

Space use conflicts in cramped dwellings

A comprehensive analysis of Portuguese households

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Abstract

With a proper design, domestic furniture may enable a more flexible use of dwellings, helping to solve use conflicts that arise from household dynamics. But which are dwellers' activities that face more use conflicts or constrains?

To answer this question, a comprehensive approach was used including interviews with dwellers and analysis of their dwelling space. Nine households of five different types were studied. All of them lived in small and congested houses. The interviews and analysis focused on dwellers needs and space use conflicts.

The main conclusions are that activities that face more constrains are (i) being in private, (ii) receiving guests and (iii) storage of personal objects & clothes. In cramped dwellings social areas are compromised, creating serious difficulties to daily life group activities. These results enlighten relevant challenges to furniture design.

Keywords: Furniture, Dwelling use, Flexibility, Portuguese households

1. Introduction

At some moment of a household life cycle, the dwelling becomes unsuitable to accommodate its needs (Guerra, 2000). This is the trigger to either change the household arrangement or start searching for a more appropriate dwelling. To avoid these situations, there have been various architectural proposals of houses that enable dwellers to adapt spatial organization according to their changing needs (Paiva, 2002; Hertzberger, 2005; Schneider & Till, 2011). Furniture may also provide a flexible use of domestic space (Morellup, 2001; Lemos, 2006).

To better understand how to design furniture that provides a flexible use of domestic space a research is being conducted. This research is organized according to the "design thinking" methodology (Cross, 1982). In the first phase ("empathy") the study focused on understanding contemporary housing context and on collecting examples of space-saving objects. The second phase ("definition") aimed at analysing the use of dwellings and to identify which are the activities that face more space use constrains. Phase three ("ideate") will use the results of previous phases to come up with creative solutions. Phases four and five will be devoted to prototyping and testing.

This paper presents the results of phase 2. The following section explains the research methodology and Section 3 presents the results. Section 4 describes the conclusions.

2. Materials and methods

This study was developed according to the following methodology: selection of household types, development of an interview protocol, interviews, and data analysis.

2.1 Household types

Household structures are multiple and vary along time. Therefore, we chose to study five types of households: i) couple, ii) couple with children, iii) mono-parental, iv) bi-cephalous, and v) co-inhabitation. Bi-cephalous households are those that include two or more family nuclei (e.g., grandparents and parents living in the same house, couple with children sharing a house with another person not related). Co-inhabitation households are those formed only by non-related persons. A family nucleus is a couple with or without children, and a single parent with one or more children (UN, 2013).

To select the households for the study we adopted the method of "extreme user". This method is used in "design thinking" methodology because: i) an idea that suits an extreme user will nearly certainly work for the majority of others, and ii) extreme situations expose clearly needs and can spur new thinking. Therefore, interviews focused on families with space use constraints. For each type, we selected households that lived in small congested dwellings using the "snow ball" approach. Having chosen multiple household types, with distinct dynamics, we could observe various spatial constraints.

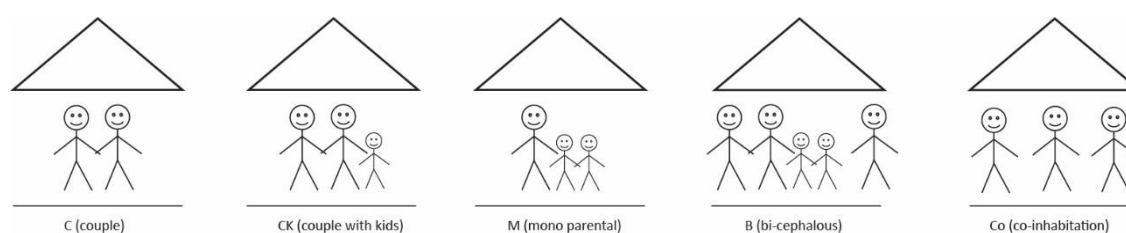


Figure 1 – Types of households. Picture edited by authors.

2.2 Interview protocol

Interviews aimed at:

- describing individual and group activities in the dwelling;
- identifying space use conflicts;
- finding strategies to solve existing conflicts.

