ACTIVITY ANALYSIS IN HOUSES OF RECIFE, BRAZIL

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0   Abstract

Domestic activities are what people do in and around their houses. People's pattern of daily activities may be dependent on individual, social and cultural values. They produce spatial patterns and are reflexively produced by them. The main proposition of syntax analysis is that social relations and events express themselves through spatial configuration. The innovation here is that instead of analysing the pattern of space, as is common in space syntax, what is analysed is the spatial pattern of activity in the home. The present paper compares the spatial pattern of domestic activities of different social groups based on the analysis of each house's structure and arrangements.

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1   Introduction

The way people use houses is a surprisingly complex issue. Daily family activities and use of domestic space are closely linked to individual, social and cultural factors as well as the spatial dimensions of their dwellings.

Hillier and Hanson (1984) argue that the main difficulty rests in the paradox of finding a relation between abstract immaterial 'subjects' and a material world of 'objects'. What is to be sought is a relationship between the 'social' subject (whether individual or group) and the spatial object acting as distinct entities: space is desocialised at the same time as society is despatialized (Hillier and Hanson 1984, p.9).

Space syntax analysis was used with the aim of understanding how social relations express themselves through spatial configuration, focusing on the morphology of spaces. Space syntax thus provides a different way of looking at spatial configurations which allows comparative results between different building structures.

The present study on the morphology of domestic experience explores the combination of a subjective technique of data gathering (Multiple Sorting Procedure) with the objective analysis of the spatial configurations of houses. This research was set up to understand how different groups of activities reflected cultural and social concepts of spatial distribution within a dwelling. This means that activities related to active leisure, such as meeting friends and chatting, would probably happen in a social place be different from those where the personally oriented activities such as resting and sleeping happen. But what are the spatial attributes of these places, and how do different levels of integration or segregation favour one or another set of activities? The answers to these questions could also help to outline a hypothesis about the spatial dimension of housing experience, looking perhaps for what is universal and what is specific to a particular culture.

2.   The syntax analysis of domestic activities

The main assumption of space syntax analysis is that social relations and events express themselves through spatial configuration. The innovation here is that instead of analysing the pattern of space, as is common in space syntax, what is analysed is the spatial pattern of activity in the home. The present paper compares the spatial pattern of activities of different social groups based on the analysis of each house's structure and domestic arrangements.

20.2

Due to the exploratory nature of the investigation, two structural aspects were chosen to describe the spatial qualities of domestic activity: the measures of integration and depth, using the exterior as a root. Depth from the root considers the number of steps which separate a determined space from the front door. The idea of describing the sequence of activities from the house entrance appears interesting since it presents the primary experience of buildings, the most natural movement from arriving home to getting to any specific place in the structure. It can be a useful measurement to understand the notion of front and back and the relationship between spaces open to visitors and those specific to the inhabitants.

3.   Describing the context and the sample

The sample studied is composed of 101 houses from three neighbourhoods. These neighbourhoods represent different spatial and social residential conditions in a developing country. They are a favela, a public housing estate and a middle class neighbourhood in Recife, in the Northeast of Brazil.

4.   Data gathering

There were two main procedures for data collection, the drawing of each house plan in order to develop space syntax analysis and the dwellers' statements of their daily activities and use of places.

4.1   Register of plans

People were interviewed in their own dwellings in order to observe the use of their houses. They were asked to draw the plan of their house or to allow the researcher to visit the house and to draw it. Special attention was paid to drawing furniture and to registering signs of activities in each room, such as leftovers in the sitting room, books on the kitchen table, or toys in the corridor.

4.2   Getting people's experience: the Multiple Sorting Procedure

The method of data gathering used to explore people's concepts of the world in their own terms, called multiple sorting procedure (Canter, Brown and Groat, 1985) seemed to be the most suitable for this study. The multiple sorting procedure consists of asking the interviewees to classify the same elements several times according to different categories, in order to understand their ideas about them. The procedure asks people to sort different elements into groups, in such a way that the elements in each group have something similar among them and are by their nature different from the elements in other groups.

This procedure provides several advantages, especially regarding the quality of data gathering. The sortings are developed in a very relaxed way, with few limitations or restrictions made. It has another quality. It does not depend entirely on verbal statements. When people start classifying they use images, symbols and concepts that are in their minds.

4.2.1   Daily activities and actions

A number of studies had been carried out focusing on daily domestic activities (Canter, 1983; Oseland and Donald, 1993; Ahrentzen et all, 1989) which have refined a framework for analysis. They clarify the nature of the activities and their inner relationships. Some of these findings help to group activities representing different sets of domestic actions: household chores, and extended chores, active and passive leisure and personal and communal needs.

