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ORGANISING FAMILY LIFE

An analysis of the spatial organisation of people and activities in the household

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ABSTRACT

HOW CULTURAL PATTERNS ARE REFLECTED ON DOMESTIC SPACE HAS BEEN VASTLY DISCUSSED IN SPACE SYNTAX LITERATURE. THE GENOTYPE ANALOGY WAS DEVELOPED WITH THE UNDERLYING NOTION THAT THE CONFIGURATIONAL PROPERTIES OF ARCHITECTURAL FUNCTION REFLECT PATTERNS OF USE AND ACTIVITY THAT ARE CULTURALLY STRUCTURED. THE PAPER WILL FURTHER INVESTIGATE THIS QUESTION BY LOOKING AT HOW THE DOMESTIC SPACE IS ABLE TO ORGANISE ACTIVITIES, AND THEREFORE INDIVIDUALS AND GROUPS, THROUGH THE SPATIAL DIVISION AND DETERMINATION OF ARCHITECTURAL FUNCTION. IT WILL EXAMINE A SERIES OF INTERPRETATIVE INQUIRIES ON THE WAY FAMILIESPERCEIVED AND USED THE DOMESTIC SPACE, WHICH WERE DEVELOPED IN THE 1970S IN PORTUGAL WITH THE EXPLICIT AIM OF RELATING SPATIAL ATTRIBUTES WITH THE WAY SPACE WAS USED. THIS WAS NOT ACHIEVED AT THE TIME, AND THE RESULTS PRESENTED IN THE PUBLISHED DOCUMENTS WERE NOT ABLE TO TAKE SPACE INTO CONSIDERATION. THE PAPER FOCUSES ON TWO QUESTIONS WHICH WERE PROPOSED AT THE TIME AS BEING MAJOR IN HOW RELATIONSHIPS WITHIN THE FAMILY REFLECT THE ONGOING TRANSFORMATION OF SOCIETY AS A WHOLE: THE PATTERNS OF USE OF WOMEN IN RELATION TO THE REST OF THE FAMILY, AND OF PARENTS IN RELATION TO CHILDREN. EXPLORATORY DATA ANALYSIS WILL BE USED TO UNDERSTAND WHERE DOMESTIC ACTIVITIES TAKE PLACE IN THE HOUSE ACCORDING TO CONFIGURATIONAL PROPERTIES AND OTHER SPATIAL ATTRIBUTES OF THE APARTMENT PLANS, AS WELL AS PATTERNS OF SPACE USE BY DIFFERENT FAMILY MEMBERS ACROSS SEVERAL HOUSEHOLDS.

KEYWORDS

Housing, domestic activities, architectural function, family relations, spatial analysis

1. INTRODUCTION

In what measure do the places families live in affect the way they act and interact with each other? How can these be designed to reflect and converge with social transformation in an ever-changing society? This paper focuses on these questions as they were posted by architects, planners and researchers in the 1970s in Portugal. It departs from a comprehensive reading of published documents and reports from that time, in order to identify converging approaches, concerns and objectives. From these, one document – organising a series of inquiries on the activities and ways of use and permanence of houses by families - was selected as the empirical basis from which to carry on research.

How cultural patterns are reflected on domestic space has been vastly discussed in space syntax literature. The importance of human activity has been an integral part of this question through the development of the concept of the inequality genotype, and its application to housing research. It is defined as consistent patterns of *"relational differentiation of the functions and categories located in different spaces within a plan"* (Hillier et al. 1980) through which social relations and processes are expressed in space. When the ordering of functions is consistent across a sample, then a cultural pattern can be claimed to exist in the spatial definition of social relations.

Underlying this idea is the notion that the configurational properties of architectural function reflect patterns of use and activity that are culturally structured. The paper will further investigate this question by looking at how the domestic space is able to organise activities, and therefore individuals and groups, through the spatial division and determination of architectural function. It will first examine how types of activities and people are distributed in different types of spaces in a house, as well as how individuals are located through time. Then, it will look at how these relate to spatial attributes and consider how variance of patterns of activity and use may occur across different cultures. Finally, the paper concludes that relationships can be found in the data between patterns of space-use and spatial attributes and advances some hypothesis on factors contributing to the convergence or lack thereof between houses' layouts and the concerns explicit throughout the documents.