The use of the dwelling was classified in ten main domestic functions (Pedro *et al.*, 2011): sleeping, cooking, eating, living, playing/studying/working, clothes care, personal hygiene, circulation,

domestic management, and being outside in private space. Each function combines several activities. Who, where and when each activity is takes place depends on household routines. During some periods of the day several activities are going on. Space use conflicts arise when simultaneous activities overlapped or demand different environment conditions.

Since there were many domestic activities to ask dwellers about, the interview protocol was designed to engage dwellers to talk about their daily routine. A relaxed environment, allowing dwellers to interact with each other, was pursued. An initial interview protocol was tested with three households. All households were responsive and enthusiastic about a "*game on their way of using their dwelling*". However, to shorten the procedure some simplification were introduced.

The final interview protocol was divided into two parts: first, a group interview with all the members of the household, and then a separate interview with each member of the household about his/her personal routines.

The group interview was based on a house activity map. It began with one member of the household drawing the plan of the dwelling in an A3 plain paper. Then, the household members together identified the location of the main domestic functions (Figures 3, 4 and 5). Complementary questions about actives carried out in group were asked.

Individual interviews took place separately and focused on the point of view of each adult member of the household. He/she was asked several questions about each domestic function. Coloured post-its, labelled with the domestic functions, were provided so that the participants could point in the dwelling plan the location of the function he/she was talking about. Each household member placed his/her post-it's in a separate film layer to allow the visualization at any time of the clean dwelling plan or the overlapping of all contributions.

2.3 The interviews

Nine interviews were carried out: couple (1), couple with children (1), mono-parental (2), bi-cephalous (3) and co-inhabitation (2). The first author of the paper carried out all the interviews between January and June 2014. The households structure is presented in Table 1.

Since this is an exploratory study and aims a comprehensive approach, nine interviews were considered sufficient. The interviews enabled us to observe distinct approaches to the use of space. We could also observe and interpret enough significant space use constraints and conflicts to provided relevant clues for the subsequent phase of *ideation*. The sample of households interviewed is not representative of the Portuguese population.

Table 1. Household type, composition and number of rooms of the dwelling.

ID	Household type	Members	Dwelling
C1	Couple	One couple	1 bedroom
CK1	Couple with kids	One couple, one child	1 bedroom
M1	Mono parental	One adult, one child, two teens	3 bedrooms
M2	Mono parental	One adult, two children	1 bedroom
B1	Bi cephalous	One couple, two children, one adult	3 bedrooms
B2	Bi cephalous	Two couples, one child	3 bedrooms
B3	Bi cephalous	One couple, one teen, one child, one adult	3 bedrooms

Co1	Co inhabitation	Five non-related adults	4 bedrooms
Co2	Co inhabitation	Two non-related adults	2 bedrooms



Figure 2. Six of the interviewed households: C1, M2, M1, Co2, B2 and CK1 (from left to right and top to bottom).

Interviews were entertaining and pleasant for both the interviewer and the interviewees. They did not last longer than one hour, and after the first five minutes dwellers were fully engaged with the "game".

Interviews triggered conversations among household members and sometimes complaints about other member behaviours. Dwellers imagined themselves doing the activities. Rooms where more activities took place were visually recognised by dwellers. The protocol steered and naturally helped dwellers to recall use conflict that they would not refer otherwise.

2.4 Data analysis

The data collected for each household was organized into:

- a text that describes the household structure, their professional activity and at what time of day they were at home.
- one table for each domestic function that indicates where activities took place and who were dwellers involved.
- a text for each domestic function that describes how, when and where the activities took place, as well as eventual conflicts or constraints that occur.

To summarize the collected data, a table that presents all households and the main conflicts or constraints was arranged (Table 2).

3. Results

This section is organized in the ten domestic function used in the study. For each function, we describe its activities and the main conflicts or constraints identified during the interviews.

The dwelling plans drawn during the interviews are presented in Figures 3, 4 and 5.