20.3

Table 1

Household Chores	Passive leisure	Private needs
ironing	watching TV	washing the face
cooking	reading	taking a bath
washing up	listening to music	sleeping
washing clothes	studying	resting
	dating	making love

Extended chores	Interactive leisure	Communal needs
shopping	chatting	having a coffee
working	meeting friends	having lunch
playing with children	drinking beer	dining
doing special tasks	going for a stroll	

4.2.2   Places and spaces in home

The environmental scale (immediate, local, distant) was the main concern in defining places, considering that many domestic activities happen also on a larger scale than the immediate space of the house. Due to the diversity of neighbourhoods analysed, the dwellers were firstly asked to select from the 26 places those that were present in their residential location.

Table 1. Domestic actions.

Table 2

Home	Surroundings	Neighbourhood	Other in city
bedroom	hall	neighbourhood assoc.	beach
bathroom	lift	church	night club
sitting room	stairs	shops	cinema
kitchen	alley	bar	supermarket
laundry	house front	club	shopping centre
terrace	pilotis	square	
yard		streets	
garden			

4.2.3   Sorting activities and places

The respondents were asked to sort the 25 labels naming domestic activities in a free way. After the sortings they were encouraged to explain the groupings, what the elements in the same group had in common as well as the concept underlying them. After considerable contact with the labels, people were asked to select the places used by them in one way or another. Finally, they were asked to sort the activities with the places where they usually perform them.

Table 2. Places and spaces in home

5   Space syntax procedure of analysis

In order to describe these 101 different houses, the first procedure was to draw the justified graphs of each house considering the main entrance of the house as the root. The second step consisted of the definition of a two dimensional description called convex spaces. Differently from the usual procedure of establishing the fewest and fattest convex spaces in a system, the break-up was done considering also the furniture arrangements which established different uses in the same space. This could be regarded a convex break-up of spatial activities. Finally space syntax analysis was carried out measuring integration, control and depth of all spaces in the houses as well as global measures such as mean values for each house structure.
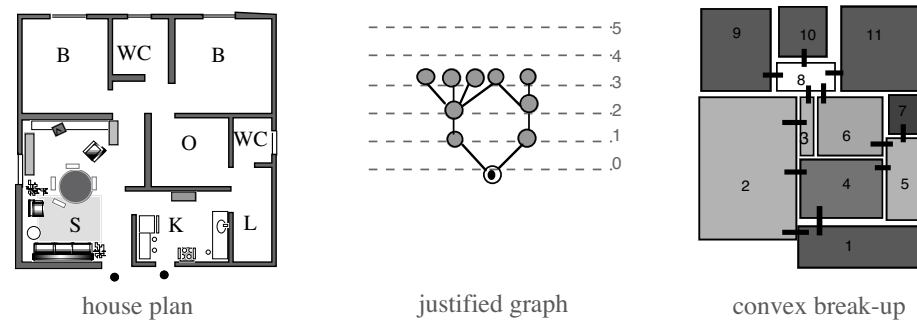
20.4

| house plan | justified graph | convex break-up |

Figure 1. The description of houses.
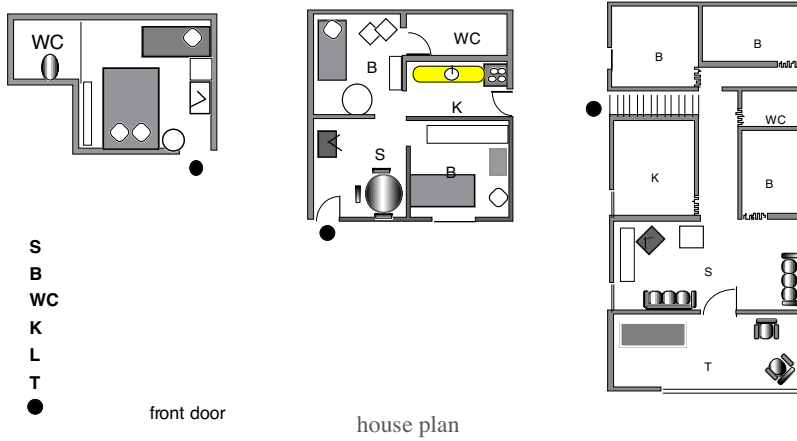
5.1   The description of the houses

Some examples from each neighbourhood were selected in order to characterise the different housing typesin the sample of 101 houses. Some further comments were added aiming to describe space uses, transformations done and other useful information.
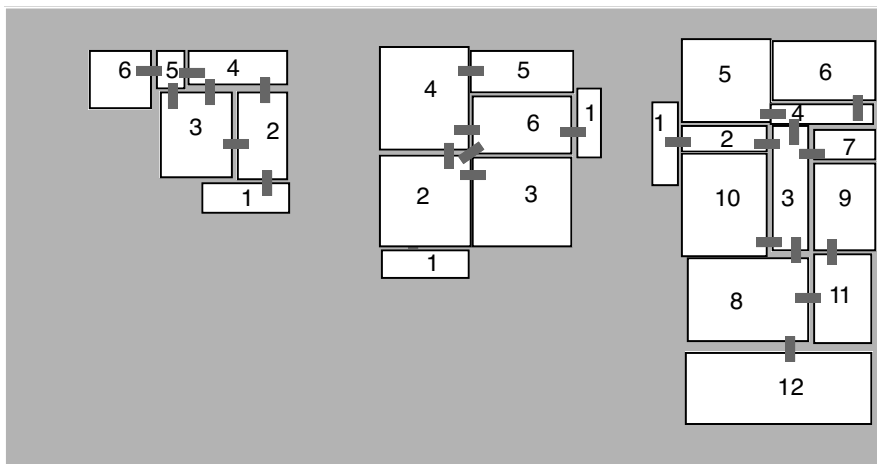
5.1.1. Favela houses

