Marginal Integration as a Survival Strategy

Two Cases in Rio, Brazil

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0 Abstract

This paper aims to present the main findings of my PhD research undertaken at the UAS - Bartlett during 1989-1992. It uses ´space syntax´ to investigate how a squatter settlement works in spatial terms compared with a housing estate. The cases are used to discuss the concept of planned as opposed to unplanned with special focus on the process of spatial urban growth and consolidation. Both cases analysed are in Rio, and the syntatic analysis reveals a pronounced peripheral integrated core. This pattern of integration was essential to explain the socio-spatial structuring of the settlements and was named *marginal integration*.

The paper argues that in these two cases the patterns of integration as well as segregation are key features, suggesting that it is the interplay between these two measures which regulates social interafece. Social and spatial segregation here assume strategical importance. The distribution and pattern of movement within the settlements, including studies of origin and destination, give a picture of the strangers-inhabitants interface and help to deny the idea of the settlements as enclosed neighbourhood units. The spatial analysis of the grid configuration in the two settlements shows that, despite their relative segregation, space is used rationally to construct a global interface.

1 Introduction

This paper applies the space syntax methodology to analyse a squatter settlement - Timbau - and a housing estate - M.Dias - in Rio, Brazil, representing respectively an unplanned and a planned environment. The cases are used to investigate their spatial and social interaction patterns. The first part of the paper starts with an intuitive description of both settlements before it moves to the syntatic analysis. This is followed by a study of the movement pattern, including studies of origin and destination.

The paper ends by arguing that it is the interplay between the integration, referred to as *marginal integration*, and the segregation which regulates social interface. This a key feature of both settlements which allow, despite their relative segregation, to use space rationally to construct a global interface denying the idea of those places as enclosed neighbourhood units.

2 Two places: Timbau and M.Dias

Timbau is a squatter settlement that has grown "organically" over more than 50 years, comprising a highly deformed grid of thirty three irregular urban blocks of contiguous mostly outward facing buildings. The fabric irregularity and fragmentation, with a mix of small and large islands defined by a chicaned network of spaces, contrasts with the highly geometric layout of M.Dias. In this housing estate the structure fol-

lows a traditional pattern organised in 45 regular urban blocks and orthogonal streets with single family houses placed centred on the 1002 plots. The basic units of spatial organisation in Timbau are the streets - there are no plots with the islands and the streets defined by the collection of buildings, whereas in M.Dias there are the blocks, subdivided in plots and partially occupied by buildings. The house is the determinant of urban form in Timbau - the starting point - while in M.Dias it is almost a consequence of it.

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The settlements are relatively marginal in relation to the overall structure of Rio with very strongly marked boundaries. Cut off to the north by the Bay and to the south by a motorway, they could be described as a *city of the poor.*

Despite the irregularity and complexity of the grid and apparent disorder, it is possible to identify in Timbau a clear urban structure and it is easier to move around than in M.Dias. Beyond the apparent dissimilarities, both settlements seem to be, however, structured by three different types of urban spaces corresponding to differences in the type of use and patterns of movement as this paper will show.

Wider spaces - referred to as *main roads* - constitute a continuous system of spaces articulated to the carriers or peripheral roads which traverse the settlements and are the main channel for vehicular access. These spaces, more permeable from outside, concentrate commercial activities and other transpatial uses (schools, temples, the community association headquarters), and are strategic in terms of taking advantage of both local and global movement as observation will confirm.