3.1 Sleeping

Sleeping comprehends various activities that usually take place in bedrooms, such as: sleeping, resting, private conversations, having intimate relations, reading, watching TV, making the bed, looking after small child, being sick, taking care of sick person, and supporting bedridden elderly.

In general, sleeping areas are private spaces. Sharing them may be the cause for constraints or use conflicts. Sleeping is not seriously constrained by other activities, because household members try not to disturb each other. However, being in private is constrained when the sleeping area is shared with another dweller not romantically involved or when sleeping takes place in a common area of the dwelling:

- Household M1: The mother sleeps with her 12-year-old son in the same bed. She feels the need for privacy for both.
- Household M2: The mother sleeps in the living room in a sofa bed. The need for having privacy while sleeping was identified.
- Household B3: Two brothers share the same bedroom. The older one only brings his girlfriend around when his brother is not there. He claims for more privacy to meet with his girlfriend.

Activities like watching TV or reading in the bedroom, are related to moments of personal leisure, and do not normally interfere with others activities. None of the interviewed households had a bedridden user, so that we could observe the activity of caring for a user with such demands. The activity of looking after a small child demands specific spatial organizations, especially in the baby stage. These spatial demands are related to keeping the space safe and having nearby objects that are directly related with taking care of the baby.

3.2 Cooking

Cooking has two main activity sets: *storing food* and *preparing food & washing up*. Storing food usually takes place in the kitchen, a pantry or an extra area of the dwelling. Storing outside the kitchen is usually used for food and items that are not used every day:

- Household B1: The terrace was covered in order to have extra space for storing and other activities. Some of the furniture in the terrace was used for food storage.
- Household Co1: Food is stored in the kitchen and in a pantry.
- Household Co2: There is extra food storage space in their corridor.
- Household M1: Food is stored in the kitchen and in a pantry.

Preparing food and washing up is usually done in the kitchen. However, when there are outdoor private spaces (e.g., terrace, balcony, private garden) some users enjoy cooking meals there. During weekends or holidays, when cooking and eating can take longer, these places are used for "barbecues":

- Households C1, CK1 and B1: When the weather is warm, they cook barbecues at outdoor private spaces.

Most adult dwellers share the activities of *preparing food and washing up* so that no one is overloaded with these activities. However, in some families the woman is still responsible for these activities:

- Household B2: The two couples prepare their meals at separate occasions. The wife of the older couple is the one who cooks and washes up.

In co-inhabitation households *preparing food and washing up* is divided among dwellers depending on several factors, such as individual schedules and interpersonal relations:

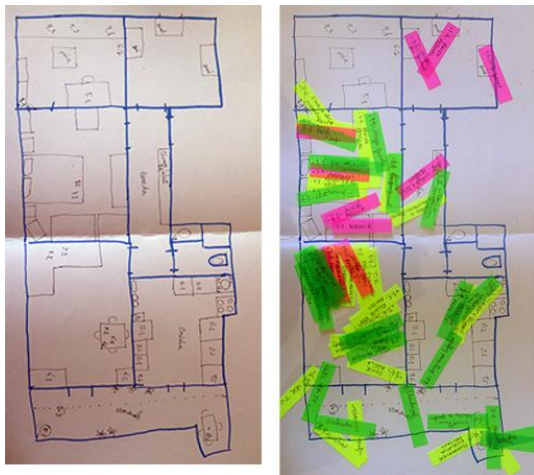
- Household Co1: Some members prepare meals together and others individually. One dweller has mismatching schedules and another dweller has most of his meals outside.



Household C1
One couple

Apartment with one bedroom and two small rooms. Not enough furniture for storing personal objects and clothes.

Constraints: storing personal clothes or objects.



Household CK1
One couple, one child

Apartment with one bedroom and two small rooms. The family added one member to the structure. Now the lack of space for storing is bigger. The living area is overcrowded, leaving no space for receiving guests for eating.

Constraints: eating with guests; storing personal clothes or objects.



Household M1
One adult (mother), two teens, one child

Apartment with three bedrooms. The mother shares the bedroom with the twelve year old son.

Constraints: being in private.