1.1. Housing research in 1970's Portugal

In the late 1960s, in response to a systematic lack of housing conditions in the country, the state begun implementing new housing policies and public housing programmes. 1969, the National Laboratory of Civil Engineering (LNEC) started working in close proximity to a new state institution for the development of social housing (FFH), which was created with the objective of integrating a new national housing policy with urban planning, centralising both in a single organic structure. This collaboration was reflected in a large body of theoretical production, which assisted the development of a series of different solutions regarding housing policies, urban morphology and domestic typology. Through the normalisation of constructive processes and development of social studies through data collection and statistical procedures, these solutions were highly innovative in the national context, and reflected contemporary housing experiences worldwide.

"They should aim to be a reflexion of the variety and richness of everyday life instead of reducing it to schemes inferred from the average, they should not be content with knowing what happens in the house, but try to understand what it is to "live the city". (...) We need data to reinvent man's home and to reinvent it we need to re-learn its meaning, understand its use, acknowledge its symbolism." (Pereira 1884)

This holistic approach to public housing development had at its basis a series of socially concerned principles and objectives that had to do with an ongoing and foreseeable transformation within intra and inter family relations, and so deviated from the traditional family values that were a basis of the regime's rhetoric. These were explicitly stated throughout documents spanning research proposals and reports, architects' symposia and debates, and architectural project specifications, and focused on four major points.

1. As it became more common for women to have jobs outside the house, researchers and architects searched for solutions that would reflect a shift in the understanding of the woman's role in the household (Portas 1969). While often positioned against a "paternalist role of the architects" (Pereira 1984) who hoped to impose their values through architecture (Pereira 1971) a concern with the isolation of women at home and the amount of domestic work was consistent across the developed documents.

2. At the same time, a growing consumption of mass media was considered likely to reflect on a larger amount of leisure time spent at home instead of outside, visiting neighbours or local commerce and services. While this seemed to mean that neighbourhood relations were declining, it also meant that family life was becoming more collective (Portas 1969). Housing development should take into account how a growing intensification of the time spent at home would contribute to the shift in the woman's role in the household, as well as in a changing attitude towards children (Pereira 1984).

3. Gradual loss of intimate connections was suggested as a fundamental cause of individual unhappiness and relationship dissatisfaction (Portas 1960, Pereira 1984). Both theoretical research and practical experiments focused on the importance of neighbourhood relations and mutual aid systems, as well as how it could be it was the architects' role to materialise and group housing in a way that allows for the facilitation of social interaction in neighbourhoods (Pereira 1984).

4. Finally, there was a focus on the degree and relative value of the relationships established between the family and other groups. This was reflected in a systematic reclamation on the part of architects for the adoption of legal regimes allowing for the use of urban land in light of common over particular interests (Teotónio Pereira, 1967, Lobo 1969, Távora 1969), as well as on a emphasizing of the importance of an urban planning integrating housing with services and infrastructures.

2. DATASETS AND METHODS

2. Datasets and Methods

2.1. The Inquiry on Urban Housing

These theoretical propositions were developed and systematized in a series of projects of sociological research undergone by the Laboratory of Civil Engineering (LNEC) in the 1960s and 1970s, and were intended to be an empirical back-up to inform future housing development (Pereira 1971, Portas 1960, Portas 1969).

Amongst these, the Inquiry on Urban Housing (Pereira 1984) was unique in its attempt to relate the spatial properties of apartment schemes to the way families perceived, used and appropriated domestic space. It was conducted with the objective of aiding architects and planners in designing social housing for diverse and constantly-changing ways of life, by making architects' options verifiable through theoretical and empirical research. It was based on a series of interpretative and quantitative inquiries conducted between 1969 and 1977 on 300 families living in sixty types of apartment layout, in four housing developments in Lisbon. These areas were selected due to both an ease of access to architectural drawings and to a wide range of families of different socioeconomic classes, apartment schemes and urban morphology and integration in the city (Figure 1):

Figure 1 . 1960s map of Lisbon with signalization of the 4 neighbourhoods

Neighbourhood (B), Benfica, is a single-family houses neighbourhood in the west of Lisbon, built in the late 1940s in what was at the time a mostly unurbanised area of the city, disconnected from secondary urban centres and with no neighbourhood infrastructures and services.

