple spatial cues, or the isolated consideration of 'crowds' or 'surveillance', are 'poor predictors' for the occurrence of crime. Recently it has been argued that social phenomena such as 'collective efficacy' might explain why some neighbourhoods have higher levels of disorder, ASB and crime and others don't (Sampson, et al, 1997). A neighbourhood characterised by high collective efficacy, so Sampson et al, is one where there is a shared willingness to work together to intervene to prevent or stop disorder through a form of social control which is based on mutual trust and community cohesion. Nolan et al (2004) take the idea of 'collective efficacy' further in order to develop 'situational policing' for neighbourhoods with a certain level of collective efficacy. The idea of collective efficacy is hereby narrowed to the smaller neighbourhood, the so-called 'face-block', a neighbourhood with individuals who 'live together on the same block, use many of the same resources and have the most face-to-face encounters' and will eventually develop a 'group identity' which distinguished the group to the outside and may make people take action for the common good, e.g. challenging an offender.

The idea that a community that can defend itself against disorder and crime can be 'planned into the urban fabric' (Sennett, 1986) goes back to Newman (1972), who promoted 'Defensible Space', a paradigm that evolves around the notion of 'territorial space' dedicated to a closed community, where access from the outside is limited and controlled. A contrary point of view is taken by Jane Jacobs (1961), who argues that only the co-presence of strangers and residents alike produces the 'eye on the street' that makes streets safe – this requires open, permeable and accessible environments of mixed land use that attract people to populate the streets.

These two ideas not only differ in what is thought to be the social principles that are effective against disorder and crime, but also promote different spatial paradigms for these social dynamics – the enclosed territorial space on the one hand versus the permeable public mixed use space. We will review the spatial key parameters of both approaches – accessibility, movement potential, permeability, land use – along other parameters, in how far they might be involved to have an impact on the occurrence and risk of ASB.

3. Global distribution of incidents

The research presented here considers the ASB FLARE data sets for the London Boroughs Tower Hamlets and Newham. Each data set consists of the reported ASB incidents over a period of two years, from 2005 to2007 The data set covering Tower Hamlets consists of 3.989 incidents, that fall into 17 different categories. From the initial data sets, we have excluded incident types that were under-represented (less than 200 incidents) or such that are not located in the public realm (such as noise harassment which is predominantly complaints about noisy neighbours). We will consider these incident types (numbers in brackets indicate number of incidents):

- Motor-Vehicle Crime (199)
- Property Damage (226)
- Drugs (577)
- Dumping (213)
- Violence (1059)

The data set covering Newham consists of 45.914 incidents, that fall into 19 different categories. Again, we have excluded incident types that were under-represented or such that are not located in the public realm:

- Drugs (676)
- Graffiti (347)
- Harassment (828)
- Prostitution (271)
- Theft (397)
- Vehicle Crime (885)

Each individual incident has been geocoded with an accuracy of 20 metres tolerance. As a spatial model of the road network, we use a simplified road centre line map generated from the OS MasterMap ITN layer. We use the Depthmap software (developed by Alasdair Turner) to calculate the spatial measures for Accessibility (Integration) and Through-Movement (Choice). Each ASB incident has then been linked to the according street segment of our spatial model.

Plotting different incident types on a map in order to see global distributions, we realise that incidents often seem rather randomly distributed. For most incident types, we cannot identify anything like hotspots visually. Some incident types such as theft tend to cluster around high streets in some areas, but not in others. However, all incidents tend to be located mainly in residential areas; there are very few incidents in non-residential parts of the boroughs. We can assume the reason for this is that people might report incidents more readily in their own areas where they live and are bothered by signs of disorder (Fig. 1, Fig. 2). For statistical analysis, we looked at each incident type individually, and also we did not attempt to merge the data of the two boroughs because of the different incident categorizations on the one hand, and of the differences in incident 'density' on the other hand which might be related to different policies how the data might have been collected.

In order to see the correlation of ASB incidents to socio-economic conditions, we generated a economic index per Census Output Areas by dividing the number of residents falling into the three upper categories (KS14A0002: People aged 16 - 74: Large employers and higher managerial occupations, KS14A0003: People aged 16 - 74: Higher professional occupations, KS14A0004: People aged 16 - 74: Lower managerial and professional occupations) by the number of people falling into the three lower categories (KS14A0009: People aged 16 - 74: Routine occupations, KS14A0010: People aged 16 - 74: Never worked, KS14A0011: People aged 16 - 74: Long-term unemployed). We then calculated a risk index for each output area by dividing the number of incidents by the number of people, to account for different output area sizes and different population densities. If we compare incident risk against a socio-economic index, we see a certain tendency for incidents cumulate in deprived areas; however, better-off areas are by no means free from incidents. Comparing the 10 highest-risk areas for each incident type, it shows they are different for each incident type. Although there is a tendency for a high-risk area to have a low socio-economic index, some high-risk areas fall into economically better-off areas – there is, for example, a high risk of Motor-Vehicle Crime on the Isle of Dogs in Tower Hamlets, being on the upper end of the socio-economic scale of the borough (Fig 1) However, the overall correlation between socio-economic index and incident risk across different types of ASB on the output area level is very weak (between $R2 = 0.002$ and $R2=0.02$).

Looking at the relation to spatial accessibility (Integration) – we calculate the deciles for Integration at different radii for the road network of each borough, then assign to each incident the decile rank of the associated street segment and plot the distribution over these decile ranks separated by

incident types – we find in many cases that incidents are surprisingly evenly distributed over the road hierarchy (in Tower Hamlets, this applies for Property Damage, Drugs, Dumping, and Violence; only Motor-Vehicle Crime peaks clearly in the lowest decile – the least accessible spaces. In Newham, we find even distributions for Graffiti, Violence, Theft and Vehicle Crime, for Drugs there is a slight tendency to more integrated spaces. Only Dumping and Prostitution show clear peaks to the more accessible spaces).

