

INTEGRATION OF HOUSING SCHEMES, SOCIAL INTERACTION AND RESIDENT WELL-BEING

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Lay Maria Cristina Dias

Federal University of Rio Grande do Sul
e-mail: cristina.lay@ufrgs.br

Lima Márcia

Federal University of Rio Grande do Sul
e-mail: cia_lima@terra.com.br

Abstract

The paper investigates how levels of integration of housing schemes can affect social interaction among residents within the scheme and with its urban context, further affecting resident social and emotional health. The study incorporates global configuration aspects and their cognitive dimensions within a single framework in investigating the relationships between man and built environment, more specifically those involving the analysis of relationships between the configuration characteristics of accessibility, legibility and perception of environmental performance. Methodological procedures consisted of post-occupancy evaluation of four low income housing schemes comprised of different layout, size and location in the city of Montenegro, southern region of Brazil. Data were collected by complementary techniques, such as mental maps, interviews, observations of behaviour, physical measurements and questionnaires. Quantitative data were analyzed through non-parametric statistics and qualitative data by meaning and frequency. Following the perceptive approach adopted, user satisfaction and environmental behaviour were employed as indicators of environmental performance and social interaction. Space syntax measures were used in order to analyze spatial configuration as measured by the axial map of local and global integration and analysis of street connections with the immediate surroundings and with different locations in relation to the consolidated urban area. Results indicate that successful integration of the scheme in its urban context helps social housing residents integrate into the neighbourhood and the city, increase satisfaction with their place of residence and promote sense of belonging and well-being. Moreover, results confirm that the size of the scheme and its location are interrelated and tend to affect the type and intensity of interaction among residents of the housing scheme and those of the immediate surroundings. It was further confirmed that smaller schemes, which can be more easily inserted within the existing urban fabric and better located, close to local services and trade, may positively affect residents' satisfaction with where they live and the neighbourhood. On the other hand, it was found that the larger schemes located far from consolidated urban areas tend to prevent strangers to penetrate naturally in the inner parts of the place and indicates the existence of friendships restricted to the place where they live, confirming that schemes most distant and isolated can cause residents to relate only to each other and encourage social segregation in relation to the city. The study underscores the importance of assessing the role of spatial configuration in affecting levels of integration of housing schemes in order to produce more qualified residential environments that support and facilitate sociability, promoting sense of belonging and citizenship, all of which support residents' well-being.

Keywords: social housing, spatial configuration, spatial behaviour, social interaction, resident well-being

Theme: Spatial Cognition and Behaviours

INTRODUCTION

It is argued in this study that Brazilian public housing has been negatively affected by standardization of project design and the nature of the system of provision based on economy of scale, with overemphasized priorities for quantitative targets. Consequently, the design of most housing schemes built so far was not appropriate for the satisfaction of user needs and aspirations and often have common features that distinguish them from the rest of the urban area in which they are located. The attribute mainly identified as usually affecting public housing, is its artificiality – a ‘cyst’ in relation to its urban context. In short, the spatial configuration generally provided in low-income housing schemes is characterized by: lack of relationship with its urban context, as streets designed to serve the housing scheme do not integrate with the existing urban network; low density; uniformity and dispersion, which imply high costs in infrastructure, maintenance and replacements; location on the urban periphery, lack of attractors to motivate surrounding residents to use the environment and integrate as part of the neighbourhood. The repercussion of the number of standardized projects with similar problems, in its urban context, looked as damaging to neighbourhood residents and to the city as a whole (Lay and Reis 1994).

Therefore, it is clear that the spatial structure of social housing provided in Brazil and its performance need to be further analyzed in terms of quality, as attempted in this study, in order to identify the relevant factors requiring change and the nature of change that will promote significant improvement in mass housing provision. When bad performance exists, the massive scale and number of those projects in Brazil, which replicate poor quality housing schemes has been creating a major negative impact on the cityscape, propagating “ulcers” in extensive parts of cities (Lay and Reis 1994). The consequences of this are predictable, in that the attitudes, motivations and behaviour affected by the adversely perceived performance of housing schemes and entire lower-income neighbourhoods might encourage further deterioration of the cityscape, adversely influencing citizens’ feelings of self-esteem, their social standing in the community, their relationships to neighbours, sense of belonging, and sense of identity with the place, further affecting maintenance of social order, encouragement of self-development and promotion of well-being for the population.