Alvalade (A) is a collective housing development built in 1950 in a central area of Lisbon.

Olivais Norte and Olivais Sul (O) are two large, adjacent, social housing developments built in the 1960s. They're made up of large housing blocks and wide open spaces and, located in the north of Lisbon, far from secondary urban centres, they have few and concentrated neighbourhood services and infrastructures.

The results were presented in a collection of apartment plans, each representing one of the 300 families. The interior space was divided in rooms labelled according to a general function, such as kitchen, living room and bedrooms. For each family, the arrangement and disposition of furniture was registered. In each labelled room it was represented which domestic activities took place, and which family members were usually present at the different times of day, organised in six time-slots: morning, lunch time, afternoon, evening and night (Figure 2). Additionally, each family was characterized according to socioeconomic variables, such as income level, traditional or progressive values, parents' age, children's age and the employment status of the woman.
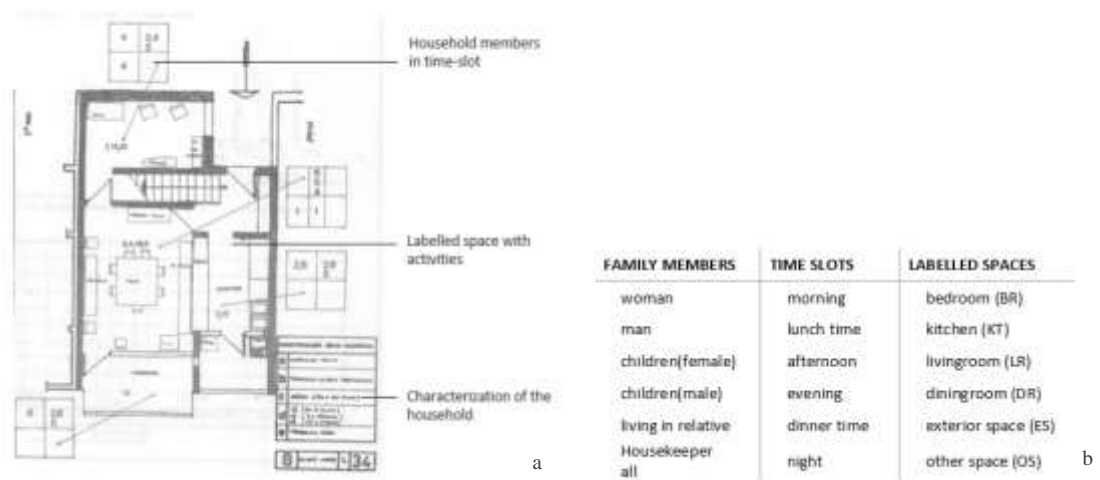
Figure 2 - a) plan of one of the apartment layouts analysed in the Inquiry on Urban Housing, b) categories used for the different variables

The plans published in the Inquiry on Urban Housing books provide information on where domestic activities take place, and where and when household members are usually located in the house. Domestic activities are defined in the inquiry according to previous research (Portas 1969) on essential domestic functions. These were considered to be: *sleeping, prepare meals, normal meals, weekend meals, special meals, general permanence, adult guests, children's play, studying, professional activity,*

young guests, ironing, washing clothes, drying clothes, sewing, particular permanence, adults studying (Figure 5a).

While the aim of this study was explicitly to relate spatial attributes with the way domestic activities are carried in the apartment, this was not fully achieved at the time. Most conclusions pertain to the modes of aggregation of different activities, with some, not thoroughly systematized, information on the relationship between different activities and the area of kitchens. The analysis published in the book is informative of the way of life of the sampled families, providing some sociological results of the inquiries that cannot be learned by studying the plans.