Favela huts (see figure 2.a) are usually one single room under a roof where all the domestic activities happen. They are built up by the dwellers according to their most basic needs, usually under great constraint, lack of resources and mainly lack of space.

Different house functions are separated by means of curtains and furniture, and flexibility is a necessity; a sitting room during the day usually turns into a bedroom during the night. As the houses are small, they intensively use the surrounding space outside as a continuation of the indoor rooms.
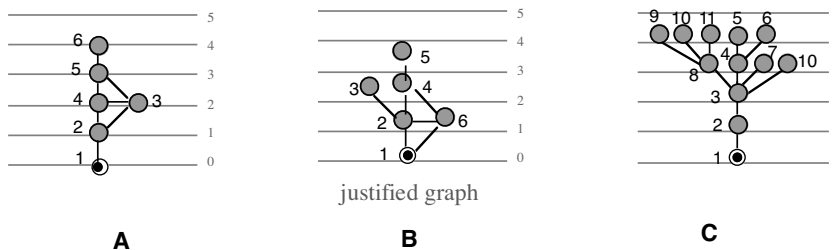
The justified graph in figure 2.a describes the high permeability of activities through the presence of rings. In this hut the shallowest part of the space accommodates the TV set and a kind of small coal stove. The bed acts as a sofa and the proximity with the door is important. The front doors are always open. Residents can cook indoors and also outside. The TV can be watched while in front of the house, and this is the most active space of the house. The house in figure 2.b, although more structured with proper walls, still portrays a similar relationship between spaces by the absence of doors and all openings concentrated in the middle of the house. The justified graph shows that by the existence of interior and exterior rings the spatial relations in this house are similar to the previous hut.

WC

S
B
WC
K
L
T
● front door

B

WC
B
K

B
B

WC

B

K

S

T

house plan

20.5

convex break-up

6 5 4
3 2
1

4 5
6 1
2 3
1

5 6
1 4
2 7
10 3 9
8 11
12

justified graph

A
6
5
4 3
2
1

B
5
3 4
2 6
1

C
9 10 11 5 6
8 4 7 10
3
2
1

A   **B**   **C**

The third house in this example is built on a first floor over the family business. It is a bigger house which presents a tree-like structure. Here transitional spaces (corridors) have a main role in distributing the spaces. It is interesting to note an inversion in the usual distribution of house functions where the private area or bedrooms are at the entrance and the social spaces like the sitting-room and terrace are in the deepest area of the house.

Figure 2. Favela houuses.

5.1.2 *Public housing flats*

The sample focused on three different types of flats on this estate. The first one stands by its spatial character, being a series of very close buildings disposed around two squares, better described as empty spaces. They have very small units of two bedroom flats with a single entrance, here called type A. The corridors leading to the flats are closed at the stair level with iron-bared gates to allow control (security reasons). This also entitles the dwellers to use this closed corridor space as terraces where they arrange chairs, hammocks and flower pots. These terraces are also the

20.6

children's space for playing. The terraces were also considered as part of the houses when describing their structures. This type of minimal flat presents a very rigid plan that does not allow for internal adaptations.

The second type of flat named type B is also a rather small apartment. There are two units per floor in these three storey buildings. These flats have two entrances, a social and service one, there is also an internal option-room (with no windows) to be adapted according to the family needs. In the original plan, this room (see figure 3.b) provided the only ring linking the private area of bedrooms with the service area (kitchen and laundry). The justified graphs describe these flats as being tree-like structures where a shallow social space leads to two main 'branches" the private and service areas.

