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Perceptions of liveability in the urban realm:

Between the physical attributes of the built environment and the anti-social behaviour of its users

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Abstract

This paper investigates the perceptions of Liveability by city-centre dwellers as an emergent important component affecting the performance of towns and cities, and their sustainability. The study links residents' perceptions of the built environment's condition and aspects of anti-social behaviour present in the area of study with its physical and spatial attributes. It utilizes a survey distributed to residents in twenty housing areas in Clerkenwell, London. The dual aims of this paper are to capture residents' perceptions about the Liveability of their locality through an assessment of twenty-four criteria relating to the built environment, including the condition of the urban fabric, the effects of traffic, and the prevalence of antisocial behaviour, and link these to its physical and spatial attributes.

The paper highlights the issues most negatively affecting the Liveability standard in the area, differentiates between the area-wide issues and those that are more location-specific, and accentuates the complexity and overlap between the number of problems concurring at these locations. The most prevalent problems reported by the residents were of an anti-social behaviour nature, whether these were intimidating gatherings of young people, drunken behaviour or drug dealing activities or those that had a direct impact on the upkeep and management of the built environment and its open spaces, like vandalism and litter and rubbish. The paper then maps each troubled location as pinpointed by the respondents, and carries out an in-depth analysis of the built forms surrounding it and of the urban space in which abuse occurred, thus capturing the dynamics of inter-visibility and movement between the users and abusers of the space, the residents in the area and the passers-by. By layering the various elements of the built environment, it became evident that the selection process of any such location depended very much on the combination of problems occurring in it and the physical attributes of the locality in which it was embedded. The paper concludes by assessing the suitability of the various analytical tools to addressing the research question.

Keywords

Liveability, urban realm, built environment, anti-social behaviour, space syntax, visibility graphs.

1. Introduction

The paper here presented reports on a project initially nested within the context of a much larger interdisciplinary EPSRC-funded research consortium "VivaCity 2020" that carried out its research between 2003-2007. Subsequently, the methodology was developed and articulated through the Doctoral housing-related research also funded by the EPSRC and concluded in 2014 (Zako, 2014).

The paper presents a study on the inter-relationship between the spatial and morphological attributes of the built environment and the residential satisfaction of its inhabitants It has been carried out in London's Clerkenwell, through a selection of twenty housing estates and developments, representing the range of housing types present today in English towns and cities. The selected examples thus vary significantly in their age, construction type, design morphology, tenure and the social class of their residents. The study is two-fold, first by carrying out an in-depth survey and analysis of the urban fabric and the urban realm through the conventional measures of building and housing densities, land uses, building heights, façade analysis, road type analysis and a complete photographic survey of the study area, further complimented by the more specialised space syntax analysis of Clerkenwell within the larger context of London. The second element of the study aims to capture the residents' views on the Liveability of their locality through an attitudinal survey that has been distributed to every housing unit in the selected case studies, requiring the respondents' assessment of their local environment. The survey draws upon the (then) UK government's Liveability Agenda and its three sections on upkeep, management or misuse of the private and public space and buildings (scruffy buildings, poor condition housing, graffiti, scruffy gardens, litter and rubbish, vandalism, dog excrement and nuisance from street parking) , road traffic and environmental issues (motorways, noise from railways and aircraft, heavy traffic, and poor air quality) and the abandonment or non-residential use of domestic property (vacant sites, vacant buildings, intrusive industry, and business in domestic property) as identified in the English House Condition Survey (EHCS, 2003). This is supplemented by a section on antisocial behaviour (intimidating gatherings of young people, drunken behaviour, begging and homelessness, drug dealing, prostitution, crimes against person, car vandalism and theft, and crimes against property) derived from documentation produced by the Home Office, primarily its "Defining and measuring anti-social behaviour: Home Office Development and Practice Report no.26" (2004), resulting in 24 criteria in four sections.

2. Theoretical Grounding

The research reported here directly addresses the relationship between the design of the urban built environment and its perceived liveability, by seeking to establish whether there is a relationship between the physical attributes of particular urban places and the range of behaviours that the environment affords (Gibson, 1977, 1979) to different groups within society. Liveability therefore embraces aspects of the quality of an urban space, and the sense of it becoming a pleasant place to use, that feels safe, as well as being an environment that is experienced as inviting and enjoyable.

This duality places the current study within the realms of man-environment /environment-behaviour studies, a field that took shape in the late 1960's and has grown since. Rapoport (*1973*), in one of the early deliberations on the nature of these studies, highlights its three main components as people's behaviours, the environment's characteristics and the mechanisms that link the two. He also draws attention to the multi-disciplinarily nature of any such studies, as well as their additive nature. In doing so, he calls for an approach that links the empirical to the theoretical aspects through larger '*meta-models',* which can encompass and embrace the wide range of issues and approaches within the field. In his argument he also highlights the role of the environment on behaviours, moving from "*environmental determinism to the environment as inhibiting, facilitating, or neutral and the environment as catalyst"* (*Rapoport, 1973, p.129*).

Hillier and Leaman, also in 1973, pinpoint the difficulties inherent in man-environment studies especially once it had been accepted as a paradigm, by identifying its paradoxes. They suggest that its two constituent elements, the '*organism*' surrounded by the *'environment',* and the *'environment'* that contains the '*organism*' are two sides of the same coin, and therefore they become '*locked together*' and cannot be separated. This is in part due to the multidisciplinary approach advocated for such studies.