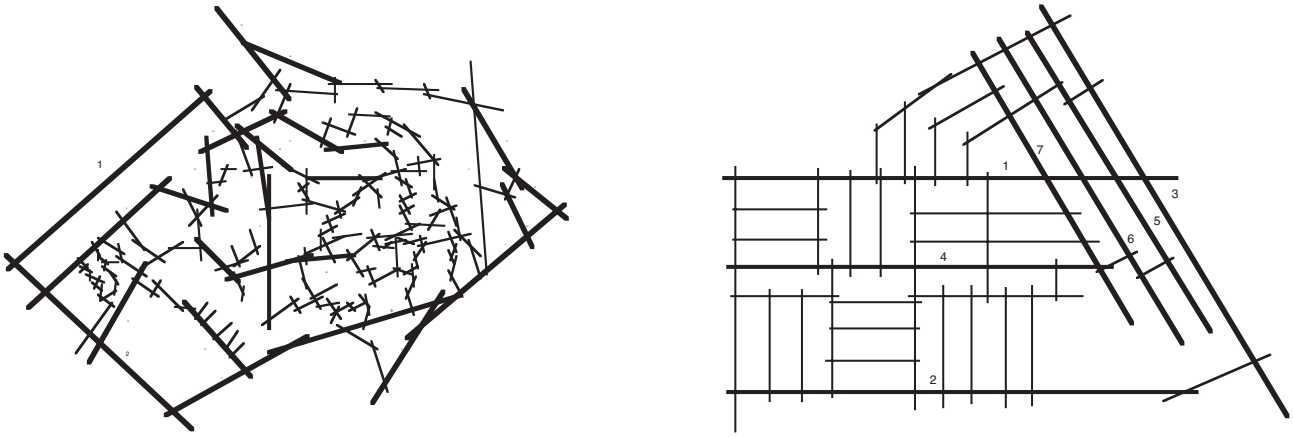
Local roads, which reach deeper into the heart of the settlements, also allow vehicular traffic but dead-end on an extensive network of pedestrian spaces. The *pedestrian roads* are a web of spaces giving access to the less accessible residential part of the settlements which constitute almost discrete local territories. Local and pedestrian spaces work almost as an extension of the private domain.

Three squares constitute larger beads and are strategically located - in Timbau they are at intersections of the local roads with the web of pedestrian alleys and in M.Dias they are in the geometric center of the residential quarters. They are an intermediate territory between local and more global scales. Those spaces, together with the streets leading to or at the boundary, as the questionnaire has shown, are the favourite meeting places. This has led to infer that, later substantiated by observation studies, movement has a centrifugal nature (directed towards outside).

Streets in both places are intensively used for children's leisure, adults' direct personal contact and social interaction, neighbouring activities, commercial and labour activities. They are a place for social interaction and a setting for watching and vending. Shops have large openings to the street making the spaces highly permeable and taking more advantage of pedestrian movement. Streets are filled with people. Women sit at their front door in the late afternoon when they have finished their household chores, chatting and watching the world go by while they supervise their children at play. Over the weekend and after work, bars are full with groups talking and playing snooker or cards and on Saturday morning there are always football games. Children

are spread all over the settlements. They fly kites from the flat rooftops, invent ball games and play in the streets, even in the narrowest alleys. The streets and lanes are filled with vendors and small stalls full of goods for sale.

Questionnaires and observation studies suggest that there seems to be a clear division in terms of gender and use of the space. Children seem to favour local streets and alleys (almost 60% for Timbau and 100% for M.Dias answers), followed by the squares in the case of Timbau (40%) and by the pier and the football field in M.Dias (roughly 15% for each category). Yet, spaces populated by women and children are different, they are visible from each other, allowing the surveillance of children.



Women meet mostly at their house-doors (85% for Timbau and 95% for M.Dias) whereas men meet at the bars (100% of the cases in Timbau and 75% of the cases in M.Dias). The degree of overlapping by the genders in those spaces is small, with only a few men joining women at the doors, or women men at the bars.

These observations seem to point the importance of the local and global properties of space in structuring movement, encounter and interaction patterns, on the distribution of land uses and in the making of social relations. Looking in more detail at the urban structure of the settlements through space syntax analysis and by studies of movement analysis might shed a light in explaining their configurational structure and their social and functional implications.

3 The syntatic analysis

The procedure was to analyse the settlements on several levels. System 3 has embedded the settlements into the adjoining area, and was large enough to guarantee that any "edge effect" (Hillier and Penn, 1991) was well removed from the catchment area. System 2 has excluded the neighbouring housing estate of Timbau and squatter settlement of M.Dias. System 1 shows both settlements on their own.

