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DWELLING BEHAVIOURAL PATTERNS

DEFINING HOUSE USE THROUGH SPACE SYNTAX MAPPING

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ABSTRACT

House use is a cultural consequence, and as all others inherent to a society or social group. People in the same social group tend to relate to dwellings and the spaces that compose them in different ways.

This paper's aim is to understand different house uses by analysing a dwelling occupied by a nuclear family – parents and children of different ages. The focus will be individual use inside the household and dwelling to understand the relation between a family member's role in that social structure and its use of the domestic space. The aim is to create maps that correspond to individual behavioural patterns and to define if a person's role in the household is indicative of or conducive to a certain pattern. To achieve such goal the research draws upon space syntax theory, namely visual graph analysis (VGA), that enables the drawing of graphs that represent a use map of the dwelling. VGA is the chosen method as it consists of a simplified representation. The creation of the graphs will be accomplished via direct observation of dwellers routines and by inquiry.

The results show that, although there are common spaces, different people tend to use different spaces in the dwelling, in fact that certain members of that family structure don't use or go in some spaces or rooms and that use is a direct result of the role they play inside the hierarchized household unit.

KEYWORDS

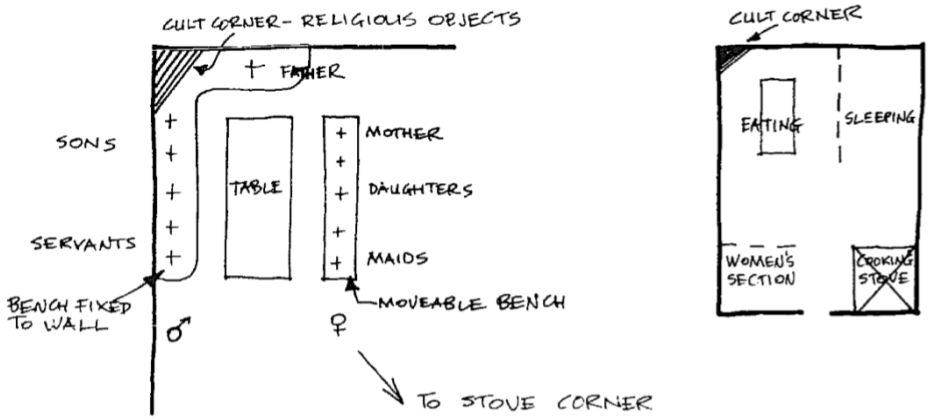
Space Syntax, Behavioural Patterns, Environmental Psychology, House Use, Mapping and Visual Graph Analysis

1. INTRODUCTION

Dwelling is a fundamental feature of human life and though it relates to a basic need it also entangles social meanings and depicts social codes. As Rapoport (1969, p. 46) stated, *building a house is a cultural phenomenon, its form and organization are greatly influenced by the cultural milieu to which it belongs*. Considering the *Family* as an important social cell, it is important to analyse house use and behavioural patterns of its different members to understand how the role one plays and the hierarchy of the household both influence how one relates to space, the domestic and intimate space. *In an emblematic sense the organization of space thus in small scale depicts the structure of the total*

society of the people concerned. It reflects a concentrate of all observable relations between the different generations, age groups, classes of the community, kin, and the division of labour between these (Ränk *Apud* Grøn, 2014, p. 30-31).

Throughout time and cultures, house use and space allocation (and functionality) have been determined by people's role in the household and space division has been based on gender or family's hierarchy. Rapoport (1969) dissects several traditional houses and different cultures where *(...) hierarchies in the use and allocation of space* took place, one of which the medieval eastern and central European home (fig. 1). According to this author, *(...) inside the dwelling, symbolic attitudes account for the prevalence of symbolic space distribution in the house (...)* Rapoport (1969, p. 54). Edgü and Ünlü (2003) also stress the symbolic and behavioural facet of the home.



(fig. 1) Dining table and dining room arrangement.
In RAPOPORT, Amos – *House Form and Culture*. p.54

Eleb and Debarre (1989) describe domestic space arrangements according to gender in the 17th century. *Man and woman lived separate lives, a consequence of the marital norm of the time – arranged marriages, family alliance: the fissure between the couple leads to the splitting and segregation of their intimate quarters* (Moreira and Farias, 2018, p. 4).