Therefore, the research as a whole (and in consequence this paper as well) has been placed into a broader theoretical, contextual and architectural framework, a transdisciplinary framework that triangulates the relationship between people (as users of space) and places (the physical and spatial

attributes of the built environment) through a policy-driven agenda, that of Liveability. Liveability or what constitutes a vibrant liveable urban environment has received academic-theoretical attentions, and policy-oriented inputs that are shaped and influenced by sequential governments and their overall ideologies. In-spite of changing political agendas and theoretical directions, liveability is centred around the people's interactions as well as their perceptions, and therefore remains important for the everyday lives of city dwellers.

3. Methodology

The selected twenty case studies yielded between them 2834 housing units, and 277 householders returned surveys usable in the analysis (a further two surveys were excluded). For each of the 24 Liveability and anti-social behaviour (ASB) criteria included in the survey, the respondents were asked to rate it on a five point Likert scale, whereby five indicates that it was a major problem, and one that the issue did not represent a problem in their locality. Once a respondent identified a specific issue to being a major problem (4 or 5 rating), they were asked to mark its location on an accompanying map included for this purpose. Between them, the 277 respondents to the survey identified 997 occurrences of major problems within the 24 Liveability and ASB criteria, and were able to pinpoint 570 locations on the accompanying maps. The criteria or issues under investigation varied in the occurrence or the severity of which they were considered to be a major problem, and also varied in the degree to which residents were able to pinpoint the locations of their occurrence

Within the four sections of survey, two (the upkeep section and anti-social behaviour section) had eight individual issues each, whilst the other two (road traffic section and abandonment of property) had four each. Taking this difference in consideration, the section on road traffic and environmental issues scored highest with 206 occurrences for its four issues in terms of their negative effects on the perceived Liveability of the area, but was by far the least map-able of all for sections. Furthermore, poor air quality was the single highest scoring item within the entire survey; unsurprisingly it proved difficult for the respondents to pinpoint this on their accompanying maps. This was consistent throughout the twenty housing estates and developments under study.

On the other hand, the section dealing with the abandonment or misuse of property was the least problematic in affecting the Liveability standards as reported by the respondents to the survey. Similarly, they were unable to pinpoint the locations of such problems on the maps.

The last section within the original Liveability agenda, that of the upkeep and management or misuse of private and public buildings and spaces was consistently the most cited to be causing major concerns to the residents and having serious negative effects on the Liveability of their areas and was also most mapped within the three Liveability sections.

By far, the issues which respondents to the survey felt to be negatively affecting the Liveability standards of their localities most were those within the anti-social behaviour section. The 277 respondents to the survey reported 390 incidences and from these they were able to pinpoint on the map 344 locations.

Considering the two elements of the responses, the rating of a major problem and locating it on a map, a mismatch appeared. Issues within the road traffic and environmental section (heavy traffic and poor air quality) appeared on the list of the eight highest ranked problems collectively across the sample, but were rarely mapped out. At the other end, the intimidating gatherings of young people and drunken behaviour ranked quite highly, both as major problem in the area and were also precisely located on the maps.

	Issues	Total Reported Count	Rank Order		Total Mapped Count	Rank Order	
upkeep, management or misuse of the private and public space and buildings	ScruffyNeglectedBldg	45	10	347	33	6	207
	PoorHousing	30	16		12	11	
	Graffiti	17	19		2	16	
	Scruffy Gardens	35	14		20	9	
	Litter&Rubbish	72	4		40	5	
	Vandalism	51	8		78	2	
	DogExcrement	61	6		21	8	
	NuisanceStreetParking	36	13		1	17	
road traffic and other forms of transport	Motorways/MainRoads	38	12	206	2	16	8
	Noise(railway&Aircraft)	14	21		0		
	HeavyTraffic	58	7		1	17	
	PoorAirQuality	96	1		5	14	
abandon or non-res use of domestic property	VacantSites	19	18	54	4	15	11
	VacantBldgs	16	20		0		
	IntrusiveIndustry	14	21		7	13	
	UseDomesticBldgs4Industry	5	23		0		
Anti-social behaviour	InitimidatingGatheringYoungPeo	94	2	390	132	1	344
	DrunkenBehaviour	76	3		63	3	
	Begging&Homelessness	20	17		5	14	
	DrugDealing	44	11		56	4	
	Prostitution	10	22		17	10	
	Muggings/CrimeAgainstPerson	34	15		11	12	
	CarVandalism&theft	63	5		30	7	
	CrimesAgainstProperty	49	9		30	7	
		997			570		