Of particular relevance for the objectives of this paper, are those relating to the role of women in the household. The study concluded that only 20% of the inquired women undertook a professional activity outside the home. Inside, they were the main responsible for all domestic chores (in 68% to 82% of cases). In 9% to 23% of cases they got some help from hired housekeepers, and in 5% to 16% from their children. Neither men nor other living-in relatives contributed significantly to household work. It is also of note that, even though these activities are not discretized in the plans and fall under the general umbrella of general permanence, 55% of families watched tv regularly and 87% listened to the radio. Only 30% of inquired families reported having mutual aid relationships with neighbours, with most indicating family and friends as their major extra-household relations.

2.2. Methodology

Due to its focus on the house as the domestic space and the family as its subjects, the Inquiry on Urban Housing limited its study to the investigation of the changing role of the women in the household as well as on new paradigms of collective life at home, in particular regarding the relationship between children and parents. This paper takes these as a focus point for an exploratory study of the relation between spatial attributes and activities and individuals, conducted in three steps:

1. Data extraction from plans. Digitization of the architectural plans of the 50 apartments in the published document, as well as of data concerning the activities carried out by family members in the domestic space.

2. Spatial analysis of the same plans taking into account:

a) Area values for apartments and labelled spaces. Even though the theoretical volume of the Inquiry on Urban Housing advanced hypothesis regarding the reflection of a series of spatial attributes in patterns of space use, area was the spatial attribute most systematized throughout the analysis, as well as the one attribute consistently studied across social housing research at the time.

c) Depth, both with outside as the origin and between labelled spaces calculated through the construction of accessibility graphs. Depth has been showed to relate with the way spaces are perceived by those who know them and use them regularly. Bafna

and Chambers (2014) have successfully related it to the frequency of sedentary activities with social and incidental participation.

b) Integration, calculated through the construction of accessibility graphs between spaces as labelled in the plans. The genotype analogy (Hillier and Leaman, 1974) has consistently showed the importance of the measure of integration in the study of how cultural patterns are reflected in housing layouts (Hillier et al. 1987, Hillier 1996, Hillier, Hanson 1997). Monteiro (1997) found patterns in the ordering of integration values of activities across a sample of Brazilian houses, as well as variations related to social class. Amorim (1999, 2001) has applied the genotype analogy to modernist buildings in Brazil and found configurational consistencies.

3. Organization and preliminary analysis of the gathered data through exploratory data visualization: Descriptive analysis of the available data on family members and activities' distribution in the domestic space, allowing for the understanding of the type of activities (individual, services and collective) that more often take place in different types of labelled spaces, the amount of time spent in the house and type of room by each family member (3.2.1.) and, finally, the ordering of average integration values of different activities, rooms and household members (3.3.1).

The analysis and subsequent interpretation took into account three important limitations of the dataset:

1. It is not clear what the identification of family members in spaces in time-slots means regarding the regularity of that occurrence. It is not possible to know if convergence of family members in the same labelled spaces and in the same time-slots indicate co-presence.

2. It is also not explicit if the "all" category is a representation of all family members at the same time, or a substitute for signalling all individual family members.

3. Most non-spatial information from the inquiries – notably who performs which activities - was never fully published. As a consequence, it is possible that potential interesting interpretations are being missed, or can only be advanced as hypothesis.

3. RESULTS

3.1. Description of the dataset

The 300 families represent 6% of the universe of the 4 neighbourhoods. Selected for representability, these should be families from different socioeconomic classes that lived in normal conditions, that is, couples with children, excluding those with living in guests, those sharing an apartment with another couple, excessively large families for the allocated apartment, and socio-professional outliers. These should also allow for the analysis of plans with a wide range of different spatial attributes.