In the 20th century, Modernist architecture sought to convey and call attention to social and cultural aspects and ways of live. Mirroring social changes a new housing model came to light and was maintained until today, where a woman's role was no longer that of housewife or lady of the house, but a working member of society, perceived as equal to man (in society and in the family); the individual gained relevance and a private space for each person became paramount (Moreira and Farias, 2018, pp. 8-9); and the home became more democratic and a place for the family, not for the outside, more private and intimate. This model carried to present time – that of the house and of the family.

2. DATASETS AND METHODS

The paper focuses on house use and behavioural patterns and proposes an analysis of a single family's dwelling, a nuclear family of 5 – mother, father, three children of different ages, from 6 to 17 years old[1]. The goal is to ascertain whether the role a family member plays – parent *vs* kid, older kid *vs* younger kid, wife *vs* husband – is indicative of or conducive to a certain behavioural pattern and space use.

The study was conducted by way of inquiry and observation of the family's routines: an inquiry to all members individually so to register daily paths and tasks; observation by standing in the family's home while they experienced an ordinary day, performing usual tasks. For the present paper house chores were disregarded since it would be erroneous to map a person's trail executing such tasks when the purpose is to understand a behavioural pattern and effective house use[2]. Once the information was gathered a space syntax Visual Graph Analysis (VGA) was performed: different justified graphs were drawn to support substantiated results, with emphasis on integration (RA) and depth readings. The use of space syntax in such an investigation is considered pertinent and, as Hanson (1998, p. 270) advocated, a mean of understanding *household practices, inter-personal behaviours, domestic habits and routines (...)* reaching out to *(...) related disciplines such as sociology, anthropology and psychology in addressing the social and personal interpretation of domestic space*.

The family that composed the case-study is a nuclear family of five members – parents and three offspring. Both the parents are middle aged (40´s) and have a professional activity outside the home. The father works longer hours than the mother, arriving at home only at dinner time, as opposed to the middle of the afternoon for the mother. Nonetheless, the mother leaves for work earlier, taking the second oldest kid in the morning. The youngest child (6 years old) is taken to school by the father but returns home with the mother more frequently, as does the middle child (14 years old). The oldest child (17 years old) is somewhat independent and leaves for school alone and returns home on his own, remaining, in most days, alone in the dwelling for major part of the afternoon.

The dwelling (fig. 2) is a two-storey four-bedroom apartment is the outskirts of Lisbon. In the first floor are a hall, kitchen, common living room (living and dining), three bedrooms and three bathrooms (two of which are ensuites). The second floor consists of a craft room, a game room, one bedroom and a bathroom[3].

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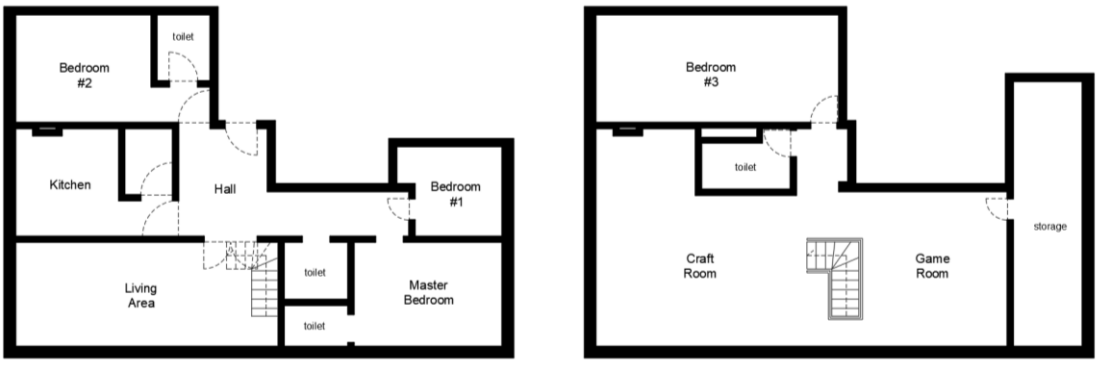
[1] Two sons – 14 and 17 years old – and a daughter – 6 years old.

[2] The domestic activities considered encompass sleeping, hygiene, cooking, eating, leisure and working.

[3] When conducting the space syntax analysis two storage spaces were disregarded: the kitchen storage that was considered to be part of the kitchen as a whole and the second-floor storage that is rarely used and is in a squat roof space.