The process of social and spatial differentiation that characterizes the urbanization of Brazilian cities is marked by strong segregation and segmentation of urban space in terms of social groups (Maricato 2001). Segregation is also derived from a dispute for convenient location within the city. It is a process in which different classes or social strata tend to concentrate more intensively in certain regions or groups of neighbourhoods, sometimes creating a significant concentration of low-income population in large areas. The problem seems to be directly related to characteristics of spatial configuration and location of housing schemes, since segregation can be related to the geometric distance (location) or topological distance (configuration). Marques (2007) points out that segregation means, besides the social separation, inequality of access, which can restrict circulation or hinder the establishment of frequent contact between groups. In this sense, according to Villaça (2001), the urban space is inherently unequal; availability of equipment, infrastructure and quality of buildings, as well as the inequality result from differences in accessibility to all points of urban space. In order to account for the attested influence of the built environment on spatial behaviour and well-being, this investigation focuses on the configuration characteristics that affect user attitudes and the perception of environmental image of social housing schemes.

The network of social relationships is regarded as essential to residents’ effective integration in the community they live, and territorial behaviour is part of a system that allows social organisation take place, promoting neighbourhood interaction and community formation. Consequently, legibility of site layout, which results from how the site is organised and how the buildings and spaces are located and related to each other, affect the ways spaces are used (Lay 1998). That is, despite spatial behaviour or user satisfaction cannot be determined by design, it can establish a number of physical and spatial qualities that can support or inhibit patterns of

behaviour, consequently affecting the intensity of contact among residents. The literature on human cognition suggests that configuration aspects of built environments have significant consequences. Lynch (1960) says that legibility, which is highly related to configuration aspects, may play a decisive role in acquiring a sense of spatial control in spatial experience. He notes that, in order to be "imageable", an area needs to be apprehended as a pattern of high continuity, with a number of distinctive but interconnected parts. Moreover, he argues that in the process of way finding, the strategic link is the environmental image: a generalized mental picture of the exterior physical world, which benefits from architectural legibility as experienced by an individual, further emphasizing affective qualities of spatial form that is central to the emotional and physical well-being of the inhabitant population, personally as well as socially.

Moreover, Golledge and Stimson (1997) emphasize that the path or network structure used in everyday spatial behaviour becomes critical feature of the image of a spatial environment. Others suggest that spatial layout of the built environment influences the accuracy of cognitive representations of real world spatial information (e.g. Appleyard 1969; O'Neill 1991). Hart and Moore (1971) define spatial cognition as the knowing of cognitive representation of the structure, entities, and relations of space, that is, the internalized reflection and reconstruction of space in thought. Similarly, Downs and Stea (1973) note that the process of cognitive mapping is a means of structuring, interpreting and coping with a complex sets of information that exist in different environments: cognitive maps are useful instrument for recovering information about the way we represent the environment, the regularity or irregularity of frameworks such as street systems, and the most salient positive and negative elements, which further denote user attitudes towards that environment.

From a different approach, Hillier (1996) has argued that spatial configuration may face constraints on spatial experience since it appears to encourage or impede aspects of human activity through spatial cognition and subsequent behaviour. Since 1984, Hillier and Hanson set out a theory of space as an aspect of social life, which has developed in the direction of better understanding the spatial nature of buildings and cities through techniques of configuration analysis, such as space syntax analysis tool applications, which allow dealing graphically with the numerical properties of spatial layouts in order to measure accessibility. In simple terms, spatial configuration deals with a set of interdependent relations originated by a network structure in which each part is determined by its relation to all the others. According to Peponis and Wineman (2002), built space can be defined as a field of structured co-presence, co awareness and encounter. It follows that built space is to be understood as a relational pattern, a pattern of distinctions, separations, interfaces and connections. The theorem chosen by Peponis and Wineman (2002) to illustrate ways in which built space works socially deals with linear spaces, such as streets in urban areas and the paths of movement along those spaces, and argue that high accessibility implies a higher probability that a space will be used for movement. That is, the degree of accessibility and consequently potential of movement and presence of people in the urban space would affect the choice of path to be followed by pedestrians, since people would be attracted by spaces with people and would tend to avoid deserted spaces, as Gehl (1987) points out.

