ALL THAT MEETS THE EYE

Overlapping isovists as a tool for understanding preferable location of static people in public squares

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0 Abstract

A review of current ideas on static people preferable location in public spaces indicates that their gradual occupation follow an outside to inside movement with people sitting where they have the best views. It is also suggested that specific activities are restricted to particular locations. An analysis of patterns of occupancy of 12 public spaces in the City of London did not reveal the generally accepted occupancy behaviour for all the squares. It is suggested that the static occupancy of public spaces is a function of their spatial configuration and their local interconnectivity in the urban fabric where they are embedded. In order to investigate the relationship between human behaviour and spatial design, space syntax methodology is applied. A new method was used for the data analysis. Instead of employing convex isovists from within the public spaces, point isovists are produced from the intersection of axial lines from which any part of the public space could be seen, resulting in convex spaces with different degrees of overlapping isovists. It is demonstrated that the pattern of static occupancy is inversely related to the increasing degree of the public squares convex spaces' visual connections to the surrounding area, regardless of the activities that people are engaged in.

1. Enclosure, exposure and the edge effect

Although it has been demonstrated that levels of static people of public squares is a function of the configuration of the urban fabric where they are embedded (Arruda Campos, 1997), an additional important consideration for their success is the adequate provision of sitting places. This is reinforced by Gehl who emphasises. "Only when opportunities for sitting exist can there be stays of any duration. If these opportunities are few or bad, people just walk on by. This means not only that stays in public are brief, but also that many attractive and worthwhile outdoors activities are precluded" (Op. cit., 1980:157).

According to Alexander, the life of public spaces form naturally around their borders and edges where people gravitate. Once they are full, the gradual occupation will naturally turn inwards (Op. cit., 1977: 600). Gehl calls such property as the "edge effect" (Op. cit., 1980: 159) which is widely accepted as discussed in the research conducted by a number of different investigations (Carr, 1992; Marcus and Francis, 1990; Korosec-Serfaty, 1982; Whyte, 1980 and Joardar and Neill, 1978). The edge effect exists because people prefer to sit in areas facing the pedestrian flow. Despite the gradual occupation follows a outside to inside movement, both Alexander (1977) and Marcus and Francis (1990) add that people tend to avoid very laid open spaces,

looking for areas which are not either too exposed or too enclosed, favouring a combination of unobstructed views of street activity and a degree of privacy. Whyte (1980, 1988) agrees with this point of view. He suggests that this may be related to "primeval instinct: You have a full view of all comers but the rear is covered". Although Whyte recognises that protection does not explain the popularity of curbs where "they face inwards, toward the sidewalk, with their backs exposed to the dangers of the street" (Op. Cit., 1980: 22).

As far as users activities is concerned such as reading or people watching, it is generally accepted that secluded areas far from the pedestrian flow and the direct observation of others create private spaces and therefore are favoured by people desiring privacy (Marcus and Francis, 1990; Carr, 1992 and Lennard and Lennard, 1995). Burden on a study of the relationship between spatial design and static use for a small public space in New York City is more specific. He suggests that users select different areas of public spaces according to the activities that they are engaged to. Couples favour secluded areas whereas "socializers and observers tend to favour the front edge [of Greenacre Park] where they can view the street scene and be sure not to miss the entrance of an acquaintance" (Op. Cit., 1977: 31).

Although these studies provide an important insight of patterns of space use of public spaces, they do not explore how the morphological properties of the urban grid where the public squares are embedded might affect their use. Hillier in a series of studies of the performance of public spaces (1984, et al.,1990a, et al.,1990b) suggests that that good locations for unprogrammed static use, that is, uses that do not depend on the provision of specific attractions or facilities, "were found to be those which were convexly related to the intersections of integrating lines", not at the axial lines intersection, but close to it (Op.cit., 1990a: 6). From his research, he concluded that attractors such as wine bars are not necessarily a key element, but the static occupancy of public spaces may be associated to "the visual properties of space experienced by the stationary person" (Op.cit., 1990a: 25). According to Hillier, popular stopping points are the ones with extensive visual fields. "A quantifiable representation of the degree to which a location is visually strategic is the convex isovist" (Op.cit., 1990a: 26).

2 Overlapping point isovists

The study reported here aims to investigate whether a consistent pattern of static occupancy for both sitting and standing and good locations for unprogrammed use can be established based on the analysis between human spatial behaviour and spatial design.