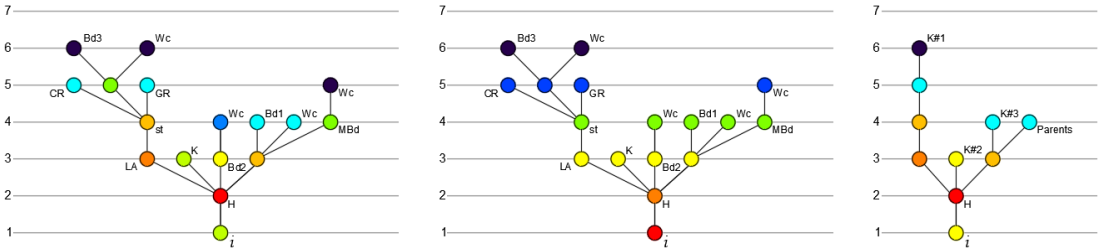


(fig. 2) Dwelling layouts

As for living arrangements, the parents take up the master bedroom, the youngest child (daughter) bedroom #1, the middle child (son)'s room is bedroom #2 and the eldest (son) appropriated bedroom #3 in the second storey.

3. ANALYSIS AND RESULTS

Before focusing on behaviour patterns and routines, it is necessary to firstly analyse the dwelling's layout through VGA, in order to understand spatial distribution and the social group's interaction and development potential. Graphs here presented (fig. 3) focus on measures of integration (RA) and depth.



(fig. 3) VGA – dwelling's integration (RA) and Depth; integration (RA) of the sleeping arrangements using AGraph software

Regarding integration, the hall is the most central space since it distributes to most of the spaces that the dwelling is comprised of. Second to the hall comes the living area. It is interesting to realize that the master bedroom shows a mean value of integration due to the ensuite; however, if we consider the master bedroom as the sum of bedroom and toilet (and do the same to Bd 2), the master will show the same degree of integration as bedroom 1 and the detached bathroom. The most segregated spaces of the dwelling are bedroom 3 and the adjoining toilet. This space distribution allows the social spaces (entry hall, living area and kitchen) to have higher values of integration, *i.e.*, centrality, segregating and privatizing the more intimate spaces, the bedrooms (apart from bedroom 2 that is greatly integrated). Depth results are consistent with the latter reading: the deeper you go in the structure the more private spaces become (the previous exception also applied).

The third graph shows integration of the sleeping arrangements[4], presented as a simplification of the first one, so to more clearly be apparent the relation between individual private spaces (bedrooms) and their significance in the dwelling. It is noticeable that the daughter's bedroom is closer to the parents' (both with the same degree of integration inside the unit), implying a more dependant social relationship. The middle child's private space is somewhat central in the system but somewhat apart from the parents-daughter unity; whereas the oldest son's room is the most segregated space, the furthest from the entrance point and the furthest from the parents' bedroom, indicating a more independent living and of more difficult control from the parents' point of view.