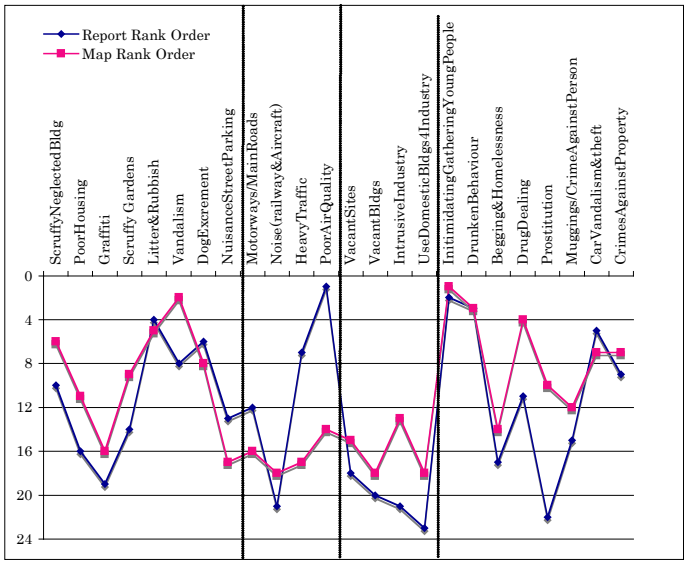

Figure 1: Respondents' ratings of the 24 problems, their reporting, mapping and the overall rank ordering and the line chart plotting the rank order the 24 problems according to their residents' reporting and map-able counts

4. Anti-Social Behaviour in the Urban Realm

Various forms of anti-social behaviour were the culprits most affecting the Liveability standards in Clerkenwell. The responses yielded a total of 132 locations in and near to the housing estates and developments around which the intimidating gatherings of young people took place, 63 locations associated with drunken behaviour and 56 known locations whereby drug-dealing activities occurred. Between them, the issues of intimidating gatherings of young people, drunken behaviour and drug activities were collectively reported 214 times and yielded 251 pinpointed locations, the equivalent of 44% of all mapped locations within the survey.

In addition to being the three most prevalent problems within the anti-social behaviour section, they also appeared concurrently and their locations overlapped. Out of a total of 132 YPG locations, 13 were blighted by both drunken behaviour and drug dealing activities, 38 with drunken behaviour and 30 with drug dealing activities. On top of that, each of these three types of anti-social activities would appear independent of the others, YPG in 51 locations, drunken behaviour in 12 and drug dealing in 13 locations. Yet not a single location was identified whereby drunken behaviour and drug dealing activities took place simultaneously without evidence of the young people's gatherings. Table 4 highlights this dynamic situational relationship between these three types of antisocial behaviour.

For any surveyed problem, if several pinpointed locations occurred in such close proximity to each other, then these were banded together and deemed a single group. This exercise resulted in 97 spatially unique groups of locations where intimidating gatherings of young people occurred, 76 within the housing estates and 21 in nearby locations. These locations were then subjected to a systematic analysis of the spatial characteristics of spaces in which they occurred and the characteristics of the built forms in which they were embedded.

More than half (58%) of the intimidating YPG occurred in the fully accessible parts of the urban realm, a further quarter (27%) occurred within the accessible parts of the housing estates and developments, whilst the last 15 of such gathering locations occurred within parts of these estates and developments that did not allow the general public access. These gathering occurred on paths (29 out 97) and roadsides (22) and near building entrances (25). Only 17 such gatherings took place in the common green and leisure areas, areas that were designed and set aside for people, especially young people, to gather in. A few isolated cases of these gatherings occurred in restricted access areas (3) and a further gathering took place in a car parking area. Overall, the intimidating YPGs occurred throughout the public urban realm and more so in the fully accessible parts of that realm.

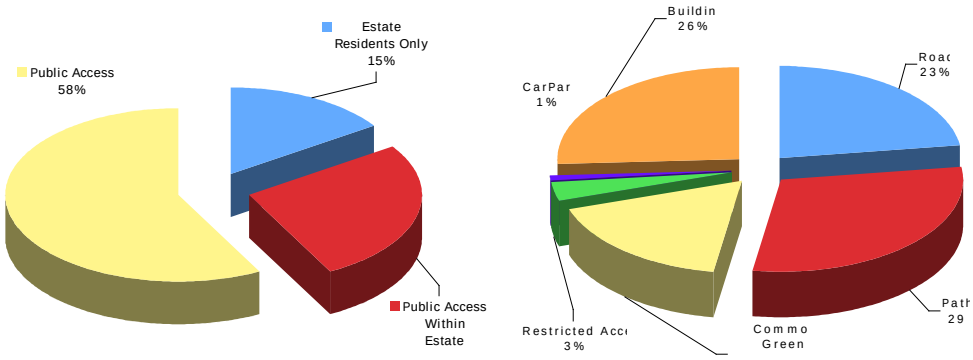

Figure 2: Distribution of YPG locations within the urban realm by space ownership (left) and types of spaces (right)

The next step was to scrutinise these locations with reference to their adjoining buildings, through analysing the building facades i.e. the primary boundaries that separated the interior of the buildings from the urban realm. The buildings' primary boundaries were classified in six categories differentiating between active frontages, frontages with doors and windows, frontages with doors only, frontages with windows only, upper floor visibility and blank walls. This classification depicted the relationship between the inside of the buildings and their surrounding realm through defining constituted-ness (accessibility and permeability) and the visibility conditions between the two, thus regulating the relationship between the private and the public, or the residents in the area and the users of its public space.

Each YPG location was then analysed in terms of its nearest two primary boundaries, and whether these offered permeability onto the space of such a location and/or overlooked it. As the scale of the urban space varied, so did the distance between the YPG locations and their closest building façades. The next step was to add on a metric distance restriction to describe the conditions of permeability and constituted-ness thus becoming vital, whereby only boundaries that were within 15 metres satisfied these conditions, anything further away from that would not affect these conditions.