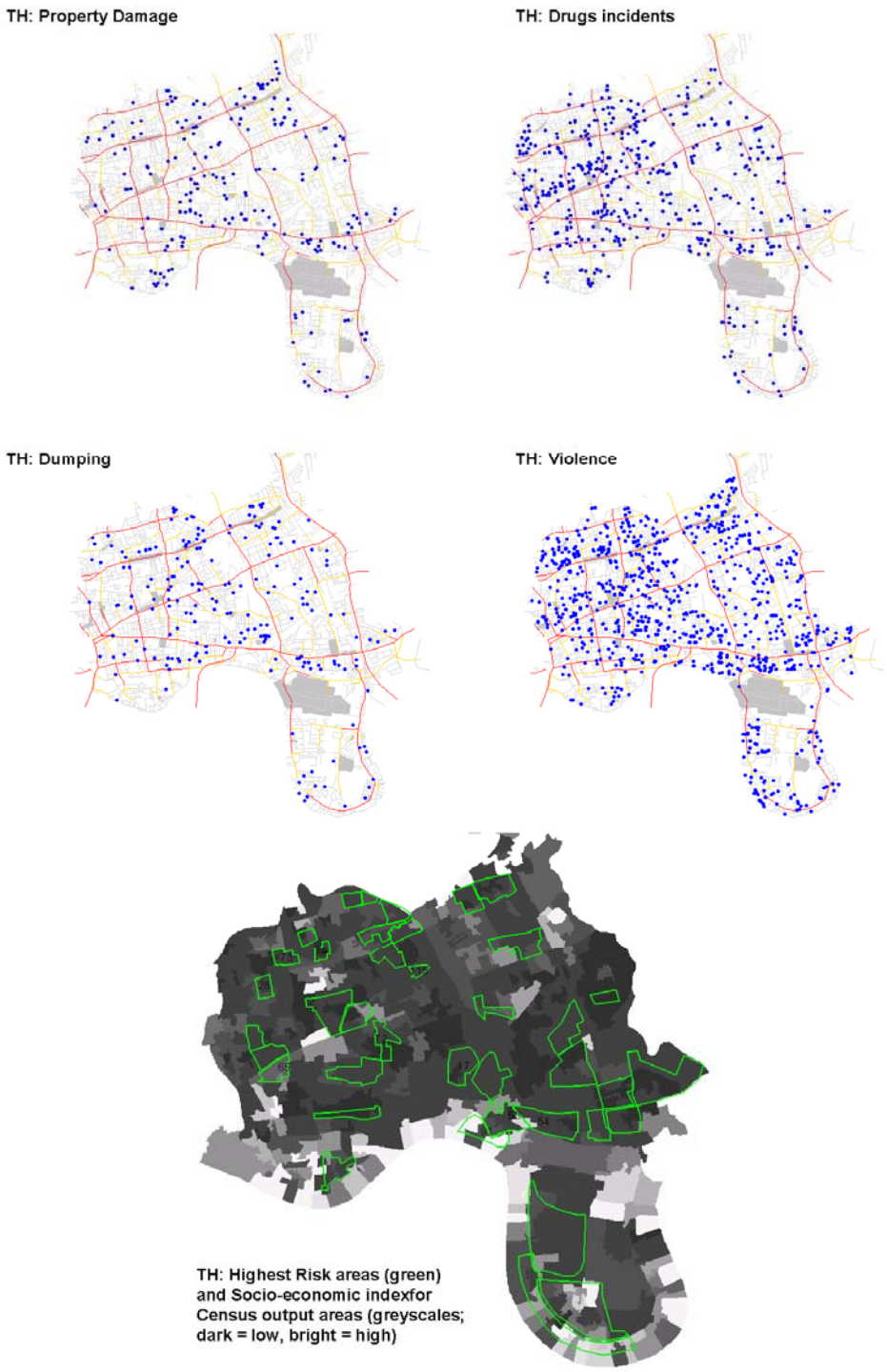

Figure 1
ASB incidents in Tower Hamlets. Blue dots represent incident locations

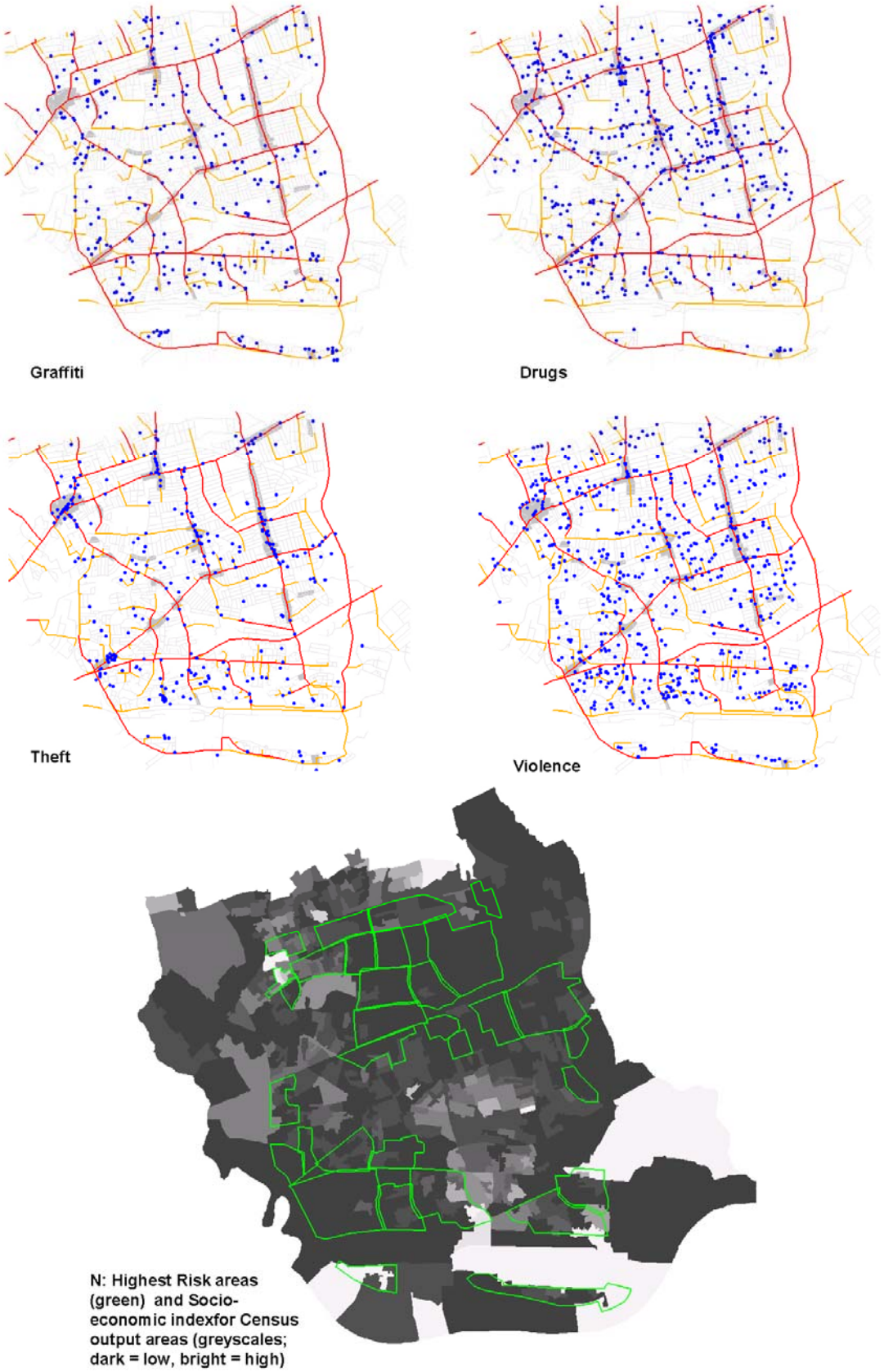

Figure 2
ASB incidents in Newham. Blue dots represent incident locations

These results are in a way counter-intuitive: For example, the literature (Brantingham and Brantingham, 1993) suggests that certain crime types such as theft and mugging typically cluster more around busy streets. We cannot identify this effect in our data sets. We suggest that this is because, on the one hand, incidents are more likely to be reported in residential areas which biases the overall spatial distribution, and on the other hand, different areas have different spatial distributions of incidents, such that overall values might cancel each other out. In the next section, we show how incidents are differently distributed in different types of layout, and suggest there are generic incident patterns in different spatial morphologies.

4. Area analysis - area types

In order to compare different types of spatial layouts, we firstly subdivided residential areas into neighbourhoods, distinguishing different neighbourhoods according to structural and visual properties such as street patterns, building and dwelling type. Edges of neighbourhoods could in most cases be identified easily; they are defined through adjoining residential neighbourhoods with clearly different morphological characteristics, or through high streets with different non-residential land uses.