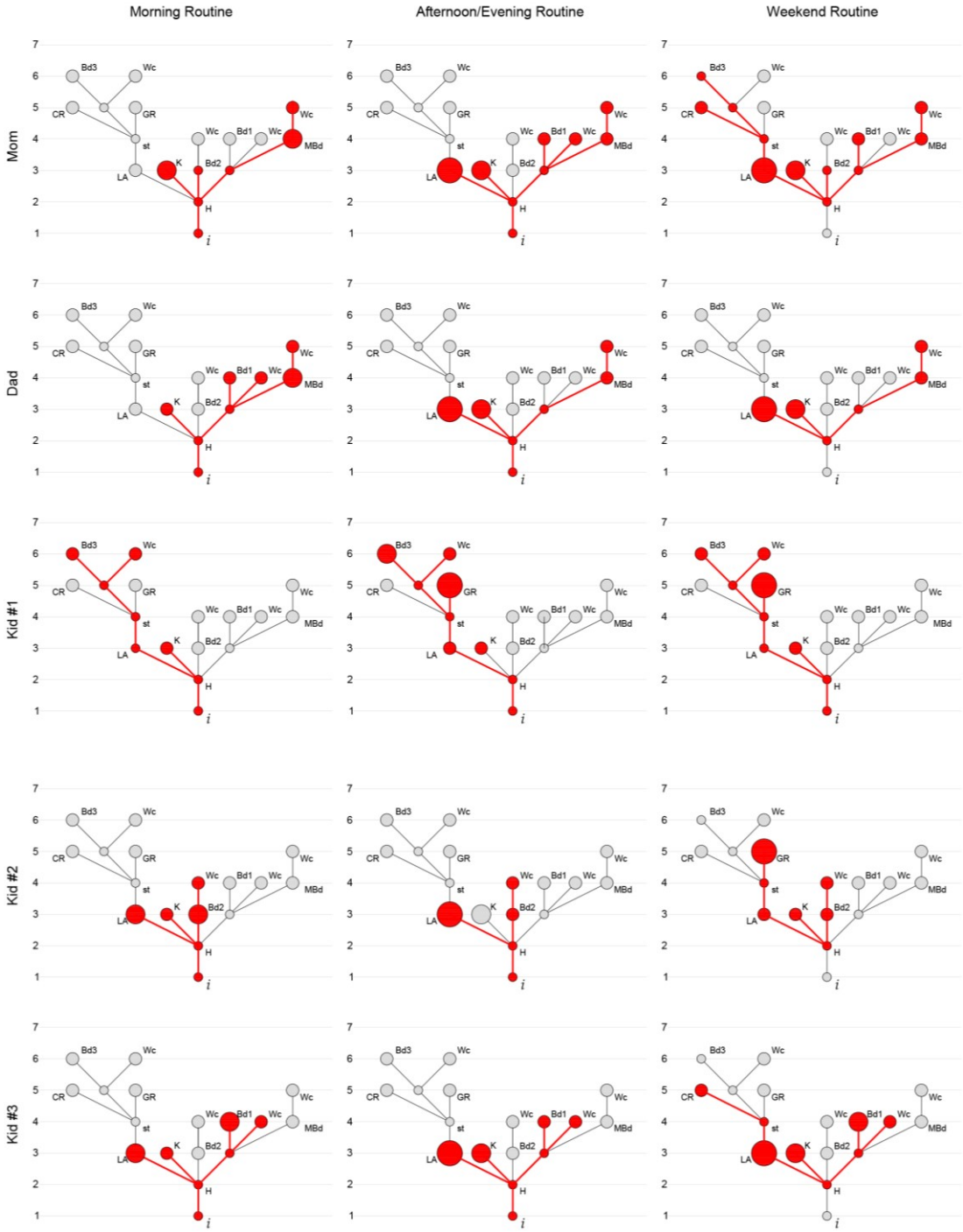
This first analysis reveals the potential of space and the behaviours that the current layout can potentiate. To fully understand the modes of living it is necessary to conjoin the data collected in the interviews and the direct observation regarding daily routines – week day (morning and afternoon/evening) and weekend[5]. The referred data was transformed in justified graphs (fig. 4) that account for everyone's trail in the dwelling, thus demonstrating each person's routine and behavioural pattern. Each space in the graph was drawn according to time spent therein: smaller nodes correspond to walkthrough only spaces and bigger nodes show the gradation of usage.

When analysing foremost the parents' routine, it is apparent that on weekdays it is quite similar, either in the morning and the afternoon/evening. The only difference is that the father tends to the daughter in the morning leaving the mother in charge for bedtime[6]. It is remarkable to realize that during the mornings, both parents only wander through the spaces in the first-floor bedroom-kitchen 'wing' (right-hand side of the graph). In the afternoon/evening, house use is extended to the living area, which both declare is the place where more time is spent at that time of day. During the weekends, the father's routine is much the same as weekdays evening, with a very small trail, only using three spaces[7] - Master Bedroom, Kitchen and Living Area -; whereas the mother expands her house use and stays in more spaces at different times of the day – Master Bedroom, Kitchen, Living Area, Daughter's Bedroom and Craft Room[8].