Building entrances constituted two-thirds of the reported YPG locations (65 counts) and facades with windows overlooked 82 (85%) such locations. In adding the element of metric distance, whereby only primary boundaries within 15 metres or less were considered, the number of YPG location that were constituted was reduced to 57 (59%), in spite of the tendency for YPG locations to occur near estate entrances and stairwells into blocks. This re-calculation also reduced the number of locations that were overlooked to 70 (72%).

In combining both conditions of constituted-ness and overlooking, 57 locations (59%) turned out to be both constituted and overlooked, 33 locations (34%) were either constituted or overlooked, and the final 7 locations (7%) were neither constituted nor overlooked. Ninety (93%) of the young people's habitual gathering locations, were either constituted, overlooked or both. Even when introducing the 15-metre restrictive condition, these figures were only reduced to 83%, or 81 such locations. At odds with the obvious assumption that young people's preferable gathering places are blanked-wall spaces, our findings indicated that these gatherings were actually occurring in constituted and overlooked spaces. This suggests that the young people in this survey were not shying away from the public eye, even contrarily to that; they might have been affirming their presence in the urban realm through their choice of highly visible locations.

	Counts		Percents	
	No distance restriction	Within 15 mt. distance	No distance restriction	Within 15 mt. distance
Constituted	65	57	67%	59%
Non_Constituted	32	40	33%	41%
Overlooked	82	70	85%	72%
Not_Overlooked	15	27	15%	28%
Constituted&OverLooked	57	46	59%	47%
NOT Constituted_OverLooked	25	24	26%	25%
Constituted_NOT OverLooked	8	11	8%	11%
NOT Constituted_NOT OverLooked	7	16	7%	16%

Figure 3: Analysis of YPG locations in respect to the conditions of constituted-ness and overlooking

These conditions of constituted-ness and overlooking are the consequences of the built forms surrounding the space of each gathering location. They also reveal how each of these locations is seen from its surroundings. On the other hand, the view from within the space outwards from it, would be governed by additional elements of the built environment in which it is embedded. The shape of the view outwards is dependent on the open and un-built parts of its surroundings, and any opaque constructions that would restrict such views. With this in mind, visibility graphs were created from each YPG point in reference to the building (primary) boundaries and also the high opaque fences that blocked its view. These graphs presented the extent of surrounding realm that were visible and also accessible from each such location. A number of geometrical properties for these graphs were calculated including: area, compactness (in comparison to a circle, whereby a compactness of a circle =1 and that of a line = 0), perimeter and occlusivity amongst other (Batty 2001, Turner and Penn 1999).

The distribution of the range of their areas, their compactness and the relationship between the two were analysed. Frequency distributions of both areas of these graphs and their compactness showed

that YPG locations occurred within smaller areas but less compact/more linear. Moreover, the larger the area of the graph created from each YPG spot, the less compact/more spiky it was. These results suggested that in their choice of locations, young people preferred to congregate in smaller areas as defined by boundaries, yet these were more linear indicating a preference for movement and dispersal.

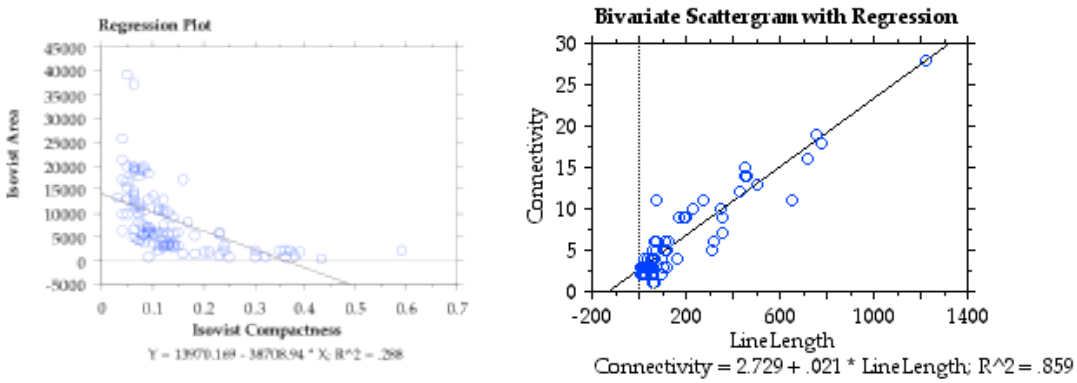

Figure 4: Scattergram depicting the relationship between Isovist areas and compactness (left), and between axial line lengths and connectivity (right)

This dynamic aspect of movement relates to the larger overall urban system in which the locations were embedded, and goes way beyond the immediate surroundings of each location. To address that, a 3-km radius axial map centred on Clerkenwell was created, and each YPG location was assigned to the axial line onto which it was situated. Attributes for each of the lines were calculated, including line length, number of connections and also the syntactic values of their local and global integration.

A "7-band" frequency distribution of these values revealed the tendency of YPG locations to be situated on shorter lines with fewer connections, and a very strong relationship within the two. Two thirds of all these gathering locations occurred on lines within the band of shortest axial lines, and half of the locations were on lines that had fewer than 5 connections in total.

