

URBAN SPACE AND ITS INFLUENCE ON CRIME

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ABSTRACT

A city can be seen as a system of spaces created by the physical stuffs, which are the buildings. Although buildings create or modify spaces and the interconnections, space is the universal stuff that holds the physical stuff together and gives it its overall form (Hillier 1998). By looking at a city as spatial representations, it can be analysed not only to understand its structure, but also to understand the relationship between its structure and its functions. Investigations into how movement, land use patterns, crime patterns and many others that occur in cities can be made possible through 'space syntax'. Space syntax is a theory and method for describing the built space, treats spatial configuration as a variable in various studies including behavioural implications of layouts (Peponis 2000). Studies using space syntax have consistently shown how the spatial configuration correlates strongly with observed movement by both pedestrians and vehicles (Penn 2003). Similarly, syntax-based studies have also suggested crime distribution is linked to urban spaces. The fact that crime is unevenly distributed in urban areas has led to various studies examining the influence of spaces in the urban area to crime. Valerie Alford (1996), for example, in her syntax-based study looked at the extent of how the spaces in an inner city area in the UK are linked to the movement of people and crime. It is based on Alford's findings that this paper questions if an urban area in Malaysia can be similarly linked to movement and crime. This paper firstly, provides a brief introduction of space syntax. Secondly, it presents the findings of one of the studies linking crime to space. And, finally, it presents a preliminary study that examined an urban centre in Malaysia and its relationship to people's movement and crime. The study used space syntax to analyse the urban spaces, which is then compared against: the police data on hotspots location of crime, and, people's perception of vulnerable spaces in the area. Using Alford's findings as a background, the study attempted to predict spaces that are likely to be vulnerable to crime. The findings of the study showed that urban spaces, which are highly integrated with high pedestrian movements are most vulnerable to crime like pickpockets and snatch-thefts during the day, matched that with the police crime hotspots, and the people's perception. Other less integrated spaces can be predicted to be vulnerable to snatch-thefts during the night. Space syntax has proved to be a useful tool in analysing urban space and its relation to crimes, as well as to predict the likely vulnerability to crimes.

Keywords: space syntax, urban space, pedestrian movements, crime

1. INTRODUCTION

This paper argues that the city, which is a system of spaces created by buildings, can have an effect on crime. The question we may be asking is: how the city or rather the urban spaces influence crime. This question can be answered if we begin by looking and understanding urban space as an entity rather than as a by-product of buildings. Once we are able to do this, then we should ask, in which spaces (or parts of the city) that is most affected by crime; and, why some spaces are more vulnerable to crime and others not. How can we look at the relationship between space and crime? We believe that by using 'space syntax' as a method and technique allows this relationship to be examined and explained.

What is space syntax? This paper will begin with a brief introduction on space syntax, which has been developed by Bill Hillier and his colleagues in 1980s at the University College of London, United Kingdom.

2. SPACE SYNTAX

Space syntax is a theory and method for describing the built space that treats spatial configuration as a variable in various studies including behavioural implications of layouts (Peponis 2000). It gives an understanding on how patterns of space relate to human culture, human activity, human organisation and human community at all levels. Space syntax provides syntactical analysis of spaces, which is a quantitative measure of spaces. By quantitative measures, this means that urban spaces can be compared to other quantitative variables on the same standing.

To examine space, space syntax suggests that firstly, the urban spaces have to be drawn in black rather than the buildings. In this way, we could see space first as shown in the example in figure 1 (diagram on the left). From this image, we can begin to see the effects of space that arise from space as a pattern. Hillier (2001) argued this pattern shapes human activity.

The theory also states that the urban grid is seen as a network of the fewest and longest lines that cover the whole system as shown in figure 1 (diagram on the right). By drawing these lines, this axial map can be processed in the space syntax software to produce a coloured line map as shown in figure 2. This processed map shows lines from the warmest colour (the red lines) through to the coolest colour (the blue lines). The warmer coloured lines are where the more integrated spaces are, and the cooler coloured lines, the least integrated spaces. A pattern of integration can be seen in this dominant structure of the urban grid. Hillier termed it as the 'deformed wheel' (figure 2 – right).