When the analysis of the preferable location for static people looks at the size of the visual fields from within the public spaces, a conceptual problem arises. How to define the convex spaces where the visual fields should be drawn up? If formal sitting areas could be a criterion, when considering curbs, steps, small walls, any kind of secondary seating, the criteria can be subjective and inconclusive. The same is applicable when studying standing static people. The research reported in this paper proposes a different approach, where the observer is outside rather than inside the

public space. It is conjectured that static people preferable location is not exclusively associated to the size of the visual fields from within the public spaces but rather the multiplicity of the visual connection to the urban environment. Areas inside the public spaces, which are seen from various different locations and theoretically seen by a higher variety of moving people, might have a different rate of static occupancy, than areas that are seen from a smaller number of locations. Therefore, the preferable location of static people in public spaces not only is a result of the visual connection between the public space but also from the urban fabric where they are embedded in, suggesting that not only the spatial properties of the public space are relevant but mainly the configuration of the urban fabric. This method is denominated the overlapping point isovists analysis.

The overlapping point isovists are based on the axial break up of the urban grid where the public spaces are embedded. The point isovist follows the Benedikt definition that states "An isovist is a set of all points visible from a given vantage point in space and with respect to an environment" (Op. cit., 1979: 47). In our case, the intersection point of two or more axial lines, that is, the topological changes, defines the vantage point, from which any segment of the public space could be seen, until all the possibilities were covered. The axial lines intersection points are then all points from where a potential observer will face a choice of either moving through the body of the public space or selecting an alternative route. Figure 1 illustrates how overlapping point isovists can be calculated.

Figure 1

For each square, the point isovists were overlapped resulting in convex spaces with different degrees of exposure, which were ranked accordingly and statistically analysed against the recorded number of static people of each area. Consequently, these resulting convex spaces would be the areas that, for instance, do not have necessary the longest or the largest isovists, but rather they are the most exposed spaces that are seen by the highest number of different locations. Figure 2 below shows the overlapping point isovists maps for the twelve selected cases.

Figure 2

3 The case study: public spaces in the City of London

Before starting a detailed quantitative analysis of the results, it is instructive to look at the general characteristics of each square and their characteristic behaviour to determine the best way to analyse the results. A selection of twelve squares was used for the investigation. Table 1 gives a brief description of the selected spaces according to the patterns of occupancy and morphological characteristics. Quality of street furniture relates to the amount of formal places available to sit, not counting secondary sittings such as street curbs, flower walls, etc.

square name	origin	presence of catering facilities		quality of street furniture	
level of enclosure	pattern of occupation of static people				
Abchurchyard	former churchyard	yes	poor	high	no clear pattern

Bank Corner	building dvlpment	no	medium	low	inside(centre) to outside
Exchange Square	office complex	yes	good	high	outside to inside
Fenchurch	building dvlpment	yes	medium	medium	outside to inside
Finsbury Av.	office complex	yes	good	high	inside to outside
Fleet Place	office complex	yes	medium	high	outside to inside (back)
Love Lane Corner	former churchyard	no	good	medium	outside to inside
New Change	building dvlpment	yes	medium	low	no clear pattern
North Guildhall	building dvlpment	no	medium	medium	back to front (both inside)
Royal Exchange	building dvlpment	yes	medium	medium	outside, centre, outside
St.Anne St.Agnes	former churchyard	no	good	medium	no clear pattern
Whittington Gds	former churchyard	yes	good	medium	inside (centre) to outside

Table 1: Description of the twelve selected public squares

A preliminary inspection of the results of the sample of twelve squares in the City of London revealed different patterns of static occupancy, with only four cases (see table 1) following a clear outside to inside pattern of occupation. The selected public spaces, which present different morphological characteristics (Arruda Campos, 1997) also, did not reveal a correlation between static people preferable location and proximity to pedestrian routes or attractors.

For instance, in the case of Bank Corner, an initial analysis of popular sitting areas suggested a preference to the inner core of the square, moving towards the seats by the steps of the Royal Exchange building (where the vast majority of moving people walk by), back around a statue for the commemoration of the World War I at the front of the square and finally gradually occupying the steps of the Royal Exchange building at the peak lunch time period. Likewise Bank Corner, Whittington Gardens and Finsbury Av. seems to follow the same pattern. Conversely, there are three public spaces, Exchange Square, Fenchurch and Love Lane Corner, that the data revealed the opposite but more conventional behaviour, with static people following an outside to inside pattern of occupation. In the case of Fenchurch Place the area that receives the first occupants is again facing the space with the smallest number of through pedestrian movement. Also there are three public spaces that no clear pattern emerged from the analysis. Figures 3 and 4 illustrate the pattern of occupation of static people for Bank Corner and Fenchurch Place.