Figure 3. Dwelling plan and house activity maps of households C1, CK1 and M1.



Household M2

One adult (mother), two children

Apartment with one bedroom. They moved from a bigger house and do not have enough storage space. The mother sleeps in the living room.

Constraints: being in private; recreation activities; storing personal objects or clothes.

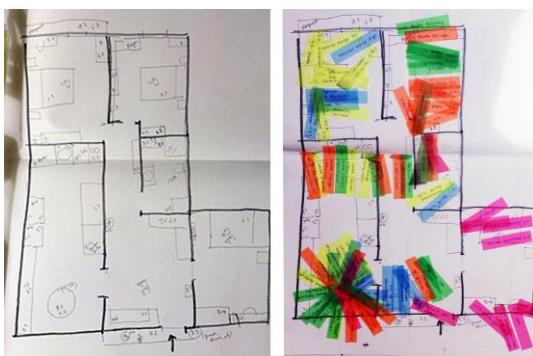


Household B1

One couple, two children, one adult

Apartment with three bedrooms. Indoors there is not enough space for group activities and for cooking.

Constraints: cooking and eating in group.



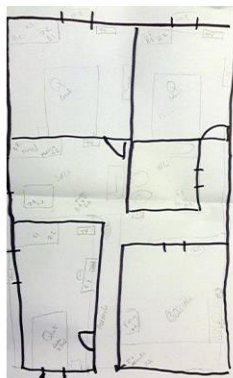
Household B2

Two couples, one child

Apartment with three bedrooms. One bedroom was built-in the living room. Both couples do not have enough storage space in their bedrooms for family and personal belongings. Living room is too small for living in group.

Constraints: recreation in group, eating with guests; storing personal objects or clothes.

Figure 4. Dwelling plan and house activity maps of households M2, B1 and B2.



Household B3
One couple, one child, one teen, one adult

Apartment with three bedrooms. Two brothers share the same room. Older one needs privacy to receive girlfriend.

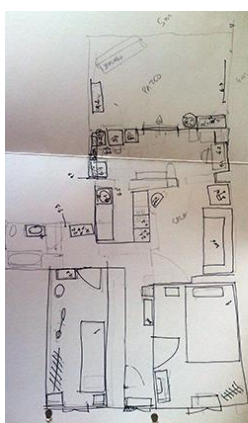
Constraints: being in private.



Household Co1
Five adults

Apartment with four bedrooms. One of the elements does not respect house rules on cleaning.

Constraints: domestic management.



Household Co2
Two adults

Apartment with two bedrooms. Small areas overcrowded with unsuitable furniture. Not enough space for receiving guests, having meals in group and storing personal assets.

Constraints: cooking, eating in group; recreation with guests; storing personal objects or clothes.

Figure 5. Dwelling plan and house activity maps of households B2, Co1 and Co2.

3.3 Eating

Eating has two main activities sets: *current meals* and *formal meals*. How *current meals* take place depend on several factors such as dwellers professional activities, break time for meals, and distance between dwelling and work or school. Depending on these factors, dwellers may have more or less meals at home. Current meals are not formal and each household has its own routines: some dwellers have their meals at different times or in separate spaces (e.g., bedroom or sofa) while other dwellers prefer to have their meals together. During current meals, most households watch TV and talk. Current meals also differ in working and free days:

- Household C1: The couple has different professional schedules and the husband's schedule is rotational. Their current meals are mostly taken in the sofa, watching TV. On non-working days they can spend more time having meals in the terrace.
- Household B1: They do not have space to eat together indoors comfortably. Therefore, in winter weekdays, they eat either in groups or individually, in bed, at the sofa or at a balcony in the kitchen. During summer, when the weather is warm, they eat together in the terrace.
- Households B1 and B3: These households include adult dwellers not related with the main family nucleus. On working days these dwellers arrive late and have meals alone. On non-working days, they have meals together (household B1 can only eat together outside).
- Household Co1: There is not a pattern with respect to having meals. Two dwellers rarely eat at home. The other three dwellers sometimes have meals together, but it depends of matching schedules, which is not linked with working of free days.
- Household Co2: One element of the household is unemployed. Usually her meals take place in the dwelling. When the other dweller is at home, they have meals together, either in a small table at the corridor or, more frequently, in the sofa, watching TV.