The youngest child, the six-year old daughter, shows the same pattern in the morning and in the afternoon/evening on weekdays, which is also a very similar pattern to the parents', which is indicative of a limited use of the dwelling or a very limited scope of domestic activities[9]. On the

[4] The kid's rooms are not only a space for sleeping but also studying and playing (work and leisure). The kitchen, toilets, game room and craft room were disregarded, but the number of spaces between the bedrooms (that act as transition spaces) were maintained.
[5] The research divided weekly routines from weekend ones because on work/school days house use is more reduced whereas during the weekend the family has the possibility to enjoy the home to its fullest extent and possibility.
[6] The mother also goes into kid#2's bedroom just to check if he's awake.
[7] Disregarding transition spaces that only serve as passageways or connectors.
[8] The mother also enters both sons' bedrooms but only to make sure they tidy it. In the daughter's bedroom she effectively spends time when playing with her.
[9] Due to her young age, apart from hygiene related tasks, she tends to gravitate around the parents or siblings, not developing *per se* an individual activity.

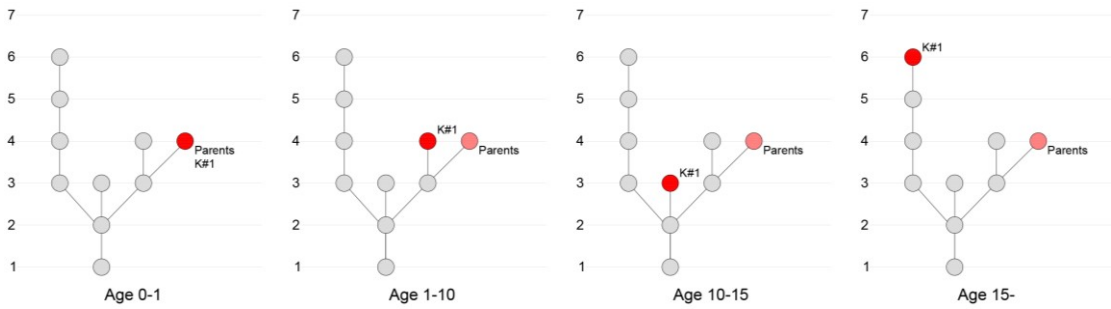
weekend, she broadens house use to the craft room. When overlapping the daughter's pattern and the mother's it is noticeable that they are mostly coincident (especially if we ignore the mother's path into the sons' bedrooms that involves no stay in them). During the interview, the mother recounted the daughter's routine: *During the weekends she tends to follow me around, where I am she is*; which accounts for the overlapping.



(fig. 4) Justified graphs representing daily routines and house use by family member and time of day/week
(i-entry, H-Hall, LA-Living Area/Room, K-Kitchen, MBd-Master, Bedroom, Bd-Bedroom, WC-Toilet, GR-Game room, CR – Craft Room; kids are numbered according to birth order – from the eldest [1] to the youngest [3])

The middle child appears to be the person with the most limited and condensed use of the dwelling as the graphs demonstate. This is due to the fact that his bedroom and the living room, two of the spaces he mostly uses, are on very shallow levels of depth and have only one transition space between them. On weekdays, mornings and afternoons/evenings are much the same only shifting the importance of the spaces – bedroom as the space more frequented in the mornings and living area in the afternoons/evenings. As two of the previous family members, on the weekend his reach grows bigger and he uses the second-floor game room, where he states he spends the most of his time.

Lastly, the oldest child, the teenage son, presents almost the opposite house use than the parents, circulating and remaining only in the spaces on the left-hand side of the graph. He is the only family member whose three graphs are exactly the same, demonstrating the same pattern of behaviour either on weekdays (morning or afternoon) or weekends. The only thing that differs is the amount of time spent in the spaces. The pattern made visible by the graph is consistent with the integration analysis made earlier: this person has a more independent living, almost separate from the rest of the family. Regarding this aspect it is interesting to analyse the older son's sleeping arrangements' evolution (fig. 5): his first bedroom was his parents', then he was moved to the adjacent one, to be close to them; after a few years and with the birth of the youngest one both boys were moved to Bd 2 and now each has their own room and the eldest occupies the one more secluded, located in a different floor.



(fig. 5) Evolution of the oldest son's sleeping arrangements throughout his lifetime

Comparing everyone's weekend house-use and behavioural pattern it is noticeable that, apart from rest and hygiene related tasks, the social and leisure activities don't occur in the same space for all family members. A clear cleavage exists: the parents and the daughter tend to use the common living area while both sons prefer to be apart, using the game room. This separation is symptomatic of the need for privacy and the teenage desire for independence from the progenitors. In opposition, the coincidence of usage between the daughter and the parents (essentially the mother) is indicative of the craving for closeness and togetherness consistent with her early age.