So far, space syntax has contributed sophisticated ways for dealing with urban layouts as differentiated patterns of large-scale connections. This complements the emphasis on local attributes (such as the dimensional profile of street sections, the characterization of boundaries, or the attributes and qualities of individual open spaces) that is typical in many studies of urban space use (e.g. Whyte 1980). Since Jane Jacobs (1961), the circulation of people and appropriation of public space has been mentioned as a crucial element to the *urban vitality*, as the number of encounters increases potential interactions among users and urban security. In addition, Jacobs claims that certain conditions can also affect interaction, such as *population density*, where higher densities are associated with higher number of interactions; *interface between public and private spaces* that generate permeability, favouring greater movement of people and interaction between them and positively affecting perception of security; *urban diversity* with variety of uses, activities, built form, social classes and lifestyles, coexisting in the

same space; and *limited distances* that might increase opportunities for social contact. Then, it is assumed that urban structures and spaces that do not have these conditions can hinder or discourage social interaction among residents and generate segregation, which appears as negative consequence of the lack of social interaction.

Therefore, it is understood that the essential quality of cities is to fulfil the need to provide meeting places and support social exchange and social interaction is considered a key indicator of housing performance, which according to Alexander (1965), is an essential mechanism for the functioning of the city. Authors (e.g. Carr et al. 1992; Lay 1998; Basso 2001; Gambim 2007) highlight the important role of public open spaces play in residential areas on promoting social interaction and indicate that the open spaces, depending on how they are configured and in accordance with the existent physical elements, can encourage contact between people. It follows the premise that certain urban structures can encourage or discourage the occurrence of more intense social interaction. Similarly, a number of assumptions have been put forward in the literature, suggesting that constant pattern of movement, characterizing spaces with the presence of people, would increase the security of users of urban spaces (Hillier and Shu 1999; Voordt and Wegen 1983). Complementary, Hillier (1998) argues that, independent of density of a certain area, if the configuration makes the natural movement of pedestrians more difficult, there will not be a sufficient number of people to generate the perception of a well appropriated and used space.

Despite the unveiled potential implied in each methodological approach, the existing gap in the field of knowledge of the relationship between global configuration aspects and their cognitive representation, and the role of spatial configuration within it must be pointed out. According to Kim (2001), this gap can be described in two ways: firstly, the neglect of perception-cognition studies within research based on syntactic descriptions of spatial configuration, and secondly, the neglect of analytic descriptions of spatial configuration in research into cognitive representations. Indeed, relatively few studies have incorporated global configuration aspects and their cognitive dimensions within a single framework in investigating the relationships between man and built environment, more specifically those involving the analysis of relationships between the configuration characteristics of accessibility, legibility and environmental image (e.g. Reis et al. 2003).

In this context, this study investigates the relationships between spatial configuration, spatial behaviour and spatial cognition at an empirical level, related to the role of spatial configuration in shaping users' perception of environmental performance of public housing. More specifically, it attempts to identify configuration patterns that might be collectively perceived as fulfilling or not residents' satisfaction with the housing scheme and their responses to it through positive or negative behaviour, and higher or lower social interaction. It is further assumed that good or bad environmental performance of social housing is reflected, among other things, on resident social behaviour and self-esteem, affected by the degree of satisfaction with the place where they live. Finally, it explores the effects of levels of integration of housing schemes on the legibility and imageability of the area and degrees of social interaction among residents and neighbourhoods, in order to produce evidence to base the production of more qualified residential environments that facilitate sociability, promoting sense of belonging and citizenship, all of which support residents' well-being.

METHODOLOGY

In order to achieve the objectives of this study, the relationship between housing schemes of different layouts, sizes and location in the city, and the level of interaction among dwellers in the scheme, interaction between the housing scheme and the immediate surroundings and the city, were analyzed. The case study consists of four housing schemes produced by COHAB - Housing Company of the State of Rio Grande do Sul, located in the city of Montenegro, characterized by single-family housing units (Figure 1). The sample of housing schemes was selected based on

the axial maps. The housing schemes show different levels of integration in the urban fabric, as measured by the axial map of global and local integration (Figures 2 and 3) and the analysis of street connections with the immediate surroundings. Integration measure is a key global measure in syntactic analysis which relates each space in the settlement with all the others, providing information about accessibility of each one in relation to all other spaces (Hillier 1996). In the global integration (Figure 2), each street that constitute the housing scheme is analyzed in relation to all the streets of the urban system, whereas in the local integration (Figure 3) each street that constitute the housing scheme is analyzed in relation to a specific number of streets, departing from each of these streets. Therefore, global integration tells about the accessibility of a housing scheme in relation to the city as a whole, while local integration tells more about accessibility in the housing scheme: the shallower the axial line (red and orange lines), the more integrated or accessible is the space. On the other hand, spaces with more depth are the most segregated (green and blue lines: yellow is in between integrated and segregated lines), as they are less accessible in relation to all the other.