We suggest that the neighbourhoods we defined can be usefully distinguished to be either a 'street based' layout type or an 'estate' layout type (Fig 3). A street based layout is based on a grid pattern of streets. The building type is either an urban block or terraced housing – in both cases, the space of the street is geometrically defined by building frontages. Building entrances are directed towards the street, which form a continuous, more or less rectilinear, network. In contrast, the road network of the estate layout is broken up and tree-like with cul de sacs and circuits unrelated to dwelling entrances. The buildings are free-standing and do not define the space of the streets. There are often separated route systems for cars and pedestrians. Building entrances are not directed towards the continuous streets, but towards inner courtyards and semi-public areas. We find that many of the neighbourhoods we have identified can be associated to be either the one or the other type, although, in the individual areas, not all of the properties listed above may be equally strongly defined.

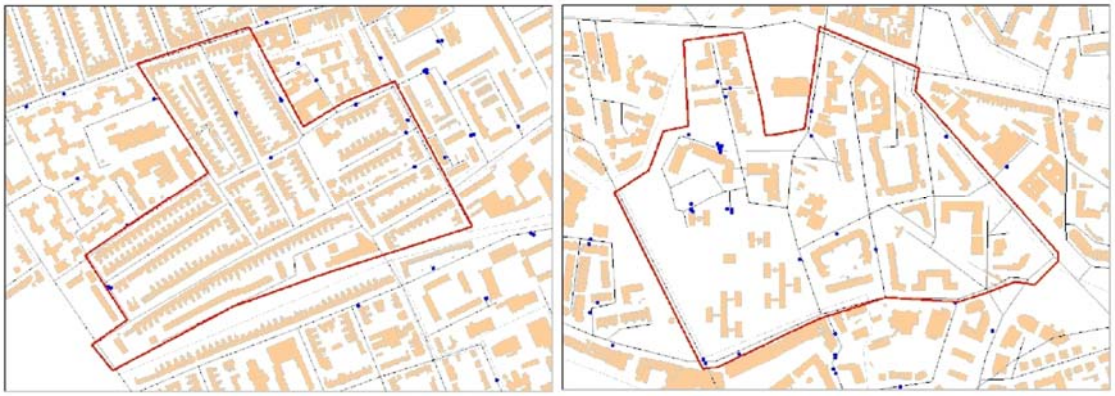

Figure 3
Residential layout types. Left: Street based layout. Right: Estate layout.

These different layout types have a generic impact on both movement potential on the streets and surveillance of the street from buildings (Hillier and Hanson, 1984 , Hillier, 1996). Street based layouts are more permeable from the outside and rather 'shallow'. The likelihood that the streets are used for through-movement is greater than in a tree-shaped layout. Given that the streets are fairly straight there are long lines of sight from each position in the network. Both accessibility and intervisibility raises the potential for co-presence of pedestrians in the streets. Terraced housing frames the street with a dense series of residential entrances – the street is 'constituted' by the building entrances.