S   sitting room
B   bedroom
WC   bathroom
K   kitchen
L   laundry
T   terrace
0   option room
●   entrance

house plan

convex break-up

justified graph
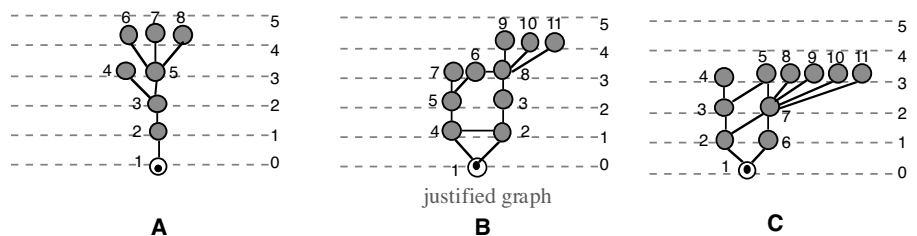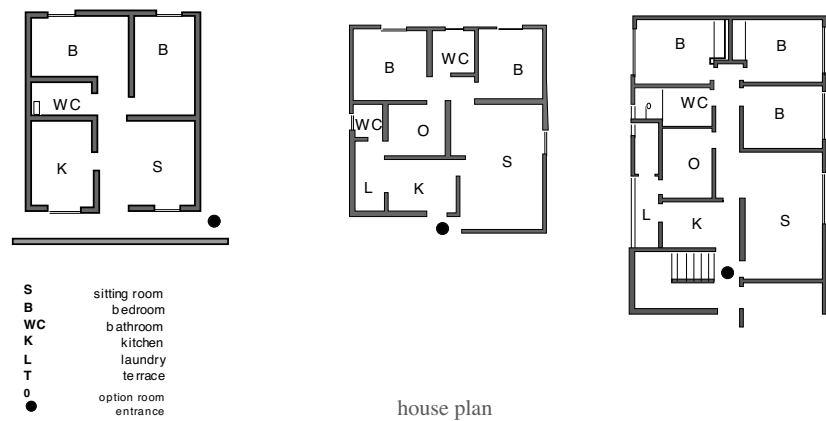
A   B   C

Figure 3. Public Housing flats.

The third housing type shown in figure 3.c, represents 11 cases of a bigger flat with 3 bedrooms plus the option room. There are only two flats per floor in these four storey buildings creating a more private common area. Even so the gates are present at each stair level. These flats also have two entrances but in this sample only two of them kept the option of the kitchen entry. The justified graph of the original plan could be described as a bush like structure, since the optional room links the private area with the service spaces.

5.1.3. Middle class houses and flats

There are two middle-class houses in this illustration. The first one represents a colonial conception of house and another a more recent conception of dwelling.

House 5.A is situated at the street level and develops its spaces longitudinally towards the back garden. It is a linear and deep house. The first room is a more elaborate space of entrance and display. A long corridor leads to the intimate core of the house; the kitchen. The bedrooms are located alongside the corridor and have no windows. They have ventilation and light from the ceiling. The justified graph indicates the deep structure and the strong role of the transitional space (corridor).

House 5.B is developed on two levels. It is situated in the rear part of the plot allowing the outside circulation by its side gardens. It provides open terraces at the front and back of the house and is characterised by few transitional spaces. It shows a structure being developed on eight levels with the presence of ring linking social and service areas.
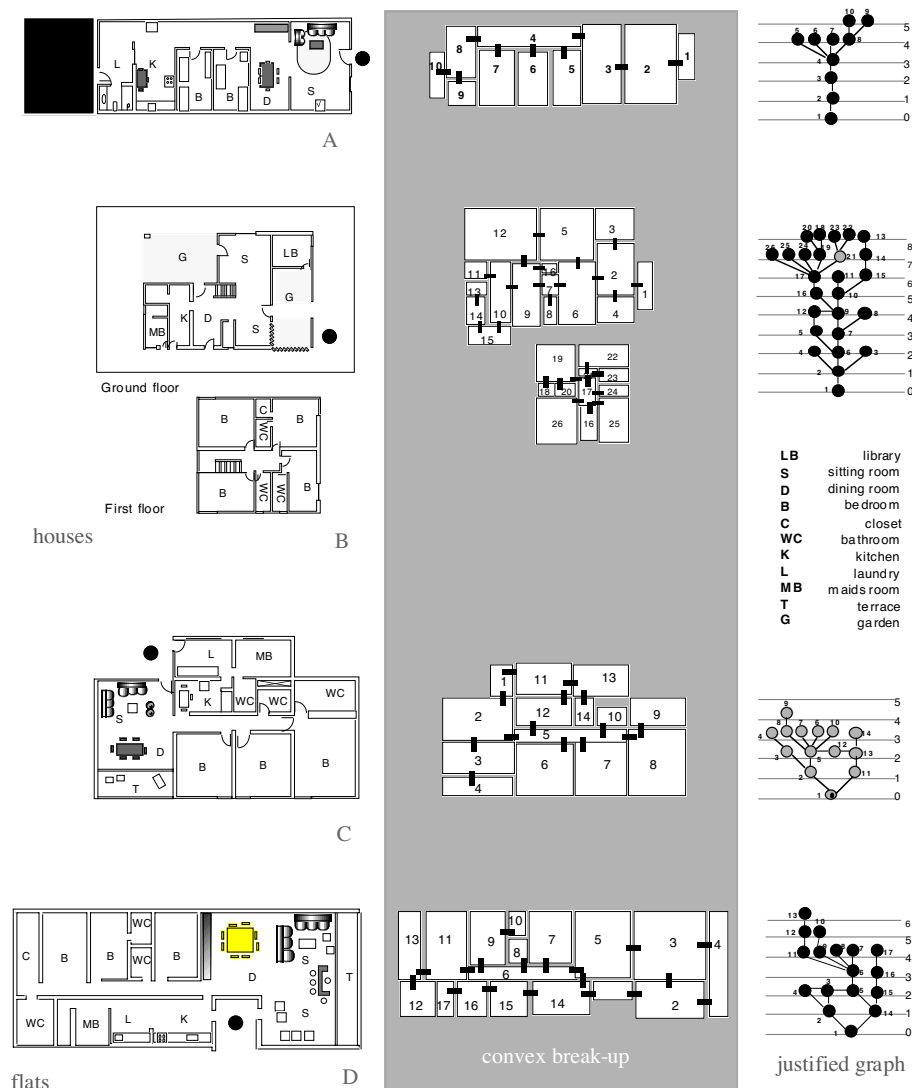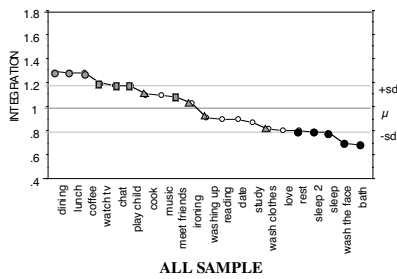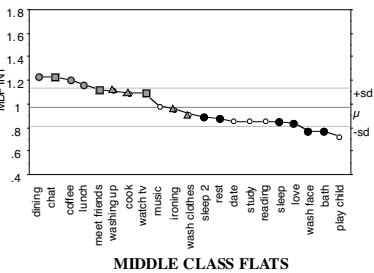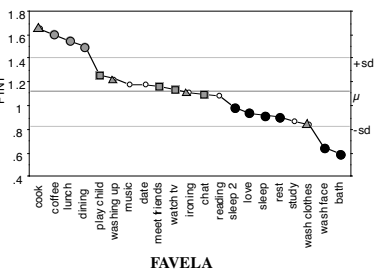
20.7