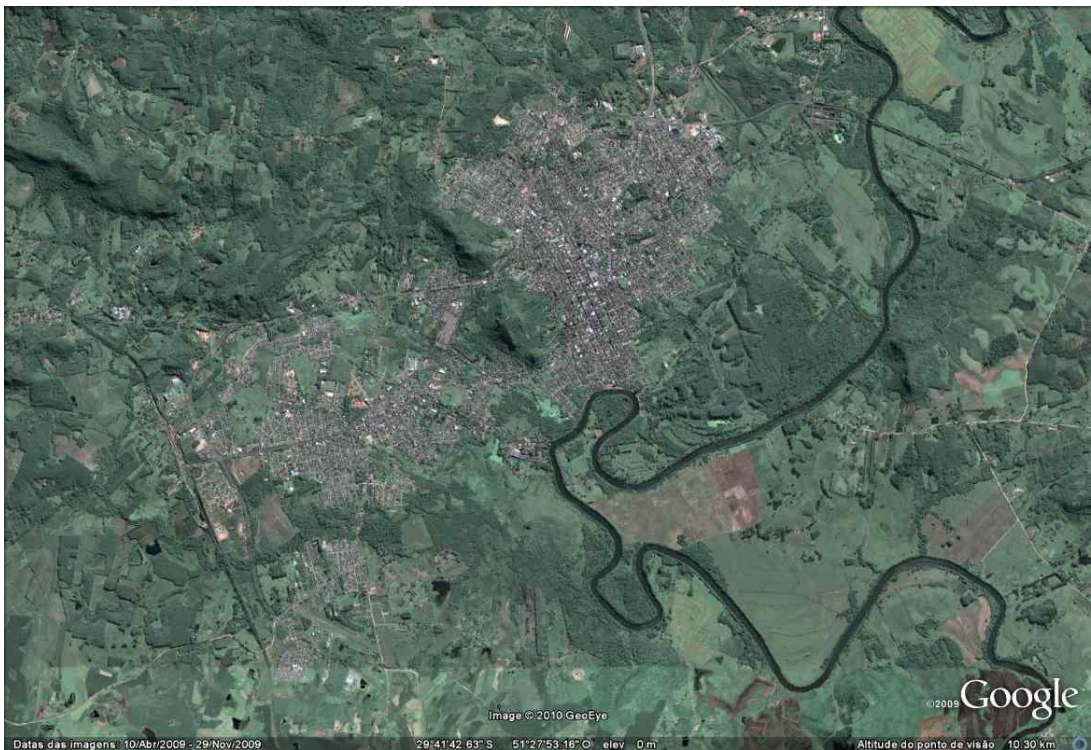


Figure 1: Location of four housing schemes in the urban area of Montenegro. Source: Google Earth, 2009

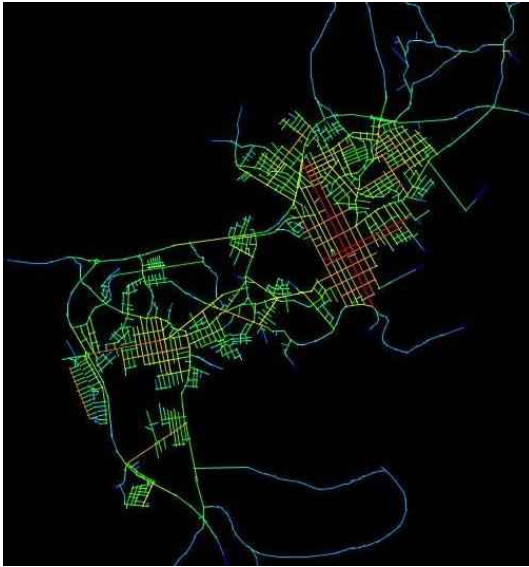


Figure 2: Axial map of Montenegro, Global Integration,

Figure 3: Axial map of Montenegro, Local Integration R3

The schemes are of small size (up to 50 housing units), medium (51 to 200 housing units) and large (more than 201 units) and are differently located in relation to the consolidated urban area of the city (Table 1).