The opposite is the case for estate layouts: streets are not constituted by residential entrances, as entrances usually are fewer – multiple flats are sharing one central entrance – and often directed towards an inner courtyard and not towards the street. The broken up or tree like street pattern is less accessible from the outside and deters through movement from non-residents. More complex path layouts have a lower intervisibility than more simple configurations.

5. Area analysis – findings

Within these areas, we find there are are distinct patterns of incidents for different types of structures. In dense residential street based layouts, ASB incidents tend to happen on the edges of the area, as if being 'pushed out' towards the roads running between the areas. In estate layouts, incidents tend happen all across the area, often in the deep ends of the tree-like street system (Fig. 3). We can recognize these typical patterns of incident distribution when we compare plots of incident locations in different areas (Figs 4 to 7). These patterns are of varying intensity in different areas, but appear persistently throughout different incident types, and can be found in both London Boroughs Tower Hamlets and Newham. Correlating incident locations with spatial accessibility measures of the roads, we often find that in street based layouts, incidents tend to happen on the more accessible streets, whereas in estate layout, incidents tend to happen in less integrated spaces (Figs 4 to 7, Fig 8). In urban residential areas, the high integrated spaces often coincide with the edges of this area; as, in cities, residential areas tend to constitute a background network of lower activity residential space surrounded by the higher accessible spaces constituting the foreground network of high activity that links centres at all scales (Hillier and Iida, 2005). Thus, the higher integrated spaces often represent the streets that are outside the residential areas and are part of the larger scale connecting tissue that runs between the residential areas. We plot the deciles of integration values of the street segments of an area (normalized between 0 and 1 for each area to make areas comparable with each other) against the numbers of incidents in that area happening on those deciles (again, we normalize the number of incidents between 0 and 1, according to the total number of incidents in that area). Comparing the plots of different area types, we can see the tendency for incidents to happen in the integrated spaces for street based layouts, and to happen in the lower integrated spaces for estate layouts, persistently for different incident types throughout both London Boroughs.

It shall be highlight that we find both the visual patterns of incident distribution and the statistical correlation with Integration to be the same in similar areas with different socio-economic conditions. For example, residential areas on the Isle of Dogs or in the Docklands can be classified as 'estate layouts' throughout. Although being socio-economically 'better-off' the incident patterns are similar to other deprived estates (see Fig 5, Westferry Road).

Although each individual incident plot or each individual statistical correlation might show these patterns more or less clearly, we suggest the persistence these patterns appear throughout the whole data set is significant – given the fact that the areas, despite certain similar structural characteristics, are widely different. Local differences may account for a lot of variation of the incident distribution patterns. For example, in street based layouts, if constitution patterns break down, incidents tend to 'select' these spaces. Also, if accessibility is reduced, e.g. the street pattern is broken up, this tends to attract incidents (e.g. Fig 4, Roman Road and Glasworthy Avenue). Similarly, in areas that have terraced building types in combination with 'estate-like' broken up street patterns, incident patterns are still 'typical' estate patterns – incidents are widely scattered throughout the area (Fig 7). An interesting case is the high street: incidents tend to happen on the high street, if these are surrounded by street based layouts or are happening very close to the high street, as if being 'pushed back' into the busy public realm from the residential areas. Incidents tend to withdraw from the high street, if there are broken up unconstituted back streets available (Fig.6).