In the structure, what we see are red lines, which are grid-like group of lines that forms the hub; the orange lines, the spoke; and the green and blue lines, the interstices. The orange lines indicates where the movement of visitors are, which is from the edge to the centre and out again without having to pass through the residential area (where the green and blue lines are). In the deformed wheel structure, this indicates that the area relates strongly to the *intelligibility* of the layout. It also shows that there is a *synergy* between residents and strangers in the layout at the same time (*local-to-global synergy*). Integration, intelligibility and synergy are some of the measures in the urban grid. Integration, is a measure of *centrality of relatedness*, the higher the number, the more central the space in the overall pattern of relatedness. As such an *integrated* line is shallow from others, and a *segregated* line, more depth from others. *Intelligibility*, is the relationship between the connectivity and global integration (*radius-n*), as given by regression *R2* value; and *synergy*, the relationship between the local integration (*radius-3*) and global integration (*radius-n*), as given by the regression *R2* value.

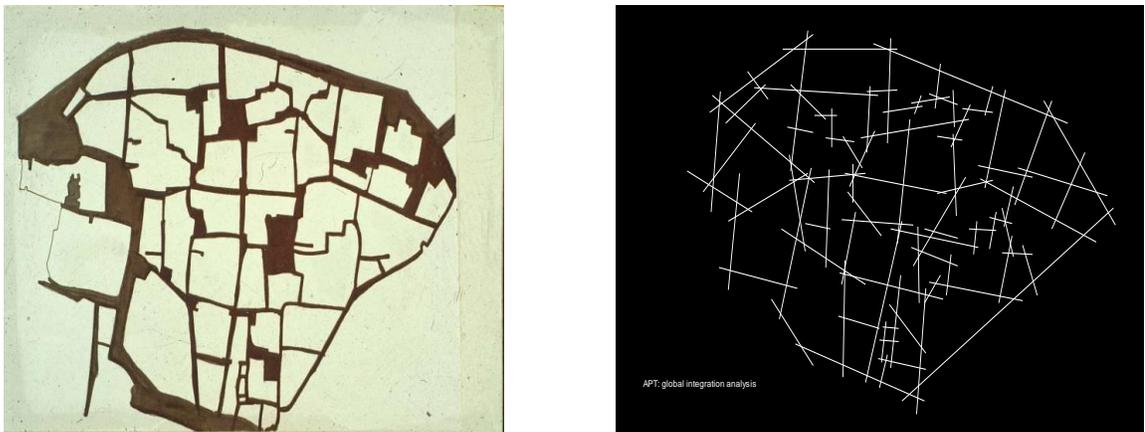


Figure 1
Source: Hillier (2001)