In each household, *formal meals* usually involve a higher degree of formality than current meals. It takes place during family reunions or when entertaining with friends. The main goal is to be together while eating. In several of the dwellings the dining table has just enough seats for the dwellers; in other dwellings there are few extra seats for receiving guests:

- Household CK1: The dining table is in the living room. Since the baby was born this room is occupied with tools related with taking care of the young one. There is no longer space to have formal meals there.
- Household B2: The dining table is in the kitchen. There is little space for extra seats and it is unusual to have meals with guests.
- Household Co2: They do not receive guests for meals because there is not enough space.

When the dining areas are too small for meals with guests and there is an available terrace that is big enough to place a dining table, dwellers use this space to overcome this constraint:

- Household CK1: The dining area is in the living room but the space is not enough. The meals with guests take place in the terrace.
- Household B1: Due to space limitations, they only receive guests for meals in the terrace. That is dependent on the weather.

3.4 Living

Living comprehends two main activity sets: *family recreation* and *recreation with guests*. Both have the same sort of activities, however recreation with guests requires more furniture (e.g., extra seats) and eventually some degree of formality.

In general, *family recreation* takes place in the living room. The main activities are having conversations, drinking beverages and appetizers, having coffee and sweets, playing games, listening to music, watching TV and playing musical instruments. Households find their own dynamics to interact among each. Some activities like watching TV, listening to music or playing computer games motivate constraints, but agreements among dwellers ensures living in-group:

- Household Co1: Some of the users enjoy playing music out loud at any period of the day. Every time a housemate complains the volume is immediately turned down.
- Household C1: The husband enjoys watching violent movies on TV whereas his wife does not like violence.
- Household M1: The child enjoys playing console in the living room. The rest of the household complains they want to watch TV. The situation is solved after some negotiations.

Recreation with guests faces space constraints in dwellings where living rooms do not have enough space to receive more users than the household members. Dwellers feel restrained from inviting guests around:

- Household M2: The dwelling has a living room crowded with storage furniture. There are no seats for guests.
- Household B2: The living room was reduced in order to build an extra bedroom. Now the living room has not enough space for all household members, much less for guests.
- Household Co2: The common spaces are small and overcrowded with furniture and appliances. The house is in a central area close to bars and entertainment spaces. Although they do not have enough space to receive guests comfortably at home, their friends see the house as a meeting point before going out on weekends' nights. Their guests do not mind standing up while having some drinks and listen to music. These visits are short and not real occasions of relaxation.

3.5 *Playing/studying/working*

Playing/studying/working includes a wide group of activities. Studying and working usually require a quiet and peaceful atmosphere. Households tend to be understanding and respectful to their close ones needs, and do not disturb these activities.

When the activities are related to playing and amusement, they normally occur in a way that they do not disturb members of the household. Usually this function takes place in living rooms, bedrooms and offices.

No major conflicts or constraints were reported in this function.

3.6 *Clothes care*

Clothes care includes five main activities: laundry, drying, ironing, sewing and other tasks (*e.g.*, shoeshine). Taking care of clothes is a daily function in every dwelling. Who, where, how and when these activities are carried out vary among households. *Clothes for washing* can be stored in several locations: either where users get undressed (*e.g.*, bedrooms or bathrooms) or near washing machines (*e.g.*, kitchen, laundry room or balcony). Every dweller puts his own clothes in the washing basket, unless he is a small child. Usually, the washing machine can be operated by all adult members of the household. However in some households just one or two adults carry out this task. In some households, the electricity contract enables to have cheaper fare during part of the day. If that is the case, dwellers usually operate their washing machine during the cheaper period.

Drying clothes is done either by using the dryer machines or by hanging out clothes in the sun. Some dwellers store clothes for ironing or folding after dried. However most of dwellers do not spend storage space on this and immediately after clothes are dry they are folded and stored; just a few garments are ironed. None of the households had a sewing machine in the dwelling. When necessary a needle for hand sewing is used.