The sample is unevenly distributed through the four neighbourhoods, both in the amount of inquired families and in their socioeconomic characterization (Figure 3a). However, it doesn't seem that the spatial attributes of the apartment plans are either consistently related to social class by showing

similarities across the sample, or influenced by neighbourhood and break the sample in considerably different sets.
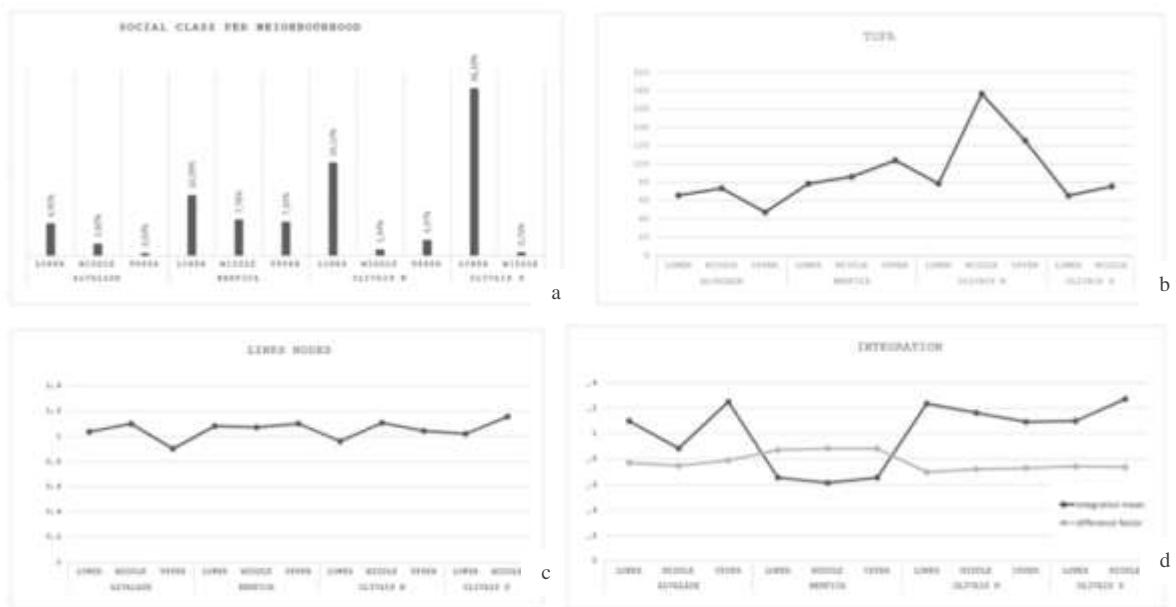

Figure 3 - a).percentage of the total number of cases in neighbourhood and class, b) mean total useful area per neighbourhood and social class, c) mean link-node ratio per neighbourhood and social class, d) mean integration values per neighbourhood and social class

Regarding socioeconomic characteristics, Figure 3b. shows that class differences don't translate in steady differences in the total useful area of the apartment layouts. In combination with Figure 3c suggesting an inconsistent relation between apartment area and openings between rooms, it may indicate that larger houses don't consistently have more transition spaces. Regarding integration values, it is notable that Benfica, where most of the apartments are for two-storey apartments, has much lower average values of integration than any of the other neighbourhoods (Figure 3d).

3.2   Preliminary house use and spatial attributes

   3.2.1.   General patterns of room use

In order to identify the places where variation might be related to spatial attributes, activities were first placed according to labelled space (Figure 4.3). The activity of *sleeping* establishes the most consistent activity-labelled space relationship, almost always taking place in spaces labelled as bedrooms. It is possible to identify a set of activities that happen between living rooms and bedrooms. These are mostly activities that take place during the family's free time at home, which might assume varying levels of desired interaction with others and which may, consequently, tell us something about (1) the collective life of the family, as well as the relationship between children and parents. Children may *study* by themselves in bedrooms or be aided by adults in livingrooms and kitchens, or otherwise lack an adequately quiet place to work; family members may spend their leisure time in their own bedrooms, or together in typically social areas of the house. Contrarily to *studying*, work-related activities often