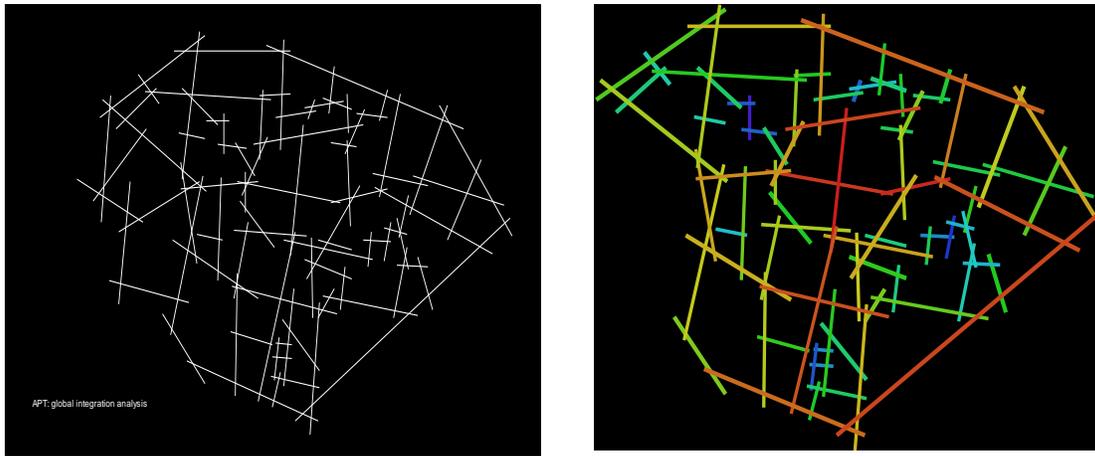


Figure 2
Source: Hillier (2001)

Now that we have seen how space syntax treats space, this paper will next illustrate the findings of a syntax-based study linking crime to space.

2.1 How crime relates to urban space – using space syntax

The advantage of using space syntax in studies is because it is able to analyse the movement patterns of people by not having to be present in a space. Space syntax takes into account the degree of integration and connectedness of the spaces to explain the displacement of people. In the study of crime, space syntax proves to be useful because crime occurs when the researcher is not around. Studies on crime patterns have shown to be consistent in explaining its spatial distribution in relation to the degree of integration and connectedness of urban spaces.

One of the earlier space syntax-based studies, which attempted to link space with crime, is by Valerie Alford (1996). Alford looked at Deptford, an inner-city area situated to the south east of the River Thames, London, to determine whether crime can be affected by the patterns of pedestrian movement in different parts of the areas and at different times of the day. By using figures supplied by the Metropolitan Police Force at Lewisham for a 2-year period between 1991 and 1992, Alford studied five types of crimes: snatch theft; pickpocket theft; robbery; armed robbery and violent crime; indecent assault and rape. With the exception of indecent assault and rape, she mapped the other types of crime according to where and when they were committed. Alford next counted the number of pedestrians in 22 streets in the centre of Deptford to obtain daily and weekend pedestrian movement patterns for each street. In identifying where are the more integrated and segregated (under-used) spaces, she used space syntax to analyse the spaces in her study area. She then compared the integration maps (the space syntax axial map) with crime maps and actual crime values according to the times it happened.

Although she did not map ‘rape and indecent assault’ as advised by the police, her findings indicate that indecent assault tend to take place in the integrated busy High Street during the day. Rapes occurred in the low pedestrian level spaces (segregated spaces), in the open space and doorway of an estate during the day, and in the quieter residential streets during the night. Her findings also indicate that pickpockets happened mostly during the day in integrated areas where the high traffic streets with shoppers are, especially in markets where the people movement are slower. The snatch theft as observed by Alford occurred in linear pattern both in crowded spaces that is along streets where there are high levels of pedestrian movement as well as in quieter streets with low pedestrian movement levels. She reported the night-time map of snatch theft as being more dispersed and inclined to occur more in low traffic areas. Alford distinguished between unarmed and armed robberies, and observed that while unarmed robberies map are similar in the distribution, the number of incidents, and the night variations with snatched thefts, she noted that the armed robberies do not have any clear patterns for both day and night maps. However,

Alford observed that areas with the lowest pedestrian movements especially at night are also the targets for violent crime.

Alford's results suggest, firstly, different types of crime are linked to different types of pedestrian spaces, and secondly, street crime is related to pedestrian flow (table 1). Thus, her findings indicate spaces with least pedestrian flow (axially most segregated space) is related to violent crime, and spaces with very slow pedestrian flow (axially integrated space), to non-violent crime.