No major conflicts or constraints were reported in this function.

3.7 Personal hygiene

Personal hygiene includes three sets of activities: *body washing*, *personal caring* and *physical exercise*. The first normally takes place in a bathroom. Even in households where there are more than four elements, no conflicts in the use of bathroom were reported. Households elements tend to organize their routines in order to ease daily dynamics. The strategy is to use the bathroom in different periods of the day.

Personal care takes place mostly in bathrooms and bedrooms. It comprehends activities like brushing and combing hair, putting perfumes and deodorants, health care and well-being services.

Some dwellers enjoy making exercise at home. Households may have sports equipment or use existing furniture and free space to make physical exercise:

- Household Co2: One of the dwellers practise regularly with a training bicycle located in her bedroom.
- Household B1: Almost all members make exercise in their terrace regularly.
- Household CK1: The mother makes gymnastic exercises in the sofa.

No major conflicts or constraints were reported for this function.

3.8 Circulation

Circulation comprehends getting in and out of the dwelling, storing objects and clothes used outdoors, and moving between rooms. These activities usually take place in the entrance hall, corridor or bedrooms.

No major conflicts or constraints were reported for this function.

3.9 Domestic management

Domestic management contains a wide set of activities, such as: cleaning, environmental control, general storage, managing domestic residues, home security, caring for plants and pets.

The *storage of personal clothes and objects* generally takes place in bedrooms or in common areas. Several interviews revealed constrains due to lack of space:

- Household B2: Two couples share a house and one of them has one child. A bedroom for the child was built in part of the space that used to belong to the living room. The living room is now too small and does not have space for storage. Each couple stores in their bedroom personal and family assets. Both couples complained about not having enough storage space.
- Household C1: A couple is living in a one bedroom flat with sloped roof. Although they had some unused space in the low ceiling areas, the high ceiling areas were not enough for placing enough storing furniture. Meanwhile, a child was born and constraints with lack of storage space increased.
- Household CK1: Extra storage space is needed in the circulation area.
- Household M2: They moved from a larger house to a smaller one. The furniture is not enough to store all of their belongings.
- Household Co2: Both dwellers do not have enough space in their bedrooms to store their personal assets. They put some extra storage furniture in the corridor, but they complaint that it is not enough for their needs.

No major constrains were reported for the remaining activities of this function. Households have their own management dynamics, setting rules that are complied with by most dwellers. Only one situation was reported:

- Household Co1: One dweller hardly ever complied with rules related to cleaning activities. The other four dwellers complained about the flatmate's conduct.

3.10 Being outside

Being outside comprehends activities that take place in private outdoor spaces of the dwelling. It comprehends two activity sets: leisure activities and service activities. When there are private outdoor spaces they are usually used. Generally, the number of activities carried out outside increase with the dimension of the space (*i.e.*, the bigger the space, the more activities take place there). Small private spaces are used for plants or being outside looking at the neighbourhood.

When dwellers do not have enough space indoors for some activities, they tend to counterbalance it in their private outdoor spaces:

- Household B1: Dwelling is overcrowded with furniture. Consequently household does not have enough space for group activities indoors. The terrace is the space where they have group meals, receive guests, exercise, listen to music, play games, among many other group activities.
- Household Co2: The terrace is mainly used for storage, plants and drying clothes. Although they do not have enough space for eating in group indoors or receiving guests, the outside area is not used for those activities.
- Household B3: The dwelling has small balconies where there is only space for a couple of plants. Even so, all dwellers said they usually go to the balconies and stay there looking at the neighbourhood.

Table 2. Domestic functions with main conflicts.