Meanwhile, the space syntax analysis of the 3-km axial map revealed that YPG locations tended to be situated on lines that were more integrated globally but less integrated locally. This demonstrated that in selecting their gathering locations, young people chose to be associated with axial lines that were strongly embedded and integrated within the larger urban context, yet their local cues were associated with the physical forms of the surrounding built environment.

5. The Built Environment and Assessments of its Condition

The section from the original Liveability survey, that was reported most by the residents dealt with eight issues under the general umbrella of upkeep, management or misuse of private and public spaces and buildings. These eight included scruffy neglected buildings, poor housing, graffiti, scruffy gardens, litter and rubbish, vandalism, dog excrement, and nuisance from street parking. The aforementioned issues differed in the degree that residents rated and considered them to have a negative effect on the Liveability standard of their area. They also varied in the degree to which the respondents were able to pinpoint their locations on the accompanying maps. Both issues of litter and rubbish-strewn locations and vandalised locations were prominently mentioned by the respondents as having a negative effect on their neighbourhoods, and were also most mapped by them. Vandalism as a map-able problem was ranked second by the respondents of Clerkenwell, immediately following the issue of intimidating gatherings of young people. As problems, both were set within the section of the misuse of the private or public spaces of the built environment, yet by their nature both depict anti-social behaviour and activities.

Whilst vandalism did not occur by itself but was always associated with other problems, a third of the litter and rubbish strewn location did not suffer any additional problems. The additional problems in either case were either other forms of decay in the urban fabric itself, or those within the umbrella of anti-social activities. As reported by the residents, vandalised locations were associated with a combination of intimidating gatherings of young people, drug dealing and drunken behaviour and were also coupled with scruffy, neglected buildings and crimes against property. Persistent associations were evident between vandalism and YPG locations, and also but to a lesser degree the three-way association of the above two with drug dealing activities. On the other hand, a half of littered locations were subjected to two further problems, and the rest to three additional problems each. The additional problems associated with litter and rubbish dumping as reported by the residents in Clerkenwell, were either upkeep problems (scruffy garden and vandalism) or anti-social behaviour (intimidating gatherings of young people and drunken behaviour). Once again, the most persistent association appeared between the anti-social activities of drunken behaviour and intimidating gatherings of young people and the dumping of litter and rubbish.

Reporting and mapping of these two problems highlight the difference of the locations in which they occur. Whilst both seemed to follow a similar trend to that of the YPG locations in that they occurred throughout the public urban realm and more so in the fully accessible parts of that realm. Yet residents' reporting highlight higher percentage of vandalism occurring within the housing estates/developments, and in areas only accessible to the residents than litter and rubbish dumping which seems to occur more in the urban realm at large. Also, noted the high percentage of vandalism of the building stock itself but not as much littering near such buildings. The survey also highlights another trend, which is the 'relatively' low incidence of both vandalism of (16%) and littering in (12%) the common green areas in and around the housing estates.