Table 1: Sample of housing schemes

Housing scheme (h.s.)	Number of residential units	Distance in relation to the city	Configuration – integration in the urban fabric
Cinco de Maio	Medium size 172 units	Close to the old city center	Not integrated
Vila Popular	Medium size 107 units	Close to the old and new city center	Integrated
Vila São Pedro	Small size 20 units	Close to the new city center	Integrated
Germano Henck	Large size 366 units	Far from the old and new city center	Not integrated

The factors most mentioned in the literature that might promote or inhibit social interaction such as characteristics of open public spaces, relations with the surrounding buildings, quality of infrastructure, services, retail and entertainment available, as well as the morphological characteristics of the scheme and the socioeconomic characteristics of dwellers, were investigated.

Methodological procedures adopted in the investigation represent a pluralistic approach to the field and data were collected by complementary techniques. These consisted of record information, physical measurements (buildings, vegetation, furniture and equipment in the housing schemes and surroundings), 72 interviews with cognitive maps in a sample of residents of the housing schemes and residents of the surrounding areas, in order to verify their perception of territory; the use of open spaces was analysed through systematic observations of behaviour registered in 112 behavioural maps, in order to develop a behavioural portrait of each residential environment, including the range of activities that occur in the outdoor spaces and identification of the environmental features that support or inhibit social interaction among

residents; application of 210 questionnaires to residents of the housing scheme and residents of surrounding area, were also carried out in order to measure the degree of social interaction and attitudes among residents in the h.s. and within the neighbourhood. The sample of respondents was defined to fulfil at least 30 residents in the h.s. and 30 residents in the surrounding area, in order to fulfil the conditions required to analyse non-parametric tests (Siegel 1956). The statistical analysis of quantitative data through frequencies and non-parametric tests such as Kruskal-Wallis and Spearman allowed inferring relationships and correlations between variables. Map of barriers and syntax analysis (Hillier and Hanson 1984) were further used.

RESULTS

The results focus upon the analysis of relationships between spatial configuration and social interaction, and the verification of the intensity of social interaction among the housing schemes investigated.

Characterization of the housing schemes

Cinco de Maio h.s. was built in 1969 and represents not integrated scheme at local and global levels, medium size and located near the city centre (Figures 4 and 5).



Figure 4 Cinco de Maio h.s. and surroundings

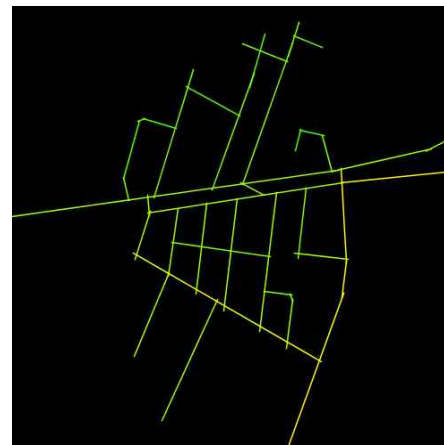


Figure 5 Axial map Cinco de Maio h.s. and surroundings (Global Integration extracted from Fig. 2)

It has two kindergartens, a school, a community centre and a gymnasium. Despite its steep slopes and lack of equipment, the existing green area in the neighbourhood is used by residents of the h.s. to perform social activities. There are few retail outlets and service in the housing scheme and surroundings.

Vila Popular h.s. was implemented in 1968, medium size with 107 single-family housing units. This scheme is integrated to the surroundings, with an integration line of high integration value in relation to the system, is located close to the city centre and has a green area and a community association.



Figure 6 Vila Popular h.s. and immediate surroundings

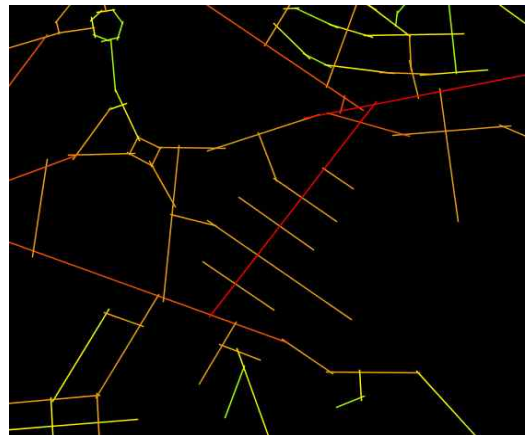


Figure 7 Axial map Vila Popular h.s. and immediate surroundings. (Global Integration extracted from Fig. 2)

In the surroundings, there are two schools, a nursery, a religious temple and a recreational space with a football field, and a reduced number of retail outlets and service in the scheme and its surroundings (Figures 6 and 7 above).