Household	Sleeping	Cooking	Eating	Living	Playing/studying/working	Clothes care	Personal hygiene	Circulation	Domestic management	Being outside
C1 One couple										
CK1 Couple, one child										
M1 One adult, one child, two teens										
M2 One adult, two children										
B1 One couple, two children, one adult										
B2 Two couples one child										
B3 One couple, one teen, one child, one adult										
Co1 Five adults										
Co2 Two adults										

4. Conclusions and discussion

4.1 Main results

The activities that faced more space use constraints are the following:

1. *Being in private*
Constraints occur when dwellers share their sleeping space with others not romantically involved. None of the households that reported this constraint had a strategy to solve or soften the problem.
2. *Receive guests*
Eating with guests and *recreation with guests* face constraints due to the lack of space. The dwellings just have enough space to accommodate the regular dwellers. These dwellings are cramped with furniture, appliances, or are too small.
3. *Storing personal clothes and objects*
This is the activity with more constraints. Dwellers tend to accumulate many personal assets. When households have to move to smaller houses, they realise how many belongings they have stored.

4.2 Discussion

Some dwellers change their furniture configuration frequently. Reconfigurations of furniture may happen for many reasons, such as the need to include/exclude activities or the need of an aesthetic change. How would dwellers accept furniture that enables daily reconfiguration to maximize the use of space?

Storage is an activity associated with all domestic functions. When there are constraints for storage in a space of the dwelling, dwellers tend to transfer storage to other areas of the house. Would it be viable to have one storage furniture that could be used for all functions?

The need for privacy is known as being part of human nature. Although each individual has personal needs of privacy, it also depends on cultural backgrounds (Hall, 1986) and the way dwellers use space (Freitas, 2001). Are there furniture barriers available in the market to ensure privacy?

There is a tendency for individualization of group activities. When there is not enough space for group activities (*e.g.*, eating, playing, talking or watching TV), users use their private spaces (*e.g.*, bedroom) for this purpose. What are the future consequences of individualization in furniture design?

Individualization is accompanied by the increase of technological gadgets such as smartphones, tablets, laptops and smart televisions. These appliances provide support to new forms of socialization, amusement and domestic management. How is the information and technology revolution changing the use of domestic space and how demanding it is of new furniture design?

4.3 Future developments

Methods and instruments used in this study can be adapted to future researches with a larger sample of households.

The results presented are being used to "*ideate*" new solutions of flexible furniture for domestic use. Some interviewed households will be selected to test prototypes.

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References

- Brown, Tim (2015) *Method Extreme Users*, <https://dschool.stanford.edu/wp-content/themes/dschool/method-cards/extreme-users.pdf>, accessed in 02/06/2015.
- Cross, Nigel (1982) Designerly ways of knowing. *Design Studies*. 3.4. pp. 221-227.
- Freitas, Maria J. (2001) *Habitação e cidadania: No trilho da complexidade de territórios e processos relacionais generativos*. Lisboa: ISCTE (PhD thesis).
- Guerra, Isabel. (2000) Transformações dos modos de vida e suas implicações no habitat. In Cabrita, A. Reis; Coelho, A. Baptista – *A futura habitação apoiada*. Lisboa: LNEC, pp. 179-194.
- Hall, Edward T. (1986) *A dimensão oculta*. Coleção Antropos. Lisboa: Relógio de água.
- Lemos, Sérgio (2006) *Artefactos economizadores de espaço*. Universidade de Aveiro (Master thesis).
- Mollerup, Per (2001) *Collapsibles, a design album of space-saving objects*. Thames and Hudson.
- Paiva, Alexandra (2002) *Habitação Flexível: Análise de Conceitos e Soluções*. Lisboa: FAUTL. (Master thesis).
- Pedro, J. Branco; Vasconcelos, Leonor; Monteiro, Mara; Jerónimo, Catarina (2011) *Dimensões do mobiliário e do equipamento na habitação*. Lisboa: LNEC.
- Schneider Tatjana & Jeremy Till (2011) *Flexible housing: opportunities and limits*, https://jeremytill.s3.amazonaws.com/uploads/post/attachment/37/flexible_arq_1.pdf , accessed in 12/06/2015.
- UN, United Nations (2013) *Households and Families*, <http://unstats.un.org/unsd/demographic/sconcerns/fam/fammethods.htm#A3>, accessed in 12/06/2015.