take place in livingrooms in opposition to bedrooms. The last subgroup pertains to different kinds of meals, which mostly place either in livingrooms or kitchens.
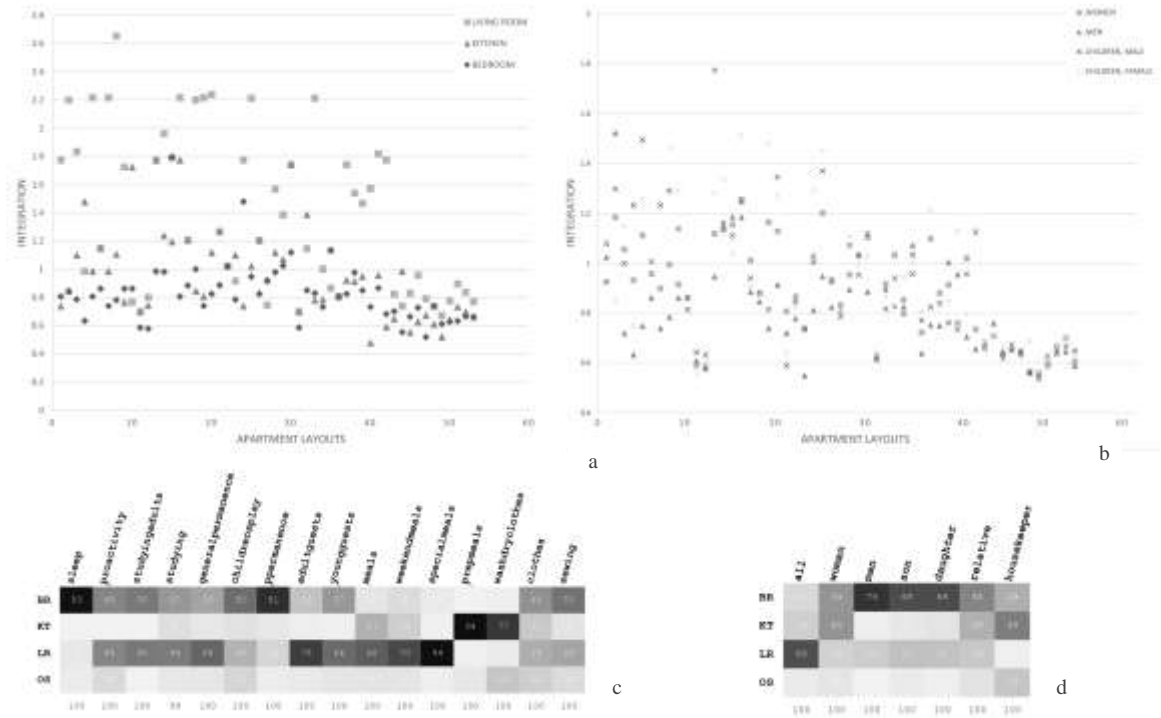
Figure 4 – a) mean integration value of three types of labelled room by apartment layout, b) mean integration value of household members by apartment layout, c) percentage of total counts of activity that takes place in labelled room, d) percentage of total times household members are registered in labelled room

In addition to activities in space, the inquiry also provided data on household members in labelled spaces throughout the day (Figure 3.4). Here, there seem to be three different categories of household-use patterns. The first groups men and children, who spend an average of two thirds to three quarters of their time at home in bedrooms, and less than one fourth of it in livingrooms. The second pertains to women, who follow a different pattern of household use from men and children. They divide their time at home mostly between bedrooms and kitchens, spending only a small percentage of their time at home in the bedroom. It's also of note that only living-in relatives spend a considerate percentage of their time at home in kitchens apart from women. However, as it was indicated before, living-in relatives don't offer any significant help in domestic chores. The third group relates to when all household members are registered as being in the same labelled space in the same time slot. Families gather together in livingrooms around two thirds of the time and, curiously, kitchens (where a lot of meals take place) and bedrooms (which might have been more private spaces) show similar results to each other.

3.2.2. Activities and integration values

When ordered by integration, activities show a pattern consistent with previous research conducted by Monteiro (1997), on the ordering of domestic activities by integration in Brazilian houses. In her study, Monteiro gathered space use data on 101 houses from 3 neighbourhoods in order to understand how different groups of activities reflected social and cultural concepts of spatial distribution within a dwelling. The neighbourhoods represented different spatial attributes and social classes. The activities considered were defined based on a different set of studies, but a parallel can be drawn with those from the Inquiry to Urban Housing as indicated in Figure 5a. No correspondence exist for *dating, washing the face, taking baths, making love, going for a stroll, drinking beer, shopping, doing special tasks.* While *playing with children* was initially considered by Monteiro an extended chore and *watching tv* passive leisure, empirical data showed these were more often considered as interactive leisure.