Figure 3 and 4

4. Spatial analysis

In order to investigate whether there is correlation between the spatial configuration of the public spaces in respect to the urban environment and static people preferable location, the research will study the gradual occupation of the public spaces in two phases. The first phase looks at the total number of static people independently of the activities that the people were engaged to. In addition, the data was quantified and analysed separately for each observational day in order to investigate whether the pattern of static occupancy would keep the same profile. The second phase looks at the number of static people against three selected activities: relaxing and/or people watching, eating or drinking but not using the facilities of wine bars or public houses and reading or engaging in any activity that requires concentration such as writing or work related issues. The idea is to explore whether contrasting activities will require different locations or not. That is, it is aimed to investigate whether people who are relaxing are in fact more likely to select exposed locations, whereas people reading will selected more secluded areas.

Using direct observation, with the snap shot technique, the information on stationary people was recorded coded according to activities. All twelve squares were observed at the same time to provide good comparison and contrast. The data was collected over two separate days randomly selected during the summer of 1996. The next step was to correlate the number of static people inside each of the resulting convex spaces and their respective degree of overlapping isovists. Three bands; low, medium and high levels of overlapping are established, focusing on five time periods, off peak for static occupancy, where the public spaces are relatively empty and therefore the choice for places to sit or stand are maximised, as follows: 8:40 am, 10:40 am, 3:40 pm, 4:40 pm and 5:40 pm.

When looking at the overall number of static people for each day that the data was collected, we can see that there is a good consistency in the static people preferable location. As shown in table 2, for 9 out 12 cases, the pattern of occupation was exactly the same for both days distribute between low, medium and high levels of overlapping. The three exceptions are Fleet Place, North Guildhall and Whittington Gardens. In all these three cases, the discrepancy is limited to two bands only and generally the difference in the mean number of static people between the levels of overlapping is relatively small. Table 2 illustrates this point more clearly.

square name	day	mean number of static people			
	low	medium		high	
Abchurchyard		d1	2.0	0.8	0
Abchurchyard		d2	1.8	1.0	0
Bank Corner	d1	9.0	6.75	1.5	
Bank Corner	d2	8.25	7.0	1.25	
Exchange Sq.	d1	14.6	4.2	0	
Exchange Sq.	d2	32.6	29.2	0.6	
Fenchurch	d1	0.4	7.6	4.8	
Fenchurch	d2	1.2	3.8	2.4	
Finsbury Av.	d1	11.2	59.4	10.8	
Finsbury Av.	d2	1.4	3.8	1	
Fleet Place	d1	2.2	3	0.8	

Fleet Place	d2	4.6	3	0
Love Lane	d1	0.8	0.6	1.8
Love Lane	d2	0.8	0.4	0.8
New Change	d1	4.4	2	0.6
New Change	d2	2.2	1.6	0.4
North Guildhall	d1	1.2	0.2	1
North Guildhall	d2	2	0	0.4
Royal Exchange	d1	10.8	10	0.25
Royal Exchange	d2	11.8	10.8	2
St.Anne St.Agnes	d1	2.2	0.6	0.6
St.Anne St.Agnes	d1	1.4	0	0.2
Whittington gds	d1	1.8	20.8	21.2
Whittington gds	d2	0.4	5.8	5

Table 2: Mean number of static people according to overlapping point isovists areas and days

But if the collected data revealed that there is a consistent pattern for static people in public squares, the data showed us also something more interesting. The analysis, after averaging out the data for the two observational days, as seen in table 3, revealed that in 6 out of 12 squares, stationary people pattern of occupancy was inversely related to the increasing degree of overlapping point isovists. There are other two cases that the low overlapping areas are again the preferable location for static people, although followed by high levels of overlapping. Only one case, Love Lane Corner, revealed a clear preference of static people for highly visually connected places. Although there are three public spaces where the majority of static people chose convex spaces of medium levels of overlapping, the data revealed that in 7 public squares, the most exposed spaces are the ones that received the least number of static people.

If we rank the three levels of overlapping isovists, assigning points according to their position for each square (for instance in the case of Bank Corner where low (3 points) > medium (2 points) > high (1 point)); areas with the lowest degree of overlapping isovist are the ones that summed the highest number of points (29), followed by areas of medium overlapping (21 points) where areas with the highest levels of exposure have 16 points, when all the public spaces are summed together. Therefore, it is possible to conclude that overall people's preference for sitting spaces is inversely related to the increasing degree of overlapping point isovists.

square name	Total all			relaxing			eating and drinking			reading		
	low	med	high	low	med	high	low	med	high	low	med	high
Abchurchyard	3.80	1.80	0	.60	.80	0	.40	.40	0	2.40	.40	0
Bank Corner	17.25	13.75	1.75	3.50	2.75	.50	2.25	2.00	.50	11.50	9.00	1.00
Exchange Sq.	47.2	33.4	.60	5.00	1.80	0	3.80	.40	0	10.8	2.20	0