The axial configuration shows that settlements structure the strangers x inhabitants interface differently. In M.Dias the grid is structured so as to easily allow strangers to cross the settlement, passing through the centre while in Timbau strangers are en-

Table 1

	1+2	*3+4*	*5+6*	*7+8*
Timbau	65	28.5	22	19
M.Dias	114	48	10	-

Table 1. Comparison between depth and length

couraged to pass around the edge. In both places, a small number of relatively shallow and long lines, as the 15% longest lines map respectively for Timbau and M.Dias above shows, are structured so as to draw strangers in from the perimeter, while a large part is clustered away into much shorter inaccessible and deeper spaces, which appear labyrinthine to strangers, and remain relatively apart from natural movement and highly inaccessible from outside. This is because the length of the spaces steadily decreases directly with depth into the settlements, making the longer lines the most shallow as a comparison between depth and length shows:

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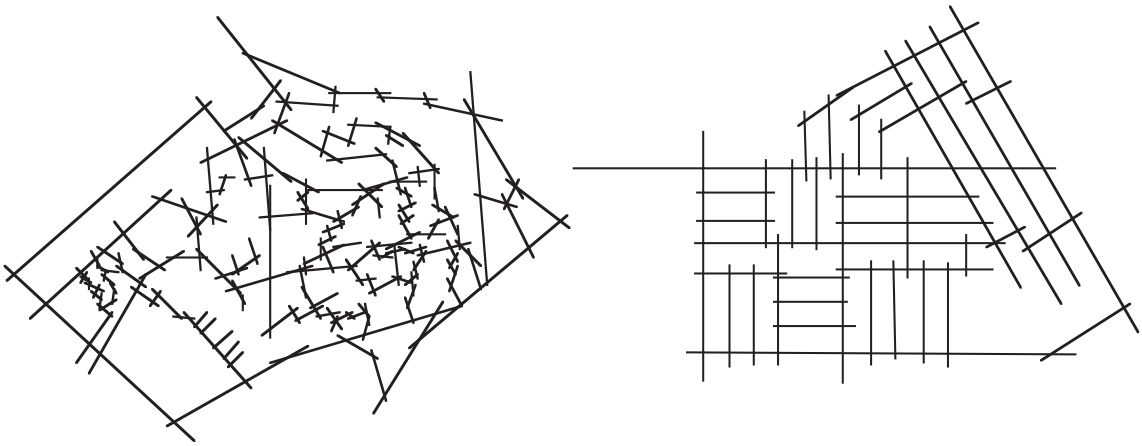


M.Dias is in general a more shallow system from outside then Timbau yet the strategic position of the squares is obvious in both settlements. They are at the intersection between internal long and shallow lines with a significant number of short deep lines, which correspond to the pedestrian network, yet remaining relatively deep to the outside. They constitute transitional spaces between the areas more easy to reach as a visitor and the internal parts difficult to access.

Table 2

	Main	*Local*	*Pedestrian*
	Timbau/M.Dias	*Timbau/M.Dias*	*Timbau/M.Dias*
nº lines	25/6	14/7	48/33
Length	69.833/105	42.692/72	19.483/37
Depth	2.917/2.33	6.692/3.5	5.837/3.6
Con	3.769/7.7	4.167/5.5	2.395/3.0
RAI	.784/2.5	1.059/1.9	.743/1.62
CV	1.153/2.4	1.269/1.55	.945/.70
RA3	1.595/2.723	1.819/1.893	1.158/1.804

Table 2. Quantitative configurational differences

The distribution of integration in system 1 shown confirms the pattern described above. In Timbau the integration core is concentrated in the south and west side perimeter, in the oldest part of the settlement, relating strongly with the neighbouring squatter settlement. Through movement circulates on the edge of the settlement, making strangers pass on the boundary rather than, like in M.Dias, through the centre.

As in Timbau, the distribution of integration in M.Dias confirms the presence of a double axial spatial code of few long integrated lines (traffic roads) and the interior quarters, clustered away into relatively short segregated pedestrian streets. The integration maps highlight the relation between the typological-functional and configurational characteristics. This is translated by the three basic types of spaces referred tp previously - the system of *main streets* corresponding to the *more integrated lines*,

the net of *local streets* to the *medium integrated lines* and the *pedestrian spaces* to the *more segregated lines*. The table shows the quantitative, configurational difference between these three types of spaces in terms of mean measures for length, depth, connectivity, control and integration.