Figure 3. Middle class houses and flats.
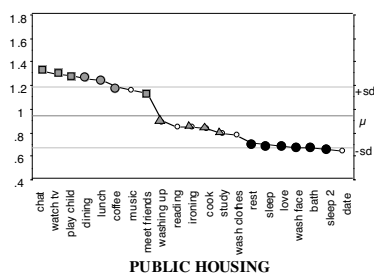
ALL SAMPLE

20.8

PUBLIC HOUSING

FAVELA

MIDDLE CLASS FLATS

MIDDLE CLASS HOUSES

Activities

▢ Interactive leisure
◯ comunal needs
● personal needs
○ Passive leisure
△ Domestic chores

Figure 5. Mean Integration value of domestic activities by housing type.

Flat 5. C is a middle size one. It has two main entrances, the social one opening to the sitting room and the service leading to the laundry. It has a shallow structure developed on four levels. The other example of flats (5.D) presents a bigger dwelling. The social area is nearly half of the total area of the flat. It is an open space which shelters the dining room, sitting room, bar and a more intimate sitting space. The justified graph presents two main branches; a linear sequence of service spaces including the maids' room and a deeper branch where the bedrooms are disposed alongside a long corridor.

5. 2   Processing the data
The first step is to aggregate the sociological data matrix, where columns indicate the places stated by dwellers as the locus of their daily activities, within a morphological data matrix. New columns were added with the corresponding integration and depth values of each of those spaces in each house. In this way each activity was associated with an integration and depth value referring to its configurational position in a house.

A statistical description of cases was carried out and those with low occurrence, were not included in the analyses. The integration and depth mean values of domestic activities for all the sample, and for each of the four sub-groups are presented in line charts.

6   The results
6.1   The pattern of integration and depth of domestic activities
The first analysis looked at the relationship of the activities regarding the internal structure of the dwellings: their spatial integration. Figure 5 shows the mean integration values for activities in the whole sample as well as for the different housing types. Figure 6 presents the depth level for each activity and Figure 7 shows the correlation of integration and depth.

From the original 26 activities, six were removed from the analysis (mainly the extended chores) either because they were placed as happening outside the house, in the neighbourhood or other parts of the city, or because of very low and non-representative counting. The empirical results show that the population studied considered 'watch' TV as an interactive leisure rather than a passive one. Playing with children was also considered as interactive leisure. One more item was added named "sleeping 2" which in a house with many bedrooms, situated that activity in the most integrated bedroom.

6.1.1. The sample
The analysis of 101 houses of the most diverse types, showed that activities consistently tend to group in different levels or bands of integration.