ACTIVITIES (MONTEIRO)		ACTIVITIES (IUH)
private needs	sleeping	1) sleeping
extended chores	working	9) professional activity
		19) adults studying
passive leisure	studying	8) studying
	reading	
	listening to music	17) particular permanence
	watching tv	
interactive leisure	playing with children	7) children's play
	chatting watching tv	5) general permanence
		16) young guests
	meeting friends	6) adult guests
communal needs	having lunch	3) regular meals
	dining	18) weekend meals
		19) special meals
Household chores	ironing	10) ironing
		15) sewing
	washing clothes	12) drying clothes
		12) washing clothes
	cooking	2) preparing meals
	washing up	

a

b

ALL SAMPLE

c

*Figure 5 – **a)** table of activities, showing correspondence between Monteiro (1997) and the Inquiry on Urban Housing (1984), b)activities ordered by integration in Monteiro (1997) and c) activities ordered by integration in the Inquiry on Urban Housing*

While differences are to be expected for studies carried out with different methodologies and on different demographics, the results of the two, as shown in figure 5b and figure 5c, present consistent similarities.

As in Monteiro, *meals* are the activities which take place in rooms with the highest average levels of integration. They are followed by *general permanence*, which takes place in the same relatively integrated rooms as the activities in Monteiro's study that would be encompassed by this more general term, such as *watching tv, chatting* and *listening to music*. *Sleeping* appears at the end of both charts, around the 0.8 integration mark.

There is, however, a notable difference in the integration of *cooking*. Because *cooking* is a fixed activity, meaning it has to take place in a determined appropriately pre-equipped room, this seems to point more towards a difference between the Portuguese and Brazilian apartment layouts than it does to a question of choice of use. Another notable difference can be verified in the integration levels of *studying*, which being one of the better integrated activities in the Inquiry to Urban Housing, is at the lower end of Monteiro's integration chart. However, as Monteiro doesn't differentiate between *studying* and *adults studying* it is not possible to know the significance of this difference.

It is also worthy of note that while similarities between the Inquiry to Urban Housing data and Monteiro's research appear clear when the two samples are considered in their entirety, these don't hold up when the samples are divided according to socioeconomic class. While these correspond to different types of housing layouts in Monteiro, it has been shown in section 3.1 of this paper that no consistent spatial differences in lower, middle and upper class apartments seem to exist in the Inquiry to Urban Housing apartment layouts. Without access to more detailed information than that provided by Monteiro (1997) regarding the socioeconomic characterization of the families in public housing, middle class flats and middle-class housing, it is not possible to attempt a true correspondence.

However, class differences do exist in the data that suggest that some of the variation in the way activities are distributed in apartments across samples might surpass spatial differences. An example of this is that while kitchens are not larger or more integrated in lower class apartment layouts - in fact, cooking is one of the less integrated activities for this class - a larger variety of activities seem to be distributed between the living room and the kitchen. On the contrary, while kitchens are one of the most integrated labelled spaces in middle class apartment layouts, these seem to mostly use these spaces for those fixed activities that can't take place anywhere else in the house. Instead, and similarly to upper class families, activities with varying degrees of socialisation take place in less integrated living room and the bedrooms.

An ordering of average integration values might or might not translate into a consistent ordering of activities in each type of apartment. Figure 6a shows that some sort of pattern exists for the activities of *eating, sleeping* and *general permanence*. *Sleeping* clearly shows consistently lower values of integration, consistent with those verified for bedrooms and concentrating bellow 1 integration mark. *Meals* and *general permanence*, which both often take place in living rooms, present much more similar integration values. Still, it is possible to recognize a tendency for meals to take place in more integrated