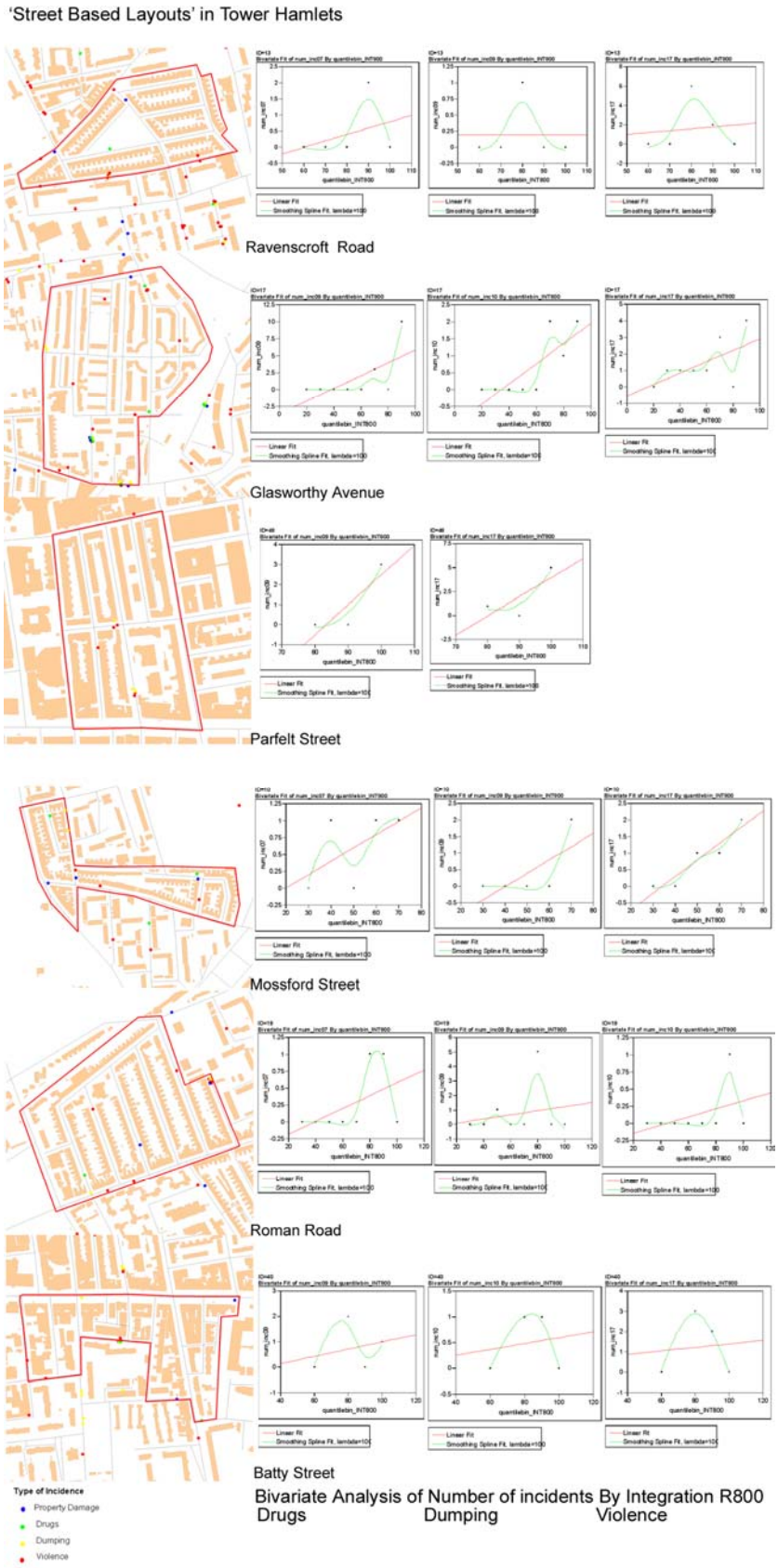

Figure 4

ASB incidents in 'Street based layout' areas in Tower Hamlets. Dots represent incident locations. Statistics show number of incident numbers of different types (y-axis) plotted against Integration R800 (x-axis).

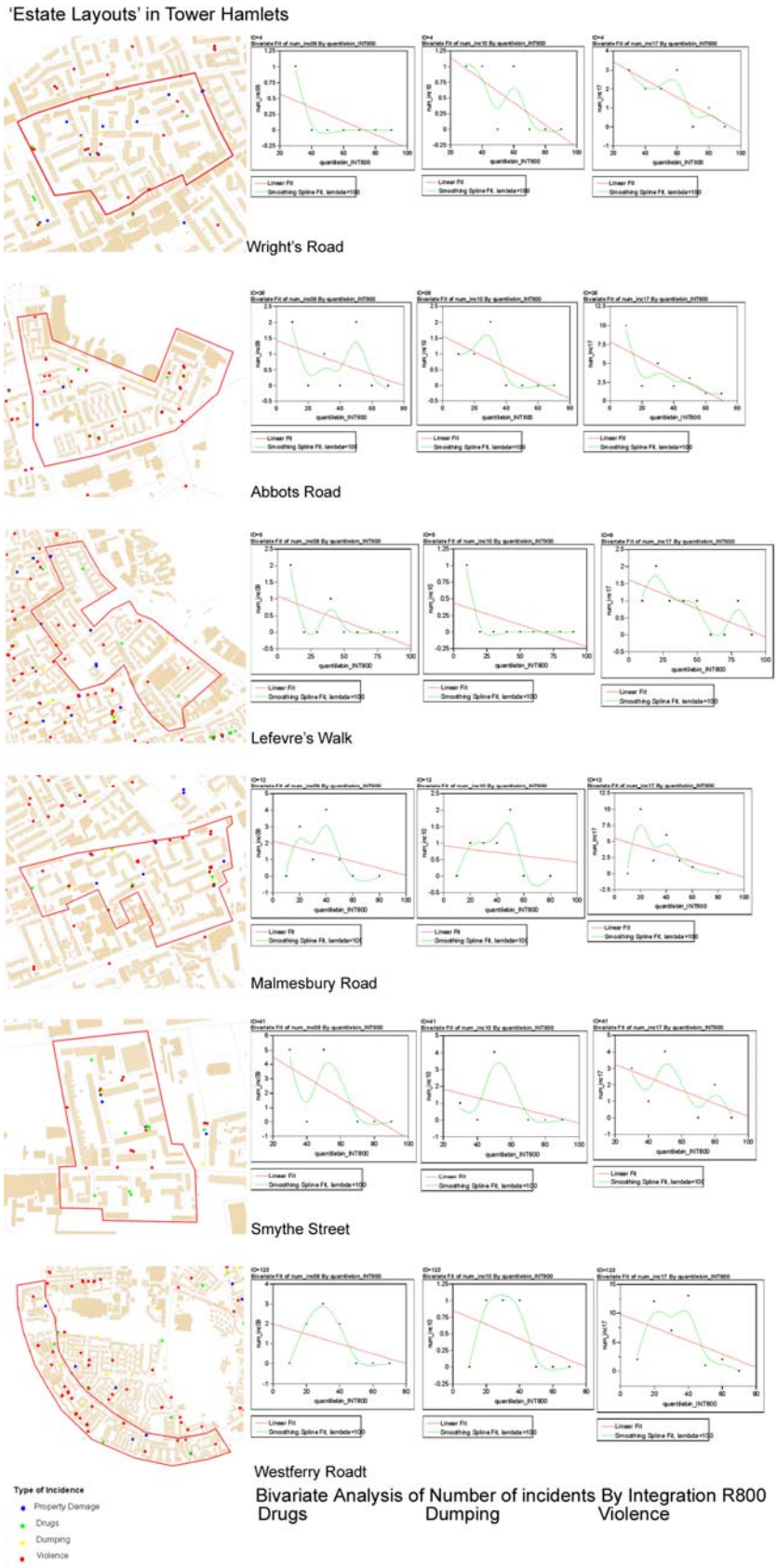

Figure 5

ASB incidents in 'Estate layout' areas in Tower Hamlets. Dots represent incident locations. Statistics show number of incident numbers of different types (y-axis) plotted against Integration R800 (x-axis).