Those happening in the most integrated spaces are dining, lunch and having coffee, which although called communal needs are better described as 'eating activities'. They are closely followed by the interactive activities of leisure: watching TV, chatting and playing with children. The second band is formed by all domestic chores and passive leisure activities which occur in spaces with integration values ranging from 0.802 to 1.106. It could be assumed that cooking, ironing and washing up, are

activities that happen in a kind of intermediate spaces, the same applying to hearing music, dating, reading and studying. The third group is formed by actions associated with the most segregated spaces in houses (integration values ranging from 0.7 to 0.8) the personal needs of sleeping, resting, washing the face and bathing. The last two are clearly the most spatially segregated. The overall pattern for domestic activities according to integration mean values presents a smooth descending sequence of activities.

ALL THE SAMPLE

6.1.2. Favela houses: the great integration

20.9

Integration values for activities in favela houses show an interesting particularity. They have the highest values in the sample. Four distinctive groupings or levels of integration can be observed. Domestic chores display a wide range of integration values, interactive and passive leisure form a single group with a very similar profile and the personal needs show the lowest values.

The most integrated activity is cooking, which together with the 'eating activities' form the first band of highly integrated activities. The placement of cooking as the most integrated domestic activity truly represents the concern of favela women to control the space.

FAVELA

The second group almost have a horizontal distribution: washing up, hearing music, reading, meeting friends, ironing, chatting and watching TV are activities with very similar integration values. Considering the size and structure of these houses it is possible to infer that if these activities do not happen in the same place, they are happening in adjacent spaces. That brings a question about the relation between activities and time. Are these activities being developed at the same place and time, or are they occurring in different time periods?

PUBLIC HOUSING

Personal needs (sleep, rest, make love) should be considered as more individual, intimate, and non-disturbing kinds of activities since they are the less integrated ones. Even so, the favela's most segregated actions concern washing clothes, the face and having baths, which can be better named here as 'wet activities'. That aspect could be better understood keeping in mind that water supply and disposal account for the most serious environmental problems in this kind of neighbourhood. Some houses have only one water tap, normally located in the backyard.

MIDDLE CLASS FLATS

The correlation integration/depth (Figure 6) sheds light on the domestic experience in these houses. For favela dwellers the activities in interactive and passive leisure are very shallow. They all happen one or two steps away from the front door. The domestic task of ironing can also be considered to be in this band, since it is performed in spaces which allow social contact and chatting. The women are also known to iron clothes (mainly as an economic activity) while listening to music or watching TV (Monteiro, 1989).

MIDDLE CLASS HOUSES

Activities

- ◻ Interactive leisure
- ⬡ comunal needs
- ● personal needs
- ○ Passive leisure
- △ Domestic chores

The house chores of cooking and washing up present similar depth levels. The activity of cooking was presented as the most integrated in favela houses but it occurs relatively deep in the house structure. This demonstrates that an increase in depth does not always mean an increase in segregation.
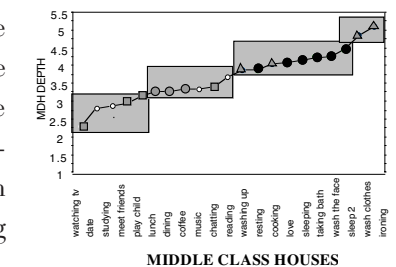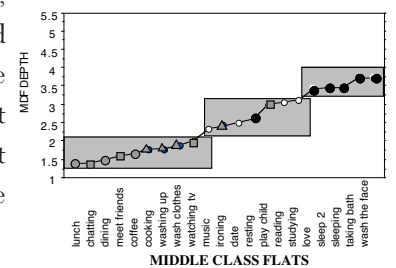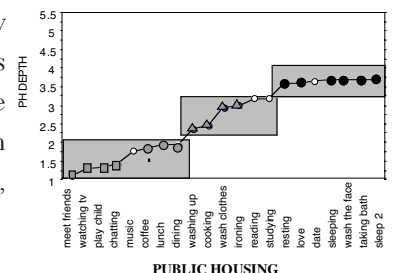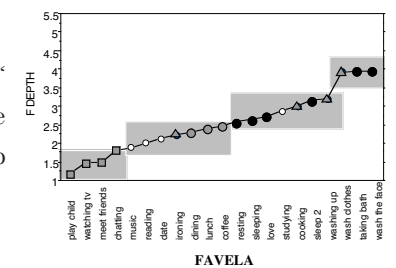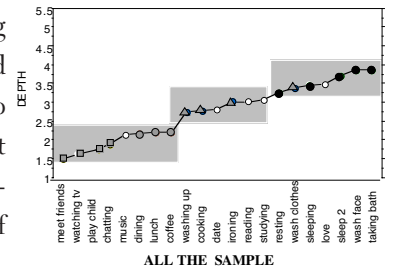
*Figure 6. Mean depth value of domestic activities by housing type.*

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6.1.3 Public housing flats: a functional pattern
Public housing results show a distinctive pattern with two main groups. The activities presenting high integration values are the interactive leisure (integration values from 1.316 to 1.269) and 'eating activities' (integration values from 1.249 to 1.171) and the relatively segregated ones: passive leisure, all domestic chores (0.886 to 0.826) and personal needs (0.699 to 0.634). Here the social activities of chatting, watching TV and playing with children are more integrated than the communal 'eating activities'. These eating activities are the ones with the highest standard deviation values showing the diversity of their situation.