Streets are 50% longer in M.Dias than in Timbau. Main streets perform better in all measures in the case of M.Dias, but, their high control values reveal that spaces which are more accessible to strangers in the system are also spaces highly controlled locally. By contrast, in Timbau the best performance is by local streets. This may be due to the fact that local streets connect the segregated with the integrated parts of the system, working as a key element on the distribution of movement. In addition to that, the position of squares at the end of local streets, reinforce the spatial importance of these spaces for the visitors/inhabitants interface.

The differences in length and depth among main and local streets confirm that strangers and through movement are bound to be restricted more to the local. In terms of length, main roads are the longest ones with pedestrian roads around three times shorter in average, and length steadily dropping from main to pedestrian streets. Local and pedestrian streets are similarly deep, and thus, comparatively more difficult to reach from globally oriented parts of the scheme.

Table 3

	1+2	*3+4*	*5+6*	*7+8*	*9+10*	*11*
Timbau	1.6	.72	1.57	.29	.46	0
M.Dias	4.8	5.68	0			

Numbers expressed in 100m and relativised for the length of the line

All variables point at pedestrian streets as being segregated, fragmented and very locally oriented territories where strangers are possibly discouraged by the spatial structure to visit. Yet, the large proportion of pedestrian streets (respectively in Timbau and M.Dias around 50% and 70% of the total number of lines) demonstrates their spread and importance for the distribution of local movement and of extensive areas. These spaces have surprisingly the higher density of shops. A possible inference is that the commerce is locally rather than globally oriented, relying more in the local inhabitants than in visitors.

Table 3

Streets with shops were on average longer than with no shops (46.5 m as opposed to 21.6 m in Timbau and 55.26 m as opposed 24.62 m in M.Dias). In Timbau, however, as the table shows, shops are deeper in the settlement, suggesting that they are placed strategically to take the maximum advantage of local movement, while in M.Dias they are more shallow suggesting that they might constitute important elements for mixing strangers and inhabitants socially.

To sum up it seems that segregation, as well as integration, have an instrumental and pervasive role in the form in which the structure of open spaces and streets is organised. This suggests that the settlements are mainly constructed by maximizsßing a local interface.

10.6

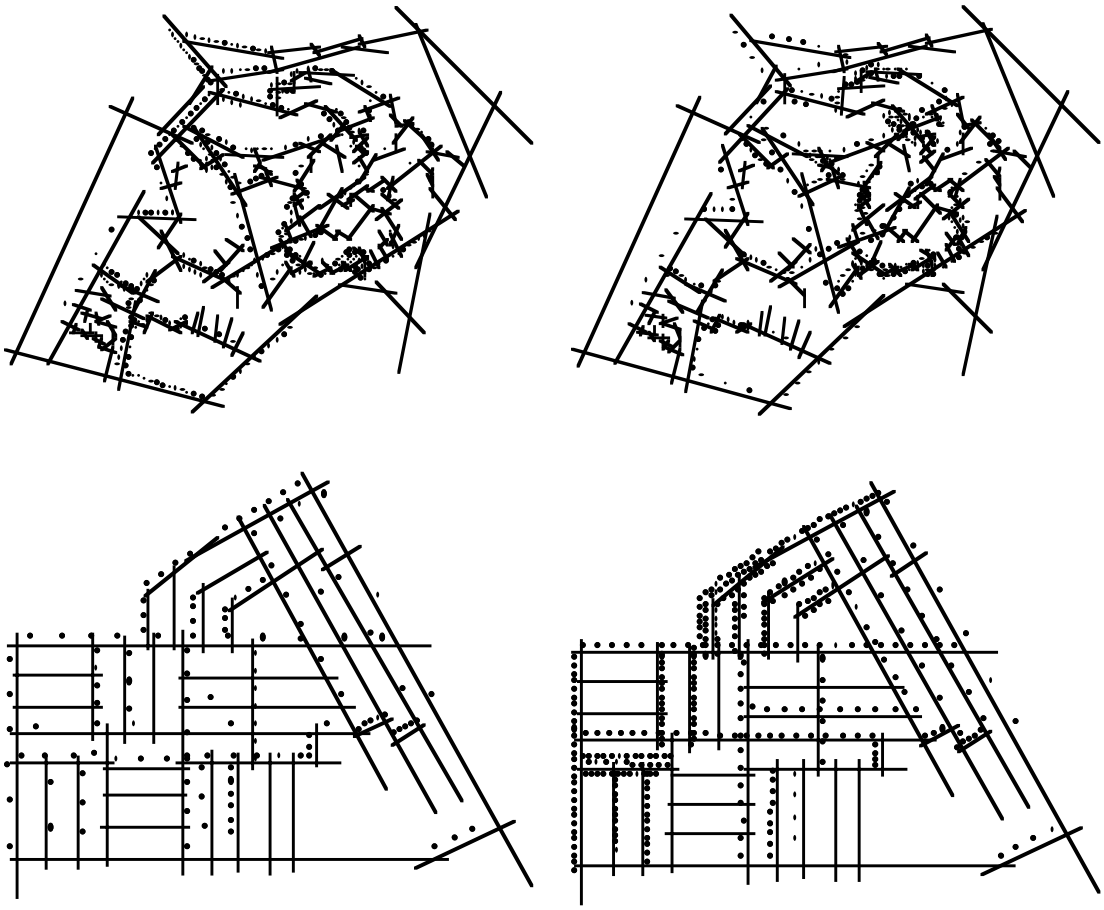
Embedding Timbau in a larger area (systems 2 and 3) shows it is strongly segregated within the urban context, with the integration core gradually moving to outside the settlement and only the peripheral lines remaining part of it. The pattern of integration seems directed towards preserving Timbau as a self-contained system, relatively marginal to its interland, only peripherally connected to the global grid, and to safeguard the interior from penetration by strangers. This effect of integration through the edge, instead of by a strong cohesive core - a more recurrent pattern in European cities - is referred to here as *marginal integration*.