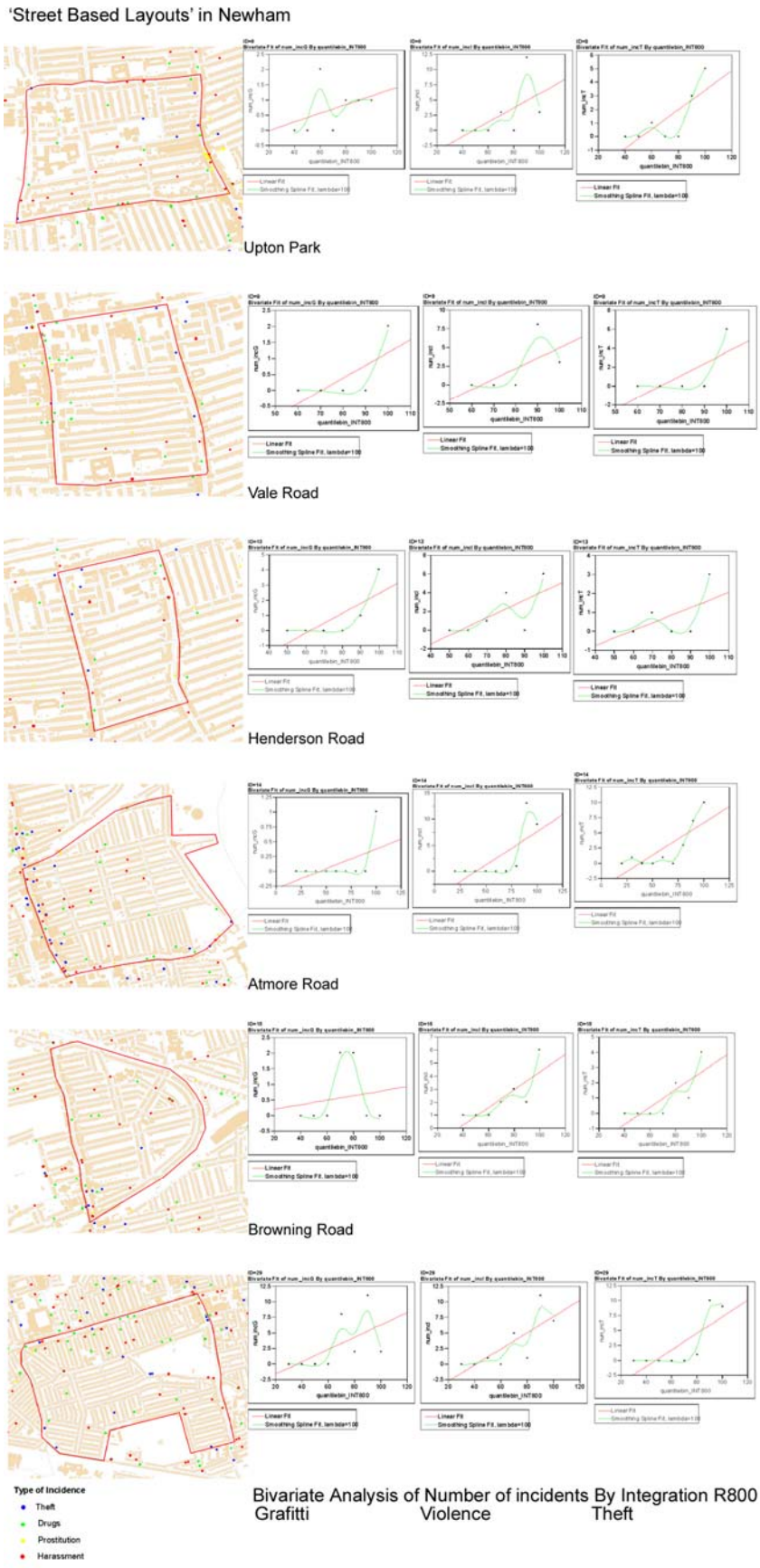

Figure 6

ASB incidents in 'Street based layout' areas in Newham. Dots represent incident locations. Statistics show number of incident numbers of different types (y-axis) plotted against Integration R800 (x-axis).