It is possible to recognise two sub-levels in the least integrated group. Domestic chores and activities like reading and studying present higher values than those of 'personal needs', but nearly all have a similar segregated index. These results suggest that patterns of activity in these flats split dramatically between the socially interactive actions and the others. It shows a very marked threshold, a kind of front/back structure associated with the distinction between activities involving visitors and inhabitants.
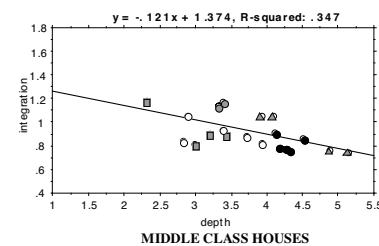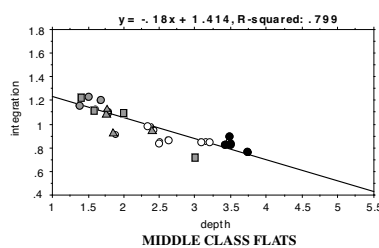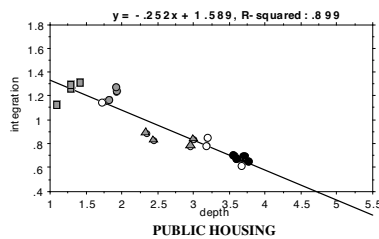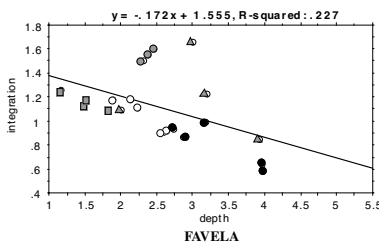
Figure 7 shows a strong correlation of integration and depth. The shallow activities are the most integrated ones and the segregated ones happens spatially deeper in the houses. It suggests that the flats structure strongly determines functional arrangements.

6.1.4 Middle class flats: the mixed partitions
The integration bands according to middle-class experience show a more mixed composition. There are three different groups of activities distributed in the first level of integration. Dining, chatting, having coffee, lunching, meeting friends and watching TV, present similar integration values to the domestic chores of washing up and cooking (1.232 to 1.111). The intermediate band is formed by ironing and washing clothes together with the activities of passive leisure and personal needs (.915 to 0.838). The third band presents the 'wet activities' of washing the face and bathing as the least integrated ones (0.765).

The results bring into consideration again the fact that the more integrated activities merge around food preparation and consumption. In fact, most middle class flats present an unusual situation for the dining spaces. The social entrance leads directly to the dining room which acts as main distributor for the sitting room, kitchen and the private areas of bedrooms. Figure 6 shows dining, having lunch and drinking coffee in the shallowest level and confirm the situation of dining rooms as principal rooms. At this stage the interactive actions of chatting and meeting friends also take place. This kind of flat invited free and easy hospitality since the visitor's first view is of the family at the dining table. The provision of two separated entrances for social and service areas gives the kitchen a certain centrality and integration value similar to the dining space. Middle-class dwellers present their passive leisure activities of dating, studying and reading in relatively segregated situations, similar to sleeping and resting. All passive leisure happens at 2 to 3.5 steps from the entrance, along with the house chore of ironing, the personal need of resting and the interactive action of playing with children. The presence of 'rest' within this group reveals a different

y = -.172x + 1.555, R-squared:.227

FAVELA

y = -.252x + 1.589, R-squared:.899

PUBLIC HOUSING

y = -.18x + 1.414, R-squared:.799

MIDDLE CLASS FLATS

y = -.121x + 1.374, R-squared:.347

MIDDLE CLASS HOUSES

Activities
- ■ Interactive leisure
- ◑ comunal needs
- ● personal needs
- ○ Passive leisure
- △ Domestic chores

Figure 7. Domestic activities: correlating integration and depth.

experience of that activity. The depth values suggest that 'to rest' does not means 'to sleep' or to retire to the private space of bedrooms. The lower integration value for 'bathing' reflects the more segregated and deeper spatial conditions of 'en-suite' bathrooms.

6.1.5 Middle class houses: a flexible distribution

In these houses, the most integrated domestic activities mix interactive leisure, communal needs, and the house chores of cooking and washing up. Watching TV presents the higher integration value (1.171) followed by the eating routines.

20.11

The inner differences in that pattern highlight more revealing aspects about these families use of space. First of all, the interactive leisure activities (chatting, watching TV, meeting friends, playing with children) are spread in the structure. "Meeting friends" for example is a more segregated activity which hints that it can be happening in an intimate living room. The most segregated activities in this structure are washing clothes and ironing. This represents spatially a cultural aspect of having the laundry adjacent to the maids, rooms which are usually in a detached building at the back of the houses.