This might be interpreted as an instrumental strategy which regulates the local x global. An elaborate socio-spatial group mechanism to protect and preserve inner dignity in the face of so many outside pressures and impingement.

The integration map of M.Dias in the larger area above (system 3) shows that important additional peripheral lines are included in the core, making it more extensive to cover the neighbouring areas. The inclusion of these lines brings more global structure to the whole fabric, connecting everything together and making the settlement more continuous to its immediate urban context. Yet, unlike the normal pattern found in western European areas, the mean integration drops as the system gets larger from 1.76 for system 1, 1.47 for system 2, to 1.32 for system 3.

It is noteworthy that M.Dias fits into its urban context in a conspicuously dissimilar form from that of Timbau. Timbau constructs integration in such a way as to keep the strangers-inhabitants interface almost peripheral to the settlement (at the edges), whereas in M.Dias the integration core cut across the system bringing strangers right through the settlement. Both settlements, nevertheless, are relatively segregated, with segregation increasing as it is embedded in their larger urban context.

This confirms that the strangers x inhabitants interface is restricted to a small part of the total street network with movement of strangers channelled to the few longest lines which are part of the integration core. This explains why, in M.Dias, the embedding of the area in its surroundings does not contribute towards an increase of integration, as the figures of mean integration revealed.



10.7

Moving people *Static people*

This however does not mean that the presence of strangers is unimportant and that the settlements can be interpreted as a neighbourhood with streets populated only by people who live there. This paper suggests instead, that it is the interplay of segregation and integration which produces a movement interface in which strangers are not excluded from the areas but are kept under strong surveillance by their inhabitants. Pedestrian movement, although very dense, seems to be generated locally rather than globally, while movement from outside becomes a marginal component of movement as a whole. The field of co-presence and encounter between inhabitants and strangers generated by this movement interface is locally controlled and depends on the interplay of the local and the global configuration to structure itself.

A question therefore arises as to whether or not both settlements exist independent spatially of the global structure of the city. Both settlements have shown themselves to be relatively autonomous and self-referential grids. The study of the distribution of movement and its relation to the patterns of integration may help to answer this question.

10.8

3 Studying the movement patterns

Observing moving and static people reveals interesting characteristics of both settlements. The observation map show the encounter rates for moving and static people found in each line and expressed them by a dot for each person per hundred metres/minute. These studies confirm that both moving and static people co-habit more or less the same places and tend to concentrate around certain spaces, especially on short lines - at the southern chicained alleys which lead into the more recent and segregated parts of Timbau and at the North top part of M.Dias.