Table 1

Types of crime	Types of space	Time
Snatch theft	▪ High pedestrian movement level – crowded spaces	Day
	▪ Quieter streets with low pedestrian movement levels	Day
	▪ Dispersed and in low traffic areas	Night
Pickpocket theft	▪ Integrated areas – in high traffic streets with shoppers	Day
	▪ in slower people movement spaces	Day
Robbery (unarmed)	▪ Similar to snatch theft in the distribution and number of incidents	Day & Night
Armed robbery and violent crime	▪ No clear patterns	Night
	▪ est pedestrian movement spaces	
Indecent assault	▪ Integrated busy High Street	Day
Rape	▪ Low pedestrian level spaces	Day
	▪ Quieter residential streets	Night

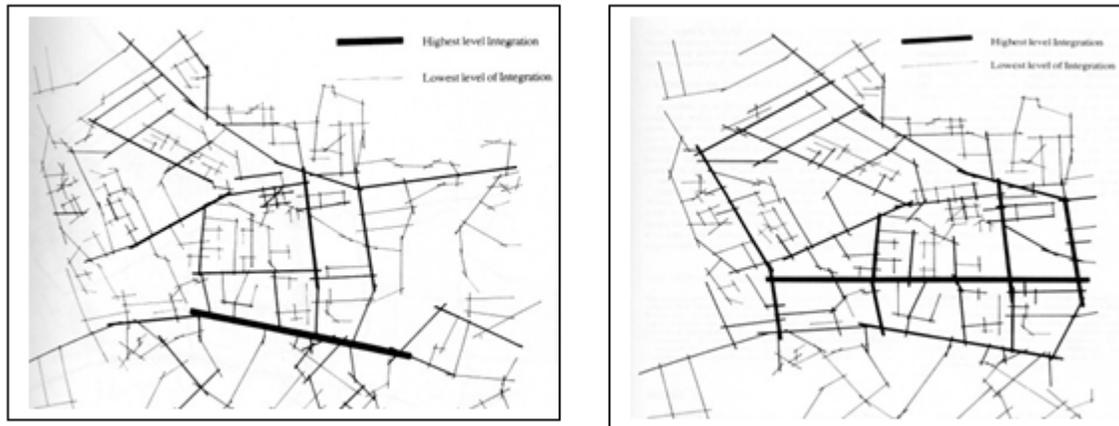
Summary of Alford's findings of crime-space relationship in an inner-city area of London. It indicates the occurrence of different types of crime, in different types of space and time.

Source: Saniah Ahmad Zaki (2004)

In her study, Alford not only analysed the axial structure of the area but also proposed for changes in some of the axial lines of the study area (figure 3). She concluded that spaces (e.g. housing estates) that are segregated (axially deep), when redesigned to produce a different layout increase the pedestrian traffic, which can improve the safety of the areas.

Thus, Alford's study shows that by using space syntax, it is not only possible to investigate how crime is related to pedestrian movements, but also how it can be used to redesign isolated spaces (or unsafe areas) so as to increase its safety. However, there is no follow-up study on the effectiveness of the new design.

Figure 3



*Axial map of study area at integration radius 5. The thickest lines, indicating highest level of integration, and the thinnest lines, the lowest level of integration, which are many steps away (most segregated) from the core (left). Based on Alford's analysis, she proposed an axial map showing changes in the layout with new integration levels of the streets (right).
Source: Alford, 1996:57, 66*

3. Crime study in Malaysia

Using Alford's findings as a background, the study attempted to predict spaces that are likely to be vulnerable to crime. Valerie Alford (1996), for example, in her syntax-based study, looked at the extent of how the spaces in an inner city area in the UK are linked to the movement of people and crime. This paper questions if an urban centre in Malaysia could also be similarly linked to movement and crime.

This part presents a preliminary study that examined an urban centre in Malaysia by looking at its relationship to people's movement and crime. The study used space syntax to analyse the urban spaces, which is then compared against: the police data on hotspots of crime, and, people's perception of vulnerable spaces in the area.