Vila São Pedro h.s. was built in 1970, with 20 single-family units. It has a green area and a school. In the surroundings, there are four houses of worship and a parish pavilion, which features group activities and meetings of community associations.



Figure 8 Vila São Pedro h.s. and immediate surroundings



Figure 9 Axial map Vila São Pedro h.s. and immediate surroundings. (Global Integration extracted from Fig.2)

There are many retail outlets and services, as this area has become a new centre of commerce and city services, that is, the new city centre. The existing shops are located along a street peripheral to the housing development and serve the residents of scheme and also the residents living in the surrounding and in the city (Figures 8 and 9 above).

Germano Henck h.s. is the largest and most segregated scheme, built in 1984. It has a school, a nursery, two places of worship, and a community centre and a church under construction. In the surroundings, there are health clinic and two places of worship. There are few retail outlets and services in the neighbourhood, which are located in the most integrated streets, but only serve the residents of the scheme (Figures 10 and 11, below).



Figure 10: Germano Henck h.s. and immediate surroundings

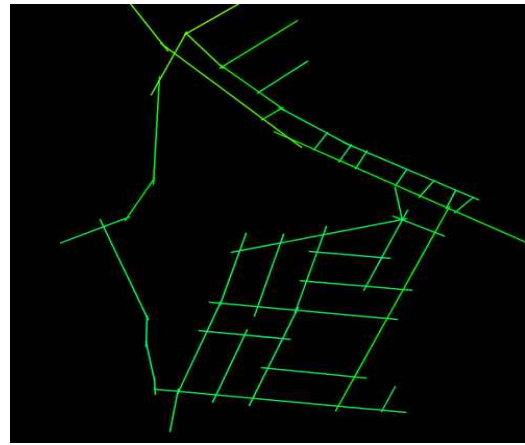


Figure 11: Axial map Germano Henck h.s. and immediate surroundings. (Global Integration extracted from Figure 2)

Relationship between spatial configuration and social interaction

It was investigated whether the integration of the scheme in the existing urban fabric, due to spatial configuration, helps the residents to integrate into the neighbourhood/city and recognize as belonging to the city. When integrated schemes were analyzed, it was found that Vila São Pedro h.s. (small size) is integrated because it is blended with the existing urban fabric, and Vila Popular h.s. (medium size) is integrated into the environment via a central street that connects neighbourhoods. However, it was verified through the axial maps (Figures 6 and 7) that the small h.s. presents continuity of urban fabric and medium size housing schemes do not, indicating greater homogeneity in the area where the small-size scheme is located.

It was found that Vila São Pedro h.s. (small-size and integrated) is inserted in the neighbourhood boundaries perceived by residents of the scheme and in the surroundings, and variations in perceptions refer to the structural pathways that serve as physical barriers, indicating that the continuity of streets in the surroundings influence the perception of integration. However, in the Vila Popular h.s. (integrated and medium-size), resident perception of neighbourhood boundaries includes only the scheme, possibly because it is a concentrated occupation, facing the main street and with few connections in the existing urban fabric. Furthermore, the perception of boundaries is also related to structural pathways that generate physical barriers. Thus, it was found that the existence of very integrated streets in the system did not influence the perception of integration, and just indicates good accessibility. Behavioural observations confirmed that the green space is heavily used by residents, despite having little equipment and furniture. It also became evident that the proximity between the scheme and the city centre, contributed to a more urban pattern of co-presence and possibilities of interaction.

Meanwhile, in Vila Popular h.s. (mid-size and integrated), behavioural observations underscore the importance of the main road system, the heavy flow of vehicles and pedestrians in different neighbourhoods, confirming researches showing that the degree of integration of a space is strongly correlated with the number of people moving in it. According to Peponis (1992), spatial configuration only determines the potential for others to notice, as the backdrop for an active society, but do not prove that people interact, share and exchange experiences among themselves, or even notice each other. In addition, it was confirmed that open spaces in Vila Popular do not meet the necessary requirements to perform activities of social life, for example, due to narrowing and irregularity of sidewalks, lack of vegetation and shading in the square, making it difficult to stay in the place, reducing opportunities for social and informal contact and

negatively influencing the level of interaction among residents.