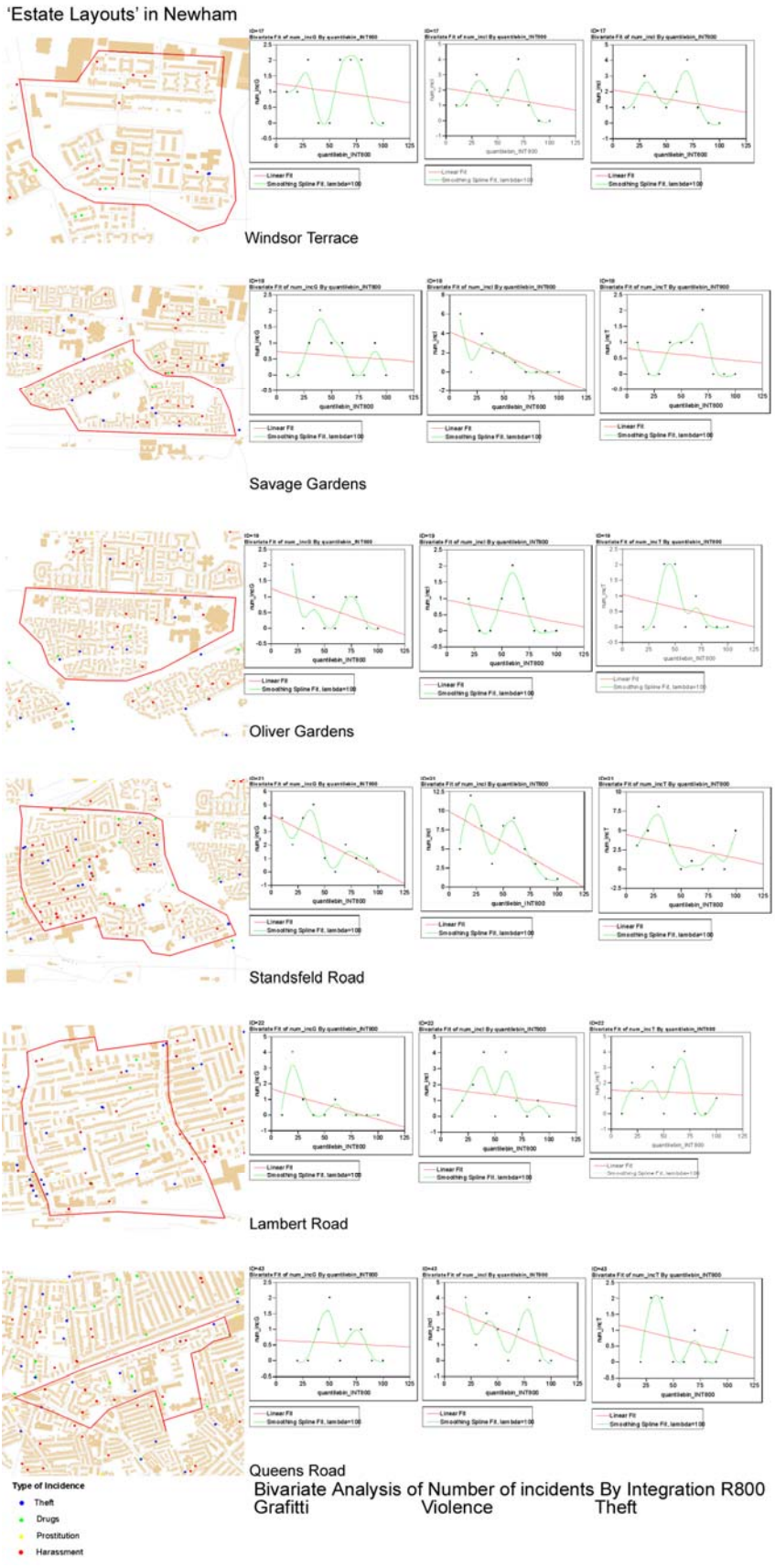

Figure 7

ASB incidents in 'Estate layout' areas in Newham. Dots represent incident locations. Statistics show number of incident numbers of different types (y-axis) plotted against Integration R800 (x-axis).

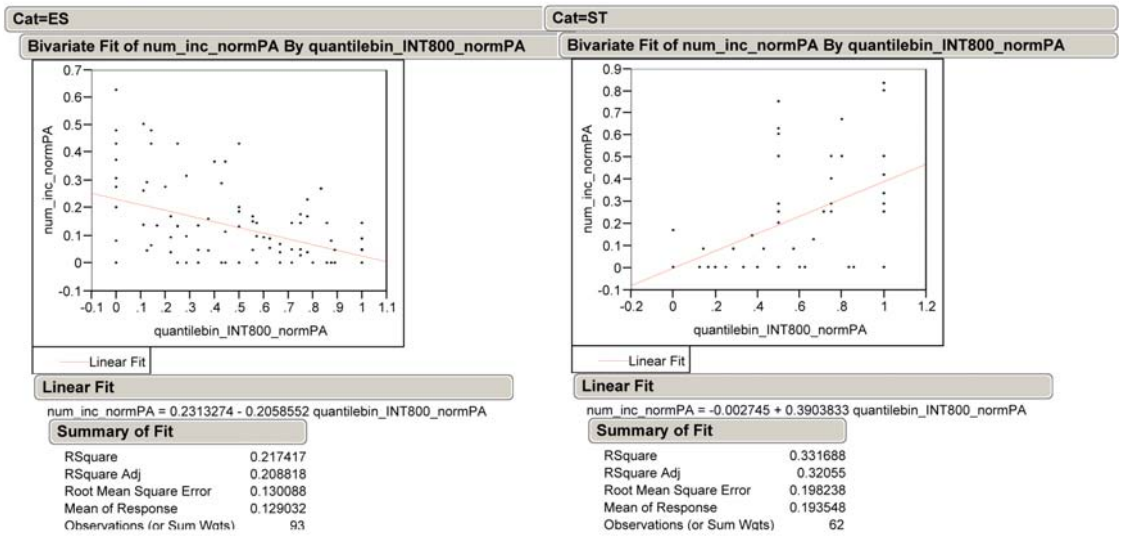

Figure 8

Newham. Upper part: Left: Average mean integration per incident location (Violence). Red shades indicate lower than average integration values. Green shades indicate higher than average integration values. Right: Number of areas per mean incident integration, grouped by area type. Peaks on the right end of the scale indicate predominantly areas with higher than average integration at incident locations, and vice versa. Lower part: aggregated scattergrams of incident numbers per deciles of integration: left: Estate layouts, right: street based layouts.

6. Interpretation of the results

These findings indicate there are generic patterns of incidents in different types of spatial layouts. We suggest that these patterns can be explained in the light of co-presence for pedestrians on the street and surveillance from residential entrances on the streets, with ASB withdrawing from both. In street based layouts, incidents are 'pushed out' through the combined effect from both co-

presence of pedestrians on the streets and constitutedness of the street from residential entrances.

If one of these mechanisms breaks down in some place, this place appears to become a candidate for ASB. Hereby the layout works as a whole towards protecting itself: constituted segments not only seem to protect themselves, but also their neighbours: earlier research on burglary (Hillier, 1988) has shown that, in areas with throughout constituted streets, the first constituted street segments on the edge of an area have burglary rates of up to 29%, whereas for constituted segments with likewise constituted neighbours, burglary rates were 2%. Contrarily, in estate layouts where there is neither much co-presence not constitutedness of the streets, where there are often footpaths distinct from roads which creates much circulation space that is hardly used, where layouts are more complicated and hard to keep in view, we find that incidents are distributed all over the area.