The axial map of the study area when produced as shown in figure 4, demonstrates a typical 'deformed wheel' structure; a spatial pattern of warmer coloured lines which form the spokes of the structure bringing in visitors out and to the hub (the centre). While the cooler coloured lines are found in between these spokes, indicating less integrated spaces and fewer movement of pedestrians. This indicates that within the study area, there are some more integrated spaces and in between less integrated spaces. If we look at some of the most integrated spaces example lines numbered 1, 2 and 4 (figure 5), we will find that these lines are highly connected to other lines and their integration measures (global and local integration) are also high (see table 2). On the other hand those less integrated lines, example number 21, which is the most segregated line (dark blue line) is connected to only one other line and the local integration measure is also very low. Similarly, other cooler coloured lines example lines 18 to 25, which are connected to fewer other lines (spaces), are also less integrated either to the whole system (globally) or locally.

Figure 3



Figure 4

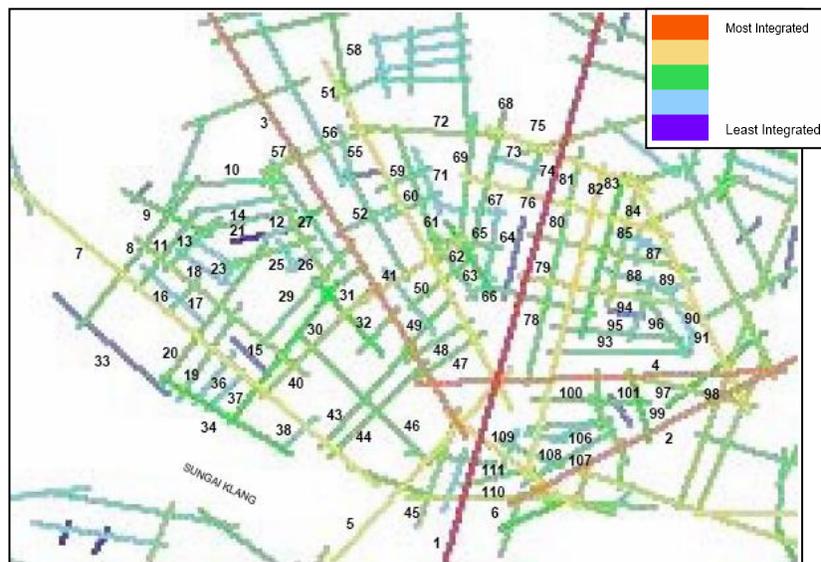


Table 2

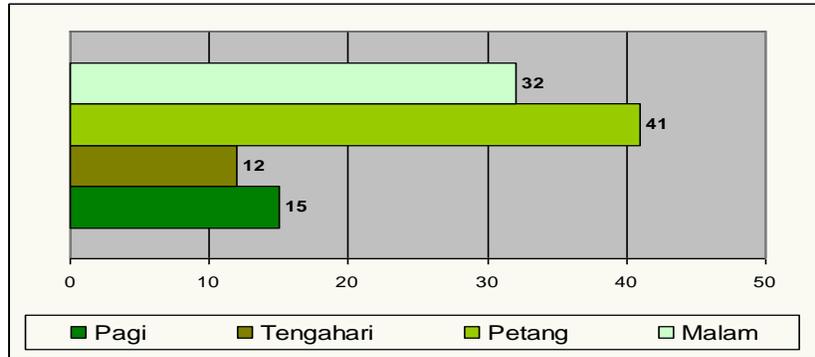
Location	Connectivity	Global Integration (rad n)	Local Integration (rad 3)
1	25	1.83	5.55
2	20	1.72	5.15
4	15	1.87	4.85
5	14	1.82	4.22
6	10	1.83	4.67
7	14	1.33	4.68
18	2	0.65	1.38
19	3	0.87	1.90
21	1	0.96	0.50
23	3	0.86	1.72
25	2	0.86	1.27
31	2	1.34	2.83
40	6	1.37	3.63
42	3	1.35	3.11
66	7	1.22	3.24

What do users think of the spaces in the area? Which spaces are perceived as more vulnerable to crime? At what of the day is viewed as unsafe by respondents? These are some of the questions that were asked in a study carried out in a survey on 100 respondents, to determine the perception of respondents on the types of crime and the likely locations where they think could have occurred. Although the respondents think that snatch thefts and pickpockets are two types of crime that occur mostly in the study area, they think that other types of crime do occur as well but not as much (table 3). Pedestrian walks are seen as the most likely location for both these types of crime to occur, followed by parking areas. They also think that these crimes would usually happen during peak hours especially in the evening rush hours and night time (figure 6).