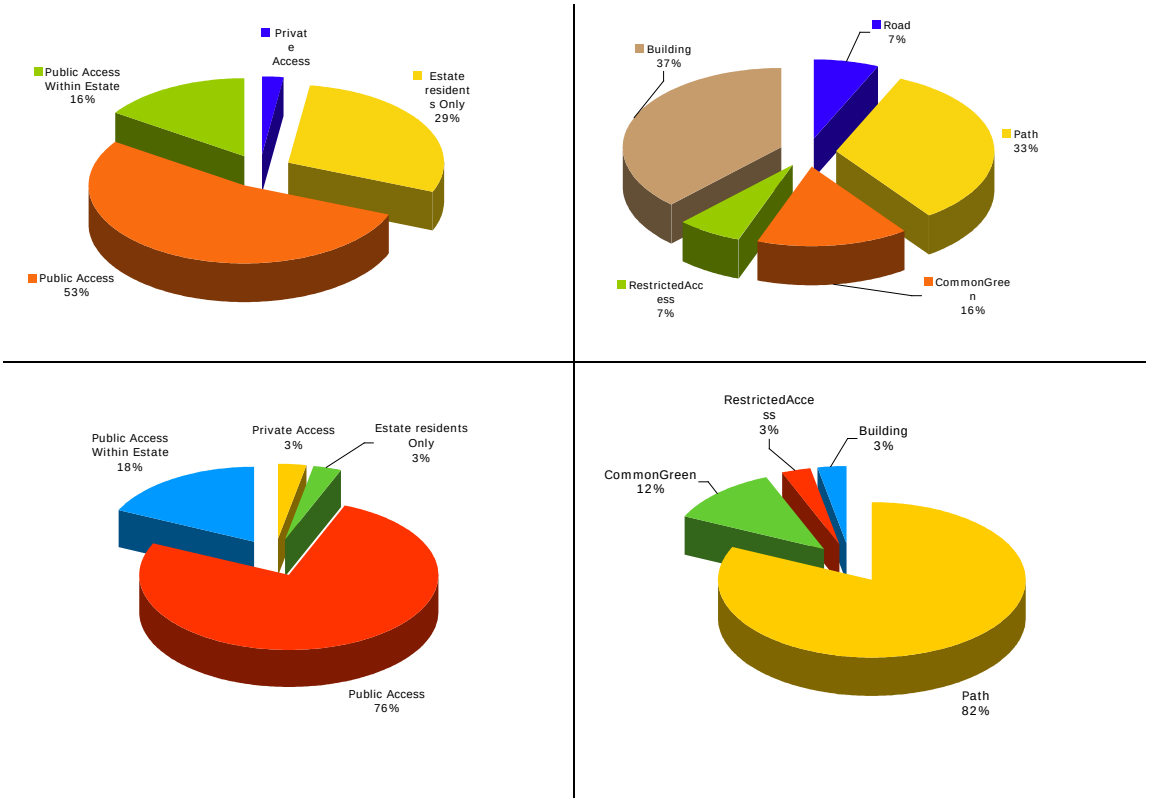

Figure 5: Top: Distribution of vandalised locations within the urban realm by space ownership (left) and types of spaces (right). Bottom: Distribution of litter-strewn locations within the urban realm by space ownership (left) and types of spaces (right)

As was the case with the YPG locations, the following step was to scrutinise these locations with reference to their adjoining buildings, through analysing the building facades according to the aforementioned six categories of primary boundaries. This was then complimented by the

introduction of the 15-metres distance restriction, also previously implemented on the YPG locations. Slight differences between the two types of problems emerge, with vandalised locations more likely to be constituted and litter and rubbish-strewn locations more overlooked. This finding is consistent before and after applying the 15-metre distance restriction. Moreover, all vandalised locations are either constituted or overlooked, and only after applying the distance from buildings restriction, that this drops by 13% of the locations. On the other hand, more of littered locations are neither constituted nor overlooked before applying the distance restriction (6%) and more so afterwards (18%). This confirms the previous finding that vandalised locations are in closer proximity to the housing stock, and litter and rubbish strewn are characteristic of the urban realm at large.

The visibility graphs created from each problem-inflicted location with reference to the building (primary) boundaries and the high opaque fences that blocked the view and restricted movement varied widely in their basic shape attributes of area and perimeter. In both vandalised and litter-strewn locations the max/minimum ratio ranged from 3-30 times between their smallest and largest areas, and between 3-17 times between their smallest and largest parameters. At this level, these findings suggest a high degree of similarity between the locational attributes of both these problems, yet only once these attributes are analysed in respect to the other problems that concur with either one that the differences start to crystalize.

The vandalised locations were grouped together according to the associated anti-social activities of intimidating YPGs and drug dealing activities. The differences between their shape attributes became more profound, whereby vandalised locations that attracted young people as well showed the highest ranges of areas and perimeters (Figure 6, column 1+2), whilst those that were not associated with either YPGs or drug dealing activities showed the least variance (Figure 6, column 3).

	1	2	3	1+2
	Vandalism, YPG, Drugs	Vandalism, YPG, No Drugs	Vandalism, No YPG, No Drugs	Vandalism & YPG
Area Mean	5312.09	14365.81	9517.64	7262.12
Area Minimum	1310.81	3866.99	3053.34	1310.81
Area Maximum	17747.91	40185.12	17399.75	40185.12
Area Range	**16437.10**	**36318.13**	**14346.41**	**38874.31**
Area Max/Min	**13.54**	**10.39**	**5.70**	**30.66**
Perimeter Mean	683.96	1450.93	1030.06	849.15
Perimeter Min.	216.22	448.6	429.9	216.22
Perimeter Max.	1598.63	3706.81	1708.05	3706.81
Perimeter Range	**1382.41**	**3258.21**	**1278.15**	**3490.59**
Perimeter Max/Min	**7.39**	**8.26**	**3.97**	**17.14**
Compactness Mean	0.188	0.123	0.147	0.174
Compactness Min	0.062	0.027	0.056	0.027
Compactness Max	0.592	0.241	0.373	0.592
Compactness Range	**0.53**	**0.214**	**0.317**	**0.565**

Figure 6: The analytical summary of the geometrical properties of the visibility graphs from the vandalised locations.

A further split of the vandalised locations in which young people also gathered, according to whether additional drug dealing activities took place as well, provided a further aspect of the analysis. Whilst the ranges of the areas and perimeters were not very diverse, yet the mean, minimum and maximum locations showed profound differences. Locations that were marred by all three problems

had smaller areas and perimeters than those that were not associated with drug dealing activities. The graphs generated from these points were also characterised by being most compact.

Marked differences could be seen in the geometric characteristics of the visibility graphs from the vandalised locations, between those that additionally suffered from intimidating gatherings of young people and those that did not, and these differences became more evident once associated drug-dealing activities were introduced. The visibility graphs from the locations that suffered from the combined effect of all these three problems together were characterised by having the smallest mean values in terms of their areas and perimeters and they were marginally more compact. Carrying out an Un-paired T-test analysis for these variables for the three categories of groups of locations (Figure 7), yielded the lowest P-values between the two types of vandalised locations in which young people gathered but differed as to whether drug dealing activities took place there or not, indicating that such differentiation was not likely to have occurred by chance.