Results further indicate that residents in Vila São Pedro h.s. (integrated and small) are the most satisfied with where the place they live and the neighbourhood, while residents in Vila Popular (integrated and mid-size) are less satisfied than those from Vila São Pedro, but have better evaluation than the other schemes (not integrated) and the surroundings. Residents in Vila São Pedro also showed better evaluation relationship with neighbours in the scheme and neighbours in the surroundings while Vila Popular appears in third place in the evaluation of quality and intensity of relationship among the residents of the scheme neighbourhood where they live, being superior only to the assessments of residents, probably due to the fact that maximizing the integration increases the control of the strangers in the place, to the detriment of the local control, i.e., the main road with high-value integration enhances the flow of strangers and decreases the control of residents, therefore decreasing opportunities of interaction among the residents. Regarding the relationship in the neighbourhood, residents in integrated mid-size scheme have a better assessment than residents of other non-integrated schemes and surroundings, but with lower assessment than residents in the integrated small-size scheme. It is noteworthy that a significant percentage of respondents of this scheme consider as “neighbourhood” only the area of the housing scheme. Finally, residents of two integrated schemes and respective surroundings are among those who reported having more friends in the place where they live, however, also indicate a high percentage of friends outside the neighbourhood, showing interaction with residents in the scheme, in the immediate surroundings and the city. The results suggest that the integration of the scheme with the existing urban context, due to spatial configuration, helps the residents to integrate into the neighbourhood/city and to become recognized as belonging to the city as well as with satisfaction with where they live. However, it appears that the perception of integration of the scheme is more related to the continuity of streets of the scheme in the vicinity, than the existence of more integrated streets in the system.

Intensity of social interaction among housing schemes

Vila São Pedro h.s. is inserted into an existing subdivision and therefore within the existing urban fabric. The continuity of the urban fabric indicates a homogeneous area. Through interviews and mental maps, it was found that the dwelling units in the scheme are perceived as part of the neighbourhood in which they inserted, both by residents in the h.s. and by residents in the surroundings. The behavioural observations indicate that the green area is heavily used by residents of all age groups, despite not having sitting facilities along the sidewalks, which facilitates social interaction among residents of the scheme and immediate surroundings. It was also noted that the sidewalks, due to inadequate width and maintenance, are not used for passive activities or socialization. Besides, the proximity of the h.s to the new city centre generates great flow of pedestrians and vehicles, contributing positively to residents' satisfaction with where they live and with the neighbourhood. There was a continuity in the flow of pedestrians on the streets of the settlement, due to the existence of services used on a daily basis (possibility of movement on foot), giving a more urban pattern of co-presence and possibility of interaction, which tends to be influenced by the geometric distance (Holanda 2002). When comparing all schemes, results indicate that residents living in Vila São Pedro are the most satisfied with where they live and with the neighbourhood. They also had a better assessment than the others h.s. of relationships among residents where they live and in the neighbourhood, besides presenting a high percentage of friends outside the neighbourhood, showing interaction not only with the residents of the scheme, but also with the immediate surroundings and the city (Table 2).

Table 2: Intensity of friendship among residents

	Cinco de Maio		Vila Popular		São Pedro		Germano	
	Scheme	surrounding	scheme	surrounding	scheme	surrounding	scheme	surrounding
	30 (100%)	24 (100%)	30 (100%)	24 (100%)	20 (100%)	31 (100%)	40 (100%)	11 (100%)
+ friends in the h.s.	19 (63,3)	7 (29,2)	15 (50,0)	13 (54,2)	8 (40,0)	15 (48,4)	27 (67,5)	5 (45,5)
+ friends in the neighbourhood	0 (0,0)	2 (8,3)	1 (3,3)	0 (0,0)	1 (5,0)	3 (9,7)	1 (2,5)	0 (0,0)
+ friends outside the neighbourhood	11 (36,7)	8 (33,3)	11 (36,7)	8 (33,3)	7 (35,0)	8 (25,8)	8 (20,0)	3 (27,3)
equal	0 (0,0)	7 (29,2)	3 (10,0)	3 (12,5)	4 (20,0)	5 (16,1)	4 (10,0)	3 (27,3)