Table 3

	Timbau	*M.Dias*
Moving men	2.122	2.62
Moving women	1.885	1.862
Moving children	2.049	3.282
Moving adults	4.007	4.482
Moving people	6.052	7.76
Static people	15.692	16.062
People playing	1.939	4.394
People working	1.119	.716
People talking	3.361	10.958

All figures in people per hundred metres/minute

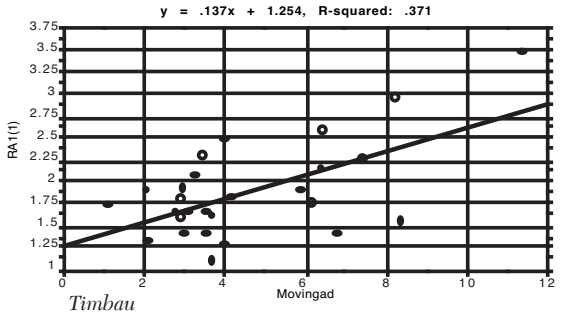
Table 3. Density of activities

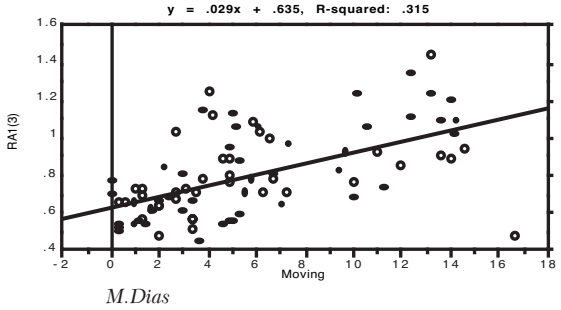
More generally, the proportion of moving people was observed to be roughly proportional to the morphological and syntatic importance of the spaces. Yet, by contrast to Timbau, in M.Dias the pattern of movement through the settlement is indeed clearly channelled and structured by relatively well defined routes which, however, do not appear to work as routes to somewhere else outside the settlement.

Unlike M.Dias, static behaviour in Timbau is unevenly distributed, with a concentration of people in the urban squares and the more secluded pedestrian streets. High levels of interaction in Timbau do not, it seems, depend on the prior existence of intense movement. People seem to select certain spaces for interaction regardless of their importance as movement channels. This indicates that static behaviour in Timbau is locally based (socially and spatially) and related to the construction of the inhabitants/inhabitants interface whereas in M.Dias it is globally oriented and associated to the inhabitants/strangers interface.

Densities of movement and activity are strikingly higher than those found in European urban residential streets (about 2.7 persons per hundred metres/minute) as the table demonstrates. Static activity, normally negligible in European urban residential areas, is significantly higher as well, confirming the impression that public spaces have the important role of socialising people.

Figure 5. Scattergram and correlation of movement and integration

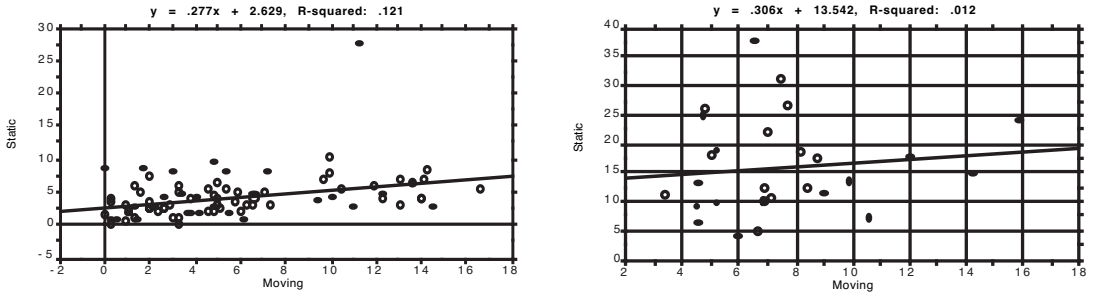




Three important reasons based on job occupation might explain these high rates. The first, is that jobs tend to be either local jobs and odd jobs, which do not necessarily take place regularly and during normal working hours. The second reason, is the relatively high number of permanently or temporarily unemployed people. The third, is that women tend to have occupations which allow them to rear their children and take care of their homes without taking them completely away from home.

The analysis also confirms that movement decreases with depth. The figures give a picture of an intense movement with a virtual presence of informal surveillance of children by adults.