Unpaired t-test	Bldgs&HiOpaque Isovist Area			Bldgs&HiOpaque Isovist Perimeter			Bldgs&HiOpaque Isovist Compactness		
	Mean Diff.	**t-Value**	**P-Value**	**Mean Diff.**	**t-Value**	**P-Value**	**Mean Diff.**	**t-Value**	**P-Value**
YPG&Vandalism, Vandalism only	1632.421	0.946	0.3473	161.003	1.051	0.2965	-0.016	-0.622	0.5359
Vandalism_YPG_Drugs, Vandalism_YPG_NoDrugs	-9053.72	-4.29	<0.0001	-766.97	-4.021	0.0002	0.064	1.886	0.0639
Vandalism_YPG_Drugs, Vandalism_NoYPG_NoDrugs	-4205.55	-2.93	0.0047	-346.10	-2.608	0.0114	0.041	1.054	0.2959
Vandalism_YPG_NoDrugs, Vandalism_NoYPG_NoDrugs	4848.18	1.24	0.2281	420.86	1.216	0.2359	-0.024	-0.656	0.5178

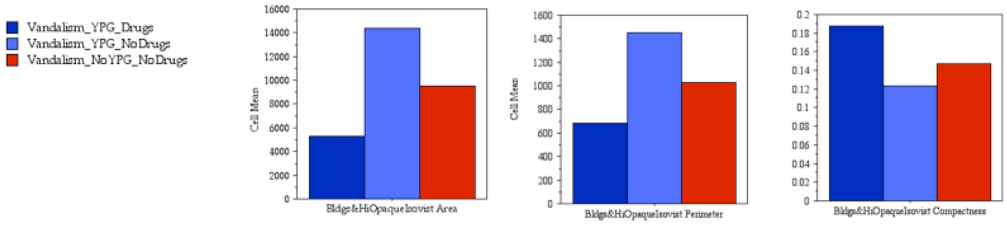

Figure 7: Analytical summary of the geometrical properties of the Visibility Graphs from the vandalised locations.

Similarly, the visibility graphs from litter and rubbish strewn locations were then differentiated according to the types of additional problems associated with them, and here differences became more evident between four sub-groups; those with additional upkeep problems, with anti-social behaviour problems, those with both of these together, and locations that were only strewn with litter without any additional reported problems. Litter locations suffering also from upkeep problems were most uniform in their areas and perimeters (ratios, 2.99 and 3.23 respectively), having the smallest mean values, and smallest ranges of area and perimeter values, suggesting their occurrence in the more confined spaces. By contrast, while littered locations suffering from anti-social behaviour problems also had quite uniform visibility graphs (ratios 6.06 and 4.31), these had the highest mean values for their areas and perimeters, indicating their occurrence in the less confined spaces of the urban realm. The locations suffering from litter only or suffering from combined litter, upkeep problems and anti-social behaviour problems had wider ranges of geometric attributes.

6. Area wide problems

Residents in all of the twenty housing estates voiced their concern about transport-related issues, and their negative impact on the Liveability standards of their area. A total of 96 respondents from all the 20 housing developments considered “poor air quality” to be a major problem; this was followed by “heavy traffic” which was cited by 58 respondents from 15 developments, and then the effects of “main roads and motorways” according to 38 respondents from 11 developments. Last within this section was the noise (especially from railways & aircraft) whereby 14 respondents from 12 housing developments indicated their concern about this issue. In compiling all these responses, it emerged that residents in 11 of 20 housing estates/developments thought theirs were blighted by all four of the transport-related issues, a further two developments suffered from three transport-

related issues, and a further four suffered from two such issues. According to the residents' responses, the last four housing developments only suffered from poor air quality. From these responses, it became clear that these problems were widespread throughout the area of study and were not affecting one housing estate/development specifically (Figure 8).

no. respondents = 277	Main Roads & Motorways	Noise (Railways & Aircraft)	Heavy Traffic	Poor Air Quality	No. of Issues
BevinCourt	-	-	-	3	1
BourneStEstate	2	1	5	12	4
BrewhouseYard	5	1	4	4	4
CatherineGriffithsCourt	1	1	2	2	4
CavendishMansions	8	1	12	13	4
CharlesRowanHouse	2	1	4	7	4
ClaremontClose	-	-	-	1	1
ClerkenwellCentral	-	2	-	1	2
DallingtonStreet	-	-	-	1	1
FinsburyEstate	6	2	7	10	4
LangdonHouse	-	-	-	1	1
LloydBakerEstate	-	1	1	3	3
MargeryStEstate	1	1	2	3	4
MyddletonSquare	-	-	3	6	2
NewCalthorpeEstate	1	1	1	3	4
SpaGreenEstate	4	1	3	4	4
Triangle	-	-	2	6	2
TrinityCourt	4	1	3	6	4
WarnerHouse	-	-	2	3	2
WestonRiseEstate	4	-	7	7	3
	38	14	58	96	
	13.72	5.05	20.94	34.66	
Number of estates affected	11	12	15	20	

Figure 8: Table showing the respondents' ratings of the four transport-related issues, by housing estate/development.

The estates and developments suffering most from the traffic and transport-related issues were distributed indiscriminately amongst the various housing morphologies, eras of construction and EHCS typologies. Similarly, no clear pattern could be related to the percentages of ground areas dedicated to roads, or to open spaces within these estates. Neither did the investigation into the types and densities of boundaries separating these estates from their immediate surroundings yield any results.