Fenchurch	1.60	11.4	7.20	.40	.40	1.20	0	1.20	1.40	.40
5.40	4.20									
Finsbury Av.	12.6	63.2	11.8	0	.40	0	.20	.40	0	3.60
7.60	2.80									
Fleet Place	6.80	6.00	.80	0	0	0	.20	.20	0	1.40
3.80	.80									
Love Lane	1.60	1.00	2.60	0	0	.40	0	.60	.60	.80
.40	1.60									
New Change	6.60	3.60	1.00	0	.20	0	.20	.60	.20	.80
.40	.40									
North Guildhall		3.20	.20	1.40	0	0	0	1.20	0	0
2.00	.20	1.40								
Royal Exchange		22.5	20.75	2.25	5.00	3.00	.25	1.25	0	.25
8.00	1.25	1.75								
St.Anne St.Agnes		3.60	.60	.80	1.20	0	0	.40	.20	.20
2.00	.40	.60								
Whittington gds		2.20	26.6	26.2	.40	3.40	0	0	1.00	0
1.80	5.20	2.60								

Table 3: Mean number of static people according to overlapping point isovists areas for different activities

When the data of static people was analysed according to activities (see table 3), the results revealed that the activities are not restricted to particular locations. There was no strong evidence that people relaxing would select more exposed areas or people reading would deliberately select secluded areas. Looking at the relaxing activity, only in two public squares the majority of people selected highly exposed spaces, with four squares the most popular areas were equally for medium and low exposed spaces (the are two public spaces that recorded zero in all bands). If we apply the same ranking method as before, low and medium exposed areas scored 30 points, followed by highly exposed ones with 23 points. Looking at preferable areas for eating, again there are more cases of public squares where the low exposed areas were favoured by the majority of people followed closely by medium exposed ones. Again using the same methodology as before, low exposed areas scored 30 points, followed by medium areas that score 29 points, and highly exposed ones with 23 points. Finally, when assessing the preferable areas for reading, low exposed areas scored 29 points, followed by medium exposed areas with 24 points, and finally highly exposed ones with 20 points.

The results may suggest that the activities that people would engage are irrelevant when choosing good locations to sit or stand. Reading is the only activity that maybe "matches" the expected level of visual connections to the surrounding areas. But, because the overall pattern of static occupancy already indicated that low exposed areas are favoured independently of the activity involved, more research is necessary to clarify this specific point. In fact, when the data was analysed for individual cases (relaxing, eating or drinking and reading) according to the overall number of static people, the study revealed that the pattern for each activity tend to follow the overall one, as it happens in 6 out of 12 cases. For instance, looking at the results of Bank Corner as described in table 3, people relaxing and/or people watching, eating or

drinking and reading all prefer to sit first in areas of low levels of overlapping isovists, follow by medium and them high levels of exposure. In another four cases, there is only one activity that does not follow the general pattern of distribution of static people. Figure 5 next shows graphically how the pattern of static occupancy relates for each of the activities.

Figure 5

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5 Conclusions

This paper has introduced a new analytical method for studying the relationship between patterns of space use of static people and the spatial configuration of public spaces. Overlapping point isovists maps showed to be a useful tool for the description and quantification of preferable locations of stationary people.

Contrary to current ideas on the gradual occupation of public spaces, it was possible to demonstrate that rather than following an outside to inside movement pattern, the gradual occupation of public spaces is in fact a local spatial property inversely related to the increasing degree of the visual connections between public spaces to the surrounding urban environment. The fact that static people activities are not restricted to particular locations reinforces the suggestion that the choice in good places to stop is a function of the spatial configuration of public spaces and urban fabric. The tendency is to look for secluded areas regardless of the activities involved.

It is suggested that a more sophisticated pattern in selecting good locations for static use exits. Having arrived at the public spaces through the linear properties of space (Hillier et al., 1990), users may at this point choose locations that provide them with a reasonable degree of privacy. Total exposure, the concern of the public gaze, is something to be avoided. Therefore, the first area of the public space to be seen by the user while moving around in the urban environment, is the first one to be avoided and a more secluded location is selected. Therefore, the user is in control of how far he wants to be visually exposed but without losing the ability to see. Only when the more secluded areas are taken, users gradually start to occupy the more exposed areas.

With a good understanding of the likely popular areas to stationary activities, public spaces can be better designed, as adequate provision of siting areas can only contribute for the success of public spaces.

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