Movement and static rates, expressed in people per hundred metres/minute, are higher on streets with a presence of shops (8.565 against 4.548 for Timbau and 7.734 against in M.Dias). Yet they increase more significantly in the integration core (15% more integrated lines) with rates reaching 16.3 (against the mean of 5.695) and 8.09 (against the mean of 7.558) respectively for Timbau and M.Dias. This suggests that, as other syntactic studies had (Hillier et al, 1990), attractors such as shops may work as multipliers on the pattern of movement which is primarily influenced by the configuration of the grid.



Timbau *M.Dias*

Figure 6. Scattergrams and correlation of moving and static people

A detailed examination of gender-related activity at different times of the day suggests that men, women and children are everywhere and all the time co-present in space but the rates vary during the day. They increase for all groups in the early evening periods, especially for women.

Looking at correlations and scatters of movement x integration finally confirms that there is a strong relation between movement and the grid configuration expressed better through integration, yet no significant relation was found with static behaviour (including play, work and talk). Unlike other syntactic studies, nevertheless, the best results were not found with logged-movement rates. This correlation of movement and integration is also significant in all gender groups with the exception of children. This might be explained by the fact that children explore rather than use space, thus are less bound to be influenced by the grid configuration. The correlations also show that there is a strong agreement between the patterns of movement of women and children confirming that they populate the same spaces.

In M.Dias, unlike Timbau, there was a strong relation between the patterns of movement and static behaviour, as the figure demonstrates, offering support to the idea that the settlements construct differently the interface with strangers and inhabitants.

Logged correlations improve the relation between the gender and the activities, showing that the co-presence of two or more activities and groups in a space act as a multiplier on the densities of use, confirming the intuitive observation that streets in the settlements are alive, cheerful and friendly.

Origin and destination studies of pedestrian movement have revealed that most people (above 80%) are locals on short journeys. Over half of journeys (57% for Timbau and 68% for M.Dias) began and ended inside the settlements, yet a significant number had origin or destination outside them (42% and 32% respectively in Timbau and M.Dias). Journeys took a different shape inside each place - in Timbau they were channelled into a route, while in M.Dias they were spread through few routes. People passing through the settlements select different routes (shallow lines) from those followed by people moving within the settlement (deep lines). The small number of these journeys (only 5 out of 360 in Timbau and none in M.Dias), and the reduced number of strangers, suggest that most people in the streets are residents or visitors to households.

To conclude, it could be said that this study has confirmed the pattern found by the movement analysis: that the settlements are structured spatially so as to construct a very strong interface among inhabitants. Yet, as the syntax analysis has shown, this is done in a logical form so as to take into account the movement pattern of the whole global system.

In many of these respects, the grids of Timbau and M.Dias, seem to be quantitatively and configurationally unlike the grids of other urban areas studied by syntax in Western European towns. In spite of their urban attributes and quality of life, they are much more localised. Yet, what seems to be invariant is the influence of the grid configuration on movement.

6 Conclusions

The spatial analyses have suggested that, despite their localised structure, they are not particularly self-referential or self-enclosed. All their morphological characteristics, including their marginal segregation, have to be understood as *instrumental* rather than *dysfunctional*.

The settlements' connections with the global grid and their form of embedding in the city have clearly shown that they are nothing like a neighbourhood unit in the sense of a social and spatial bounded area. Quite the opposite, they seem to structure themselves so as to take advantage of the global urban spatial system and to use the movement of strangers as an important component for their social field showing that both use space rationally to overcome their relative isolation by constructing a global interface, yet controlled locally.

Both settlements, and particularly Timbau, are a true example of how a part of the city can maintain its local properties and differentiation without losing its continuity and globallity. Thus it would be completely misleading to see them as local spatial structures without an effective global structure, as suggested by the neighbourhood idea.

This paper concludes suggesting that, looking at the complexity formed by the interplay of integration and segregation of these cases, it is necessary to take a less simplified view of spatial systems which admits their *complexity* and *ambiguity*.

References

1.Hillier and Penn, 1991, *Is Dense Civilisation Possible? or the shape of cities in the 21st century*, unpublished paper, The Bartlett School of Architecture.

2. Hillier et al, 1990, *Natural Movements,* unpublished paper presented at the European Conference on Management, Cambridge.