Houses also offer different kinds of introductory spaces such as halls, terraces, corridors, inner gardens and porches which act as distributors or areas of circulation. Depth is directly affected by the houses' dispositions in the plots as well as by their development on two or more storeys. In figure 6, it is possible to see that the shallowest activity happens at more than 2 steps from the houses' entrance. At an intermediary depth level, distant an average of 2 to 3.7 steps from the entrance, occur the activities described as passive leisure: dating and studying; and two eminently social ones: meeting friends and playing with children. The presence of activities demanding privacy amidst the interactive ones is explained by the existence of special rooms at the front of the houses. The presence of spaces such as offices, libraries, even a special sitting room such as the front room destined for guests, is common. Usually they are display rooms, but they are also prone to sheltering these more private activities. The pattern of domestic activity in this case shows a more flexible use of space and a more heterogeneous and rich disposition of space functions.

7   Discussion

The analysis of integration and depth describes the spatial properties of domestic activities occurring in different housing types. The results not only show the spatial qualities of places where the activities are occurring but also shed light on the empirical nature of them how they are being experienced.

The analysis of their groupings made it possible to perceive the differentiation in the activities patterns produced in each housing type. The first general observation from the results is that groups of activities consistently tend to group themselves in bands of spatial integration. The more integrated activities are the social ones. They comprise the interactive leisure functions with the communal ones related to eating. By their nature these activities involve all the family members, as well as visitors to the house. They are also very likely to happen in the presence of a wider range of activities. House chores or activities related to domestic tasks occur in spaces with an

20.12

intermediate level of integration. By virtue of their task orientation, they tend to look for a considerable integration with all other activities in the house.

A revealing aspect regards the possibility to distinguish between two kinds of activities according to their spatial requirements. There are what could be named 'rooted' activities, those occurring within defined boundaries, such as cooking in the kitchen and bathing in the bathrooms. They need special furniture and equipment in order to take place. They have very little spatial flexibility. There are also the 'loose' activities: those that can be performed in diverse locations. They are also apt to happen in conjunction with other activities. The location of the loose activities reflects the degree of flexibility provided by a spatial structure as well as their natural bias to more social or private life. The loose activities are in fact the most revealing of the general social orientations of each domestic experience.

The results for each group of dwellings present some regularities as well as specific traits. The favela houses and huts provide an extremely integrated pattern of domestic activities. It can be argued that the houses are very small, the product of all sorts of spatial restrictions. But they surely reflect a cultural experience of open and integrated structures. These dwellings are chiefly integrated by the household tasks, especially cooking. They reflect a women-centred structure. The women need to control most of the domestic activities. The extreme integration experienced by the majority of activities in these houses, happens at the expense of segregation and privacy of activities concerning personal needs (sleeping, resting, making love). As it was hypothesised before, privacy in these houses is a matter of timing and not space. In these open structures levels of integration do not seem to be directly related to spatial depth. The favela depth pattern shows that the activities with higher integration levels occur in the inner area of the houses. Those in the intermediate band of integration, mostly the interactive and passive leisure occurs in shallow spaces.

The public housing flats show a completely different spatial experience from the previous case. The integration pattern reflects the observed general tendency: social and communal activities are very integrated, house chores are at an intermediate level, the segregated activities are the personal ones. Those integration levels reflect the strong structural distribution of functional areas. The strong correlation between integration and depth (Figure 7) suggests spatial structures which do not allow flexibility in their use. The situation of the "loose" activities, mainly the passive needs, in segregated spaces suggests that their private experience is probably a spatial contingency - they are being pushed away from the one and only social place of the house, the sitting room.

Both middle class housing types have similar pattern of integration for domestic activities. Their main distinction refers to their experience of house chores. The flats present them as spatially integrated activities. The loose activities of passive leisure show a great tendency for segregation in the flats' experience and a flexible spatial distribution in the houses. Middle class flats, like public housing dwellings, have a strong correlation of integration with spatial depth.

This investigation has produced a body of empirical knowledge, which helps us to

understand how these experiences differ and the spatial qualities which are associated with them. They provide fruitful information for housing and planning agencies which make a plea for houses more adequate to dwellers' social and cultural values. Houses are not only shelter. They are not empty entities. They are imbued with cultural, social and even psychological values. Their spatial configurations link activities and form experiences which define the quality of life of their inhabitants.

The complexity of house arrangements and space use call for a multi-dimensional approach, for a broader understanding of their experience. Spatial analyses should regard it from different angles: integration, control, depth and visibility, the last one adding an extra-dimension to the analysis. It would be fruitful to see further investigation correlating subjective data, specially dwellers' assessments of their experiences, (to what extent being in those places helps or hinders their activities and goals) with space syntax analysis.

20.13

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20.14