Table 3

Type of crimes	No. of response					Total
	Location					
	Back lanes	Pedestrian walks	Streets	Squares	Parking areas	
Snatch theft	6	11	-	3	7	36
Pickpocket	2	12	5	5	8	32
Robbery	-	-	-	-	3	3
Vandalism	3	6	-	5	3	17
Others	6	2	-	3	1	12
Total	15	33	5	12	22	100

Figure 6



This feeling is confirmed when in an interview with a police officer who informed that most types of crime are found in the study area, though the frequency of the different types of crime varies. According to the police, crime like snatch thefts, robberies, and vandalism tend to occur very frequently (in less than two weeks), pickpocket, once a fortnight, and the more violent crime like murder, happened occasionally (table 4).

Table 4

Types of crime	Yes	No	Frequency			
			< 2 weeks	Once a fortnight	Once a month	Once a year
Snatch theft	√		√			
Pickpocket	√		3	56	72	75
Armed robbery	√		10	59	69	74
Unarmed robbery	√	9	14	52	60	67
Murder	7	8	11	13	21	25
Outraging modesty	√	16	23	25	26	29
Vandalism	√		√			

Based on the feedback from the police and the findings from Alford's study, a hotspot of two types of crime is mapped against the axial map (figure 7). The most likely location of snatch thefts and pickpockets hotspot areas as identified by the police is shaded in pink. While, those hotspot locations shaded orange and purple for snatch thefts occurring during the day and night time respectively are based on Alford's findings. Although, at this stage of study the police did not specify any other hotspot crime location, the red dotted lines indicate where the hotspot location identified between the two meet. This suggests that space syntax proved to be a useful tool in analysing urban space and its relation to crime.

The findings of this preliminary study showed that urban spaces which are highly integrated with high pedestrian movements are most vulnerable to crime like pickpockets and snatch-thefts during the day, matched that with the police crime hotspots. Based on Alford's findings, this study can also predict that the other less integrated spaces that could be vulnerable to snatch-thefts during the night.

4. CONCLUSION

According to Hillier, "...a clear effective pattern of movement is itself one of the most effective ways to control crime in housing estates" (Hillier, 2001). Similarly, in a city understanding the pattern of movements is also effective in controlling crime. This study has implicated how urban space affects crime. Different types of space influence crime differently, and as Alford study has shown, different crime has a different logic of space. Understanding the urban space and how it influence crime would be beneficial before any target hardening or safety measures can be introduced and implemented.

REFERENCES

- Alford, Valerie (1996), Crime and space in the inner city, *Urban Design Studies*, 2:45-76
City of Gosnells, Australia <http://www.gosnells.wa.gov.au> accessed:
- Hillier, B. (2001), *Social Logic of the city*, University College London, London
- Hillier, B. (2000) Can streets be made safe? *GIS and Crime Conference*, University College London
- Hillier, B. and Shu (2000), "Crime and urban layout: the need for evidence", *Secure Foundations: key issues in crime prevention, crime reduction and community safety*, eds. Ballintyre et al., Institute for Public Policy Research, London
- Noor Sahaliza Ramli (2004), Pengaplikasian konsep bandar selamat dalam menangani masalah jenayah di kawasan komersil. Kajian kes: Pusat bandar Klang Utara (unpublished thesis)
- Saniah Ahmad Zaki (2004). Safe Community: The Effects of Spatial and Social Factors on Crime, *Place Making and Sustainable Communities in Urban Development Conference*, Kuala Lumpur, Malaysia.
- Saniah Ahmad Zaki (2007), Residential layout for affordable quality housing: how secure is it? *World Housing Congress: affordable quality housing*, Terengganu, Malaysia.