spaces. While there seems to exist a recognizable pattern in the ordering of activities per integration value within each apartment scheme, these don't show consistent gaps between values.
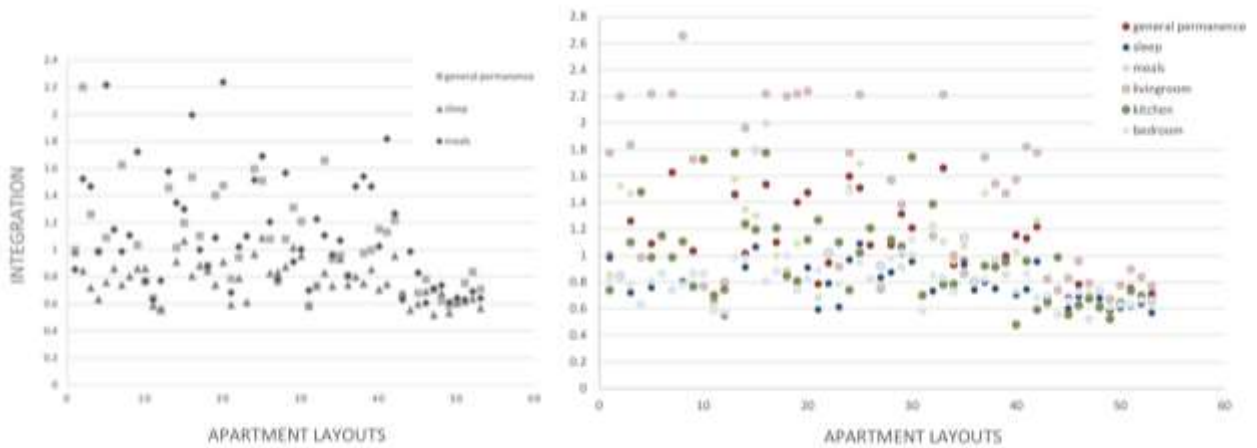

Figure 6 – a) mean integration value of three examples of activities by apartment layout, b) mean integration values of three examples of activities and of three rooms where these often take place

In parallel, there is lack of correspondence between average integration values of labelled rooms and activities that is exemplified in figure 6. While an activity like *sleeping,* which occurs with very little exception in one type of labelled space, the values of integration associated with other activities – such as the high values of *meals* in figure 6 - seem to be independent of any particular type of room. This may indicate that spatial characteristics are favoured over any specific label for the exercise of certain types of activities. In the future, it will be interesting to investigate how much variation in the integration of activities corresponds to the general architectural function assigned to rooms, how much of it relates to preference regarding different spatial attributes, and how much of it either surpasses or has to do with cultural and class differences.

4. CONCLUSIONS

When the Portuguese Laboratory of Civil Engineering started experimenting with methods for relating empirical data with spatial attributes in the late 1960s, it aimed not only at understanding how families lived the domestic space and thus to facilitate the development of housing adapted to a transforming society, but also to provide architects with tools that should make it possible to confront their objectives with potential outcomes of their work. Even though the analysis of the Inquiry on Urban Housing was not taken as far as ideally intended at the time, it proved that an analysis not taking into account extensive spatial attributes was already capable of giving clues of the way families lived that are indicative of patterns of space use associated with those questions that concerned social housing development at the time.

For example, livingrooms, for their capacity for functioning as spaces of reunion and co-presence, appeared as likely spaces of (1) sociability in the household. However, while these were the spaces most often used for the reunion of the entire family, bedrooms were as often preferred spaces for activities with social potential. As these were registered to be spaces more likely for individual use, the type of

sociability in the household seemed to be reflected both in the amount and frequency of inherently social activities, as well as the social or individual character of activities such as *meals*, *studying* or *children's play*. Similarly, the differences in the pattern of house use verified in women in relation to other family members should be further explored if (2) the forms of their segregation in the household are to be understood. The inquiries showed them spending a much higher percentage of the day at home in relation to men and children and, shown in the data to be singlehandedly in charge of all household chores, this time was consistently spent in kitchens. This puts a major focus on the integration of these spaces, as well as on the type of relationship established with the other spaces of the house.

If additional work is needed to consolidate some of the hypothesis advanced, the analysis conducted thus far was capable of finding relationships, some of them transversal across different cultures, between spatial attributes of apartment layouts and the domestic activities conducted by families. Taking the analysis further seems likely to tell us something about the relationship between the configuration of spaces and the ways families use them.

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