In summary, our findings suggest that patterns of ASB incidents can be correlated to physical properties of the environment, if we consider the environment in terms of its syntactical properties - its system effect on movement and intervisibility. We suggest that the combined effectiveness of these spatial factors that impact on the distribution of incidents. This is supported from observations of places where one of these factors breaks down, that incidents seem to precisely 'select' these spots. Layouts work as a whole to generate both constitutedness and potential for co-presence. This observation reinforces that layouts need to be considered as a whole, as syntactical systems in order to reveal their potential impact on the risk of disorder. This may be the reason why isolated physical properties of the built environment do rarely show correlations incident patterns, and, implemented in design guidelines in order to fend off disorder and crime, may be even ignored by offenders. For example, as Brantigham and Brantingham (1993) have found, "fixed defensible space cues…proved to be poor predictors of how convicted burglars rated photographs for target 'attractiveness''.

7. Discussion and conclusion

We have suggested that residential layouts that enable co-presence on the streets together with surveillance of the street from residential buildings are effective to protect an area against ASB and disorder.

On the other hand, from the perspective of the social sciences, it has been found that 'neighbourhood cohesion' is effective to prevent disorder, generating a 'collective efficacy' among residents, a shared willingness to work together to intervene to prevent or stop disorder. There have been different notions however how collective efficacy is facilitated within communities and in space. Sampson et al (1997) have investigated the relationship between social efficacy and neighbourhood cohesion on the scale of what they call the 'neighbourhood cluster', these are residential areas that have been selected to be 'as ecological meaningful as possible, composed of geographically contiguous census tracts, and internally homogeneous on key census indicators.' Each cluster contains about 8000 residents. The level of social efficacy in an area was hereby appraised by questionnaires, by asking residents how much people in their area could be trusted etc. Sampson et al find relevant correlation between social efficacy and the absence of violence incidents in an area.

Nolan et al (2004) have taken the idea of social efficacy further in order to obtain a set of guidelines how to foster social efficacy in communities. Social efficacy is hereby thought of as a phenomenon that emerges from local neighbourhoods of residents who know each other from face to face encounters, using mostly the same resources and having a common interest to maintain the area which they inhabit. The geographic unit Nolan refers to is the neighbourhood in its 'smallest, most intimate form', the 'defended neighbourhood'. Nolan et al emphasize the notion of community as a collective with a 'group identity' which is installed and maintained to distinguish the group from the outside world. Social efficacy is an achievement of the 'defensible group' which is grown over time. Whilst Nolan et al make a case for the 'defended neighbourhood' as functional entity, others have criticized this style of community precisely for the notion of self-enclosure, and

have doubted its viability within the city context. A distinct property of a 'defended community', as has been argued by Richard Sennett (1986), is their 'refusal to deal with, absorb, and exploit reality outside the parochial scale', because it is this notion of group identity which forces the group to fend off the outside and the strange in order to 'stay pure'. There is an inherent fear of the stranger against which the working principle of the community, so Sennett, is the 'celebration of the territorial community' – 'the ghetto' – in order 'to erase … strangerhood, you try to make intimate and local the scale of human experience'. This society, according to Sennett, is vulnerable to change, as any newcomer's ability to 'fit in' will be challenged.

However, 'defended neighborhoods' are not the only form of societies that have been suggested to be 'socially effective'. Jacobs (1961) suggests a different notion of neighbourhood cohesion: she pointed out that urban neighbourhoods, set in a scene where strangers mix with residents, neighbourhood relationships are mainly constituted from loose acquaintanceships and informal networks rather than close friendships among residents, where people acknowledge each other but are no close friends. These networks work e.g. through informal help among residents or between residents and shopkeepers, and casual encounters, events that might seem trivial individually but are in the sum 'powerfully cumulative'. It needs to be emphasized that this kind of network only works in open environments as it is based on casual encounters and a mix of residential and non-residential land uses. a network of relations that does not require any personal commitment, that does not need a shared 'group identity'.

Jacob's view is distinct, not only towards the attitude towards the stranger, but also towards change: Whereas in Nolan's community, a status quo is established and fixed through the idea of a 'group identity' and the operating principle the 'face' community, Jacobs' social interactions are much less defined, a net of loosely knit contacts; the idea of turnover and change is central – the neighbourhood works as a complex system which maintains a stable state - embedded and in constant exchange with its context – through constant ongoing inner processes which reproduce the system and keep it existing. It is convincing to think that this kind of neighbourhood is more robust to the natural change and residential turnover of urban life.

This different point of view warns us that it might be a simplistic idea to insist that 'effective communities' need to be enclosed 'face-groups' inhabiting territorial space, but there might be other, more complex forms . In the work presented here, we did not measure levels of social efficacy in residential areas, nor did we look at social phenomena within the neighbourhoods. Rather, we have shown how different layouts show different patterns of ASB incidents, and we have suggested that permeable accessible layouts are effective against ASB if they are well constituted by residential buildings. It is a central idea of Space Syntax that the natural co-presence of pedestrians can contribute to make the streets safe. This is accomplished if the streets are appropriate to make the presence of people / strangers feel 'normal' and appropriate. In the unambiguous public space of a well-used street, co-present people form a 'virtual community' (Hillier, 1996) that reassures people by the presence of other people.

Permeable residential layouts can be effective against ASB and disorder, as our findings suggest, if there is a good constitutedness from residential buildings. This reiterates what has been suggested before (Hillier, 1996, Hillier and Sahbaz, 2008) in context with crime: permeable constituted neighbourhoods seem to mediate the co-existence of strangers and residents; they work precisely because, not in spite of, they allow for the co-presence of strangers and residents. These neighbourhoods, as our results suggest, are 'socially effective'.

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