The next step was to investigate the characteristics of the urban fabric in which these estates were embedded by interrogating the 3km axial map of London centred on Clerkenwell. The entire area of the fieldwork was within the most integrated parts of the map, both globally and locally. Within the larger context of London, all twenty housing estates were in quite a close proximity to each other, yet the data collected within the attitudinal survey was not detailed enough to capture the high resolution characteristics of the axial map.

Moore, et al. (2009) in their recent research devised a methodology whereby they layered environmental monitoring systems to measure both air pollution and noise levels, with that of residents' perception of their urban environment. They concluded that whilst the objective and subjective accounts are not compatible yet they are complimentary and provided "detailed knowledge of the environmental conditions in the case study area" (Moore et al. in Cooper 2009, p. 71). On the other hand, previous research (Croxford et al. 1995) had shown the feasibility of linking the environmental quality of air pollution to the spatial configuration of the street system provided that detailed air quality measurements were captured at the fine scale of segments of streets.

It was not within the remit of the current study to carry out a complete environmental assessment for the twenty housing estates and developments under investigation, nor was it feasible to do so. Yet, through the postal survey, it became evident that these issues played an important role in the overall Liveability standard of the area.

On the other hand, the section within Liveability that was least troublesome to our respondents in Clerkenwell was that of the abandonment or misuse of sites and buildings. The respondents identified only four vacant sites, which turned out to be sites under construction that were later completed and occupied. A further seven locations of intrusive industry were mapped out and were linked as well to construction work taking place. This outcome is a specific reflection on the gentrification and regeneration that Clerkenwell has recently been going through and which turned it into one of the highly desirable neighbourhoods in London.

Thus far, the two sections within the Liveability Agenda that we have dealt with were "area-wide" problems. The issues within the misuse and abandonment section related to the ongoing regeneration and gentrification of the area and the locations pinpointed for such problems were part of this dynamic process. On the other hand, the issues within the transport and environmental-related section, whilst influenced by the larger context in which the area of study was located, yet their fine scale differences could not be assessed without the appropriate environmental monitoring devices. Nevertheless, the attitudinal survey was instrumental in documenting the importance of these issues and the residential dissatisfaction with the performance rate in their neighbourhoods.

7. Discussion

The focus of this paper was to capture the residents' satisfaction with their locality, and their ratings of the Liveability standards within their neighbourhoods. The mechanism utilized was a postal survey distributed to the residents in twenty housing estates and developments in Clerkenwell. This survey comprised the sixteen criteria from the UK government's Liveability agenda and was supplemented by eight anti-social behaviour criteria as highlighted by the Home Office reports of recent years to portray the wide range of problems facing the urban dweller. A parallel concern of the study was the ability to attribute these problems to their physical locations within the city and extract the morphological and geographical characteristics of their locations.

Within the first section of the paper, the most persistent issues were singled out, the complexity of the relationships between the various forms of Liveability and anti-social behaviour issues were unpacked, and the degree to which these issues were widespread or concentrated in specific locations was established.

The first layer of the analysis revealed a divergence between the actual dissatisfaction with any of the criteria and it's positioning in the urban realm. Collectively, anti-social behaviour activities emerged as the criteria causing most negative effects on the Liveability standard of the area, and were also most located geographically. Aspects of the upkeep and management of building and the urban realm, especially vandalism and litter were also highly rated as negative contributors to the Liveability standard of the area, and were also located geographically by the respondents. On the other hand, the widespread environmental dissatisfaction, in terms of noise and air pollution in the area, was accompanied by the residents' inability to spatially locate these.

The second layer of the analysis dealt with the geographical and morphological attributes of the points of occurrence of any such reported problems. First, the most persistently mapped problem, that of the intimidating gatherings of young people, was considered and related to the combinations of other problems that appeared simultaneously with it, namely drunken behaviour and drug dealing activities. The second set of problems reported and mapped by the residents belonged to the upkeep and management section, namely, vandalism and litter.

The geographical and morphological analysis of the locations frequented by young people as their gathering places, shed the light on the selection dynamics of these locations. Contrary to intuition, these turned out to be locations that were mostly in the fully accessible parts of the urban realm, and under the gaze of the residents in the area and users of its public spaces. Moreover, these locations were selected to offer the young people movement and dispersal options within the wider area. Similar trends appeared within the vandalised locations, and litter and rubbish strewn locations, especially as they appeared quite interchangeably with each other.

The next steps were to differentiate between the locations according to the multiple problems occurring in them. Some associations were more persistent than others. The upkeep problem of vandalism did not occur by itself but was always associated with other problems. The two most persistent anti-social behaviour problems occurring with it were intimidating YPGs and drug-dealing activities. On the other hand, litter and rubbish strewn locations were associated with other types of upkeep problems, and also with ASB problems (such as intimidating YPGs and drunken behaviour).

The research thus far established the complexity of associations between the various types of anti-social behaviours and their manifestations on the upkeep of the built environment, the prominent locations in the urban realm in which they took place, and the subtle yet important differences in the selection criteria of the location according to the combination of problems taking place. Moreover, the research also recognized the importance of the space syntax theory and its wide variety of tools in addressing the various aspects of this issue. Area wide problems could be thoroughly addressed through the axial map through correlations with the environmental assessments, although beyond the current research. On the other hand, the point specific problems were addressed through the assessment of the physical and spatial qualities and their correlations with the attitudinal surveys.

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