Another important finding is that the reach of the parents inside the dwelling, especially the mother's, is far greater than of the children. The latter present patterns that encompass their bedroom (to each his own only), living area(s) and kitchen, their paths and routines don't involve entering our using each other's bedrooms or toilets, while the parents' pattern is broader and there is a sense of the whole dwelling and not just certain spaces.

4. CONCLUSIONS

The commitment of the paper is to verify familiar house use and behavioural patterns. The initial hypothesis was that different people tend to use domestic spaces differently and at different times and that this use is influenced and conditioned by the role one plays inside the family's hierarchy. As per Grøn (2014, p. 34), (…) *human spatial behaviour is regulated by a series of syntax elements. These constitute the relative distance between individuals, their orientation and attitude relative to each other, their orientation in relation to and their relative distance from elements in the dwelling space (...).* In the same line of thought, Edgü and Ünlü (2003, p. 82.3) defend that (…) *the role of parents with each other, parent – child relationship, the presence or absence of an extended family structure, and numerous other features of family life are easily visible in the spatial formation of houses.*

The conducted analysis is consistent with these viewpoints and a confirmation of the hypothesis put earlier in this paper. The focal question is that space and space distribution is conducive to behaviour[10], different layouts potentiate different appropriations and that each individual, influenced by their hierarchic status, relates to space in their own way. In Hanson's (1998, p. 13) words, *(...) the internal organization of the space of the dwelling presents a fairly precise map of social relations of the members of the household.*

An important feature of house use is the need and search for privacy, which differs for each family member as the results have shown: the teenage boys demonstrate a greater demand for privacy and seclusion, preferring spaces where they can be alone, while the daughter does seem to orbit around the parents. As Alitajer and Nojoumi (2016, p. 342) have realised, *(...) privacy needs vary within individuals at different times and within cultures at different historical periods because of changing social customs and taboos*. These two authors also relate the quest for privacy to a response to power, as a mean of attaining balance, which is exactly what the analysis shows – the teenagers have based their leisure activities in a space separated from the common living area, where the parents have their laze, escaping their control. This separation of leisure spaces (increased by the difference in storeys) doesn't integrate the sons in familiar activities[11]. As Reis (2003) has put it, *(...) houses can be understood as patterns of organised space, structured according to some social principles, which affect (...) the relationship between inhabitants* (2003, p. 40.1).

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[10] França and Holanda (2001, p.2) refer to this as a *relational situation* and evoke Hillier's *Social Logic of Space* that perceives space as the stage and motor for social relations. Alluding to Peponis, Edgü e Ünlü (2003, p. 82.4) also advocate that *space should be treated as a relational system, in which the spatial patterns not only reproduce or accommodate patterns of behaviours and social relationships, but also generate them.*

[11] During the interview the mother was asked to recount the sons' routine to what she answered: *You need to ask them because I have no idea what they are doing.* This is a perfect illustration of the effects of the referred spatial segregation.

Nonetheless, the attained privacy and independence isn't just demanded by the children at some point but also encouraged by the parents that allow for a shift in behaviour, from an orbital pattern to an individual trail, and permit appropriations of more private individual spaces, as seen with the trajectory of the eldest's son's sleeping arrangements that depicts the increased independence. This is exactly what Hanson (1998, p. 13) described when stating that *(...) as the composition of the dwelling group changes, the use of rooms may change (...)*. In the case of the older son's bedroom, the continuous changes derived not only from increases in the household group (brother and sister's birth) but also from his need for his own private space, which, as the justified graphs of fig. 5 have demonstrated, grew more and more segregated.

Everything considered, it is evident that house use and behavioural patterns are dependant on the household composition and hierarchy and that space layout can potentiate and enhance certain ways of life. The proposed space syntax methodology permitted an adequate analysis of house use and behavioural patterns but it falls short on allowing for an understanding of people's social relations and interactions during the routines: using this method it is possible to realize that two or more people in the household use a certain space but it isn't possible to represent at the same time the activities they are performing, which means that two people can occupy the same space but they don't necessarily need to be doing the same thing together or acknowledge that there is another person present[12].

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[12] In the present technological era it is frequent to have several people in the same room all connected to an *iPhone*, *iPad* or other device without any interaction between them, being together but apart.

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