The analyzed data allowed to verify that the size of the housing scheme may influence the degree of social interaction with residents of the immediate surroundings, where the smaller the number of units of the set, the greater the degree of social interaction with residents of the immediate surroundings. However, it is important to note that the h.s. investigated, in addition to its small size, is characterized by being integrated and well located near a commercial centre, which can influence the results, i.e., a segregated small-size scheme could provide different results. Moreover, it was investigated whether the most segregated housing scheme Germano Henck, located far from consolidated urban areas present higher interaction among residents of the scheme than the more integrated housing developments located in central areas. It was found through the mental maps that residents of the scheme consider as part of the scheme just the occupation on the south part of the main road, possibly because it is concentrated, segregated from the surroundings (connected at only one point), with well defined limits and the presence of the road, which seems to work as a physical barrier. It was confirmed that the deeper the system (low integration) more difficult is appropriation by the pedestrian, particularly by strangers to the place that, in general, are most people in public spaces (Holanda 2002). It was possible to identify through the interviews the existence of 'social cohesion', as residents point out that everyone knows everyone, are protected and feel safe ('nothing happens with the people here').

Through questionnaires, it was verified that residents in this large scheme have one of the best assessments in relation to satisfaction with security, indicating the existence of territorial control and internal cohesion. Besides, behavioural observations confirm that the green area, soccer field and pedestrian crossings are heavily used by children, young adults and elderly, facilitating social interaction among residents, despite the lack of equipment and furniture. It was further observed that the pedestrian flow starts from the bus stop at the entrance of the scheme, since the shift to the city centre happens basically by bus. The continuous flow of pedestrians contributes to a more urban pattern of co-presence and possibility of interaction among residents. This scheme has the highest percentage of residents who have more friends in the place where they live. However, it was not found a positive assessment higher than in the other schemes that might indicate a better relationship or a stronger relationship among the residents in Germano Henck. Nonetheless, it must be pointed out that due to its location, far from consolidated urban areas, outsiders to not penetrate in the inner parts of the place, which indicates the existence of friendships restricted to the place where they live, confirming that schemes more distant and isolated can cause residents to relate only to each other and encourage social segregation in relation to the city.

CONCLUSION

Results indicate that the level of integration of the housing scheme in the pre-existing urban fabric, due to its spatial configuration, can help residents to integrate into the neighbourhood/city and feel recognized as belonging to the city. It was noted that residents in

integrated schemes tend to be the most satisfied with where they live and socially interact more intensively with residents in the housing scheme, with residents of the immediate surroundings and with the city. In this sense, spatial configuration seems to be the variable with more direct influence on social interaction among residents, confirming Hillier and Hanson's (1984) results, that put accessibility as the most effective component in the dynamics of segregation, as stated by the social distance through the natural implication of movement networks. According to the authors, from the urban structure and dynamics of social classes' point of view, segregated areas would be used by relatively homogeneous populations and morphology of these housing areas could show these pre-determinations, as well as the contrast of juxtapositions of segregated areas. Nonetheless, when compared to larger housing schemes, smaller schemes tend to have better assessment regarding the relationship among residents in the place where they live and with neighbours in the surrounding area. That is, those residents develop friendships in and outside the neighbourhood, and at the city scale, as a result of higher accessibility. It is worth noting that smaller schemes require smaller areas for implementation and can be easily inserted into the existing urban fabric, with better location and closer to local services, which can positively affect residents' satisfaction with where they live and the neighbourhood.

It was further confirmed that housing schemes located distant from the consolidated urban area, usually of large size, tend to prevent strangers to naturally penetrate to the inner parts of the scheme, thereby maximizing local control and friendship among residents and reducing opportunities of interaction with outsiders. On the other hand, the small size and good location of social housing schemes cannot be a sufficient condition for the integration of residents together with the surroundings and the city, as spatial configuration seem to be more crucial. However, it is important to note that although there is a common sense that certain characteristics are more favourable to the performance of housing schemes for the effects on social interaction, there are no conclusive studies.

This study highlights the importance of assessing the effects of spatial configuration in order to produce more integrated and qualified residential environments that support and facilitate social interaction among residents, promoting a sense of belonging and citizenship, further confirming that the architecture of settlements can positively influence our physical, social and emotional health. Finally, it illustrates how the syntactic description of spatial configuration and the theoretical positions of spatial cognition can be combined in an integrated approach in investigating human spatial experience.

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