HOUSING FLEXIBILITY BY SPATIAL INDETERMINACY: THE CASE OF THE CASA DE LAS FLORES IN MADRID

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Abstract
The indeterminacy of the domestic space is one of the main trends in flexible housing design. It involves the possibility of using the rooms in a dwelling in multiple ways that are not determined by the architect. The views of non-functionalist housing are more present lately, but still forbidden in the Spanish social housing market, where regulations stipulate a strict functionalist housing plan. However, there is a premodernist example of this strategy in Madrid: the Casa de las Flores (the House of Flowers), a rationalist building from 1931 with a neutral plan of indeterminate rooms. This study comprises a series of interviews with the users, photographs, diagrams and new drawings that show how people use their apartments. The aim of this research is to assess the validity of indeterminacy as an architectural response to social changes in Spain, with a view to its introduction in future housing developments.

Keywords: architecture; flexibility; indeterminacy; social housing; Spain

INTRODUCTION
The design of social housing in Spain depends on a dense set of rules that strictly defines the form and use of the domestic space. These design norms were originated in the mid-20th century (Ministerio de Vivienda, 1969), according to an institutionalised idea of nuclear family and family home that does not match the current social trends in the country. The changes in the composition of the population, the evolution of society and the cultural transformations (Leal, 1995) that have taken place since the beginning of democracy in 1978 alter the character of the domestic space (Putnam, 2006), and contemporary homes in Spain must host different lifestyles and freer family organisations.

A possible strategy to face this lack of correspondence between the social housing features and the growing variety of user needs is flexibility. According to Schneider and Till definition, “flexible housing is housing that can adjust to changing needs and patterns, both social and technological” (2007). In words of these authors, these changing needs can be personal, practical or technological, and the changing patterns may be demographic, economic or environmental. The broadness of this definition includes some different architectural and managing strategies for an increasing diversity of users, lifestyles and rhythms of activity.

Adrian Forty (2000) describes two main trends in the design of flexible housing. On the one hand, there is the machinist view of a flexible home as a transformable space, dominated by mobile walls and furniture or mechanic devices designed to host the different activities of the family in daily or season cycles. In this kind of architecture, the users should follow a number of predetermined steps to take advantage of the flexible possibilities foreseen by the architect. Some famous examples of this idea are the Schroeder House in Utrecht, by Gerrit Rietveld, and more recently the Flexible Apartments in Carabanchel, by Aranguren y Gallegos (Soler Montellano, 2012).
On the other hand, there is the view of the home as a space open to indeterminacy, where the architect does not predetermine the function of every room and transfers the power of defining the use of the domestic spaces to the users. Some examples of this strategy are the apartments in the *Weissenhofsiedlung* by Mies van der Rohe, or the Reicke House in Bottmingen by Michael Alder.

Some architects such as Rem Koolhaas (Koolhaas & Mau, 1995), Herman Hertzberger (1991), Michael Alder and Roger Diener (Alder et al., 1993), and Till & Schneider (2005), lean towards this second strategy. However, flexibility in Spanish social housing cannot be reached by means of indeterminacy due to the thick normative set that precisely defines the size and the function of the rooms, and also the spatial relationship between them. To support the idea that indeterminacy, as a flexible strategy, could be an appropriate instrument to overcome some of the domestic problems derived from the phase lag between regulations and social reality exposed above, it is necessary to conduct an in-depth study of its actual validity; its advantages, disadvantages, potential and ability to accommodate users’ needs. The case-study to be presented here is intended as a contribution to this more general goal.

Despite the lack of contemporary examples in Spain, a premodernist model of spatial indeterminacy in Madrid can be found: the *Casa de las Flores* (the House of Flowers, Figure 1). This housing building from 1931 is a good example of what Léger (2006) has called the *Plan Bâlois* (the Basel Plan) —a low-depth building with two strips of independent similar rooms separated by a central corridor. This plan derives directly from a very common housing type in German and French multi-storey apartment buildings in the second half of the 19th century and the beginning of the 20th (Moley, 1999). Theoretically, the flexibility of this neutral layout, this Basel Plan, comes from the indeterminate function of the rooms, their balanced geometry and the possibility of combining some of them to create larger spaces.

The aim of this work is to analyse the ways in which the apartments in the *Casa de las Flores* are used, with a view to exporting these design strategies, when successful, to future housing developments. This study is the second one of a larger research project, the purpose of which is to analyse lifestyles in some of the few flexible housing projects in Spain, and furthermore to assess the validity of flexibility as an architectural response to social changes in this country.

![Figure 1. (Left) View of the *Casa de las Flores* block from south-west; (Right) view from north-west (Source: José Hevia, 2009)](image-url)
A SPANISH CASE OF SPATIAL INDETERMINACY: LA CASA DE LAS FLORES

The Casa de las Flores is a multi-storey housing block built in 1931 by the Spanish architect Secundino Zuazo (Duarte et al., 2007). He had established strong professional bonds with German architects and was acquainted with European rationalist architecture, which he later reproduced in Spain (Sambricio, 2013). Along with the rationalist features of the building volumes and urban plan, the apartments in the Casa de las Flores are a very good example of spatial indeterminacy (Fig. 2). The rooms are arranged in series with a similar size and independent access through a central corridor, so they can be used, combined or divided in many different ways. Also, the entrance hall is large enough to host different uses, as a different room or an office in connection with the exterior. In total, the apartments have four (88 m² of net usable area) or five rooms (103 m²).

Figure 2. Typical floor plans of the Casa de las Flores (Source: Milla et al., 2003)

Figure 3. View of the central garden (Source: José Hevia, 2009)
Apart from the housing typology, the Casa de las Flores stands out in Madrid because of its urban approach. It is a pair of longitudinal buildings, placed parallel to one another from north to south with a large central garden between them. Each of these blocks is in turn made up of two dwelling strips, separated by large inner wells for illumination and ventilation. Because of its architectural and urban features, very innovative in the Madrid of the time, the building became a symbol of modernity. Thanks to the community life generated around the garden and its lush vegetation (Fig. 3), the building earned the name by which it is known. The Casa de las Flores is valued and protected since 1981 as architectural heritage (Milla et al., 2003), and is listed by the Iberian Docomomo Foundation.

METHODOLOGY

The building is divided into ten blocks. The six central blocks contain the neutral plan apartments of our interest. This research focuses on one these blocks, one of the few that have not been bought by a big real estate agency. These companies have refurbished all the housing units in the same way and they do not let tenants modify them, so their architectural evolution does not concern our study. Instead, in the block we chose to work on, the apartments belong to their users, so they could have undergone changes in their form and use. These changes are the core of our research. The work includes the analysis of 18 of the 28 apartments in this block. Among the owners of the 10 apartments not included in the study, 4 refused to collaborate in the study and 6 were not found at home during the week or even the weekend. The evaluation follows the survey methodology established by Preiser and Vischer (2005). It was carried out in three phases:

- Phase I; a series of personal interviews with the users of approximately thirty minutes long. They included up to 54 questions relating to the comparison between the indeterminate layout and conventional housing; to life in common; to the building’s image and shared areas; to the assessment of the years spent in this apartment; and to the family and professional situation of the users. The interviews were made with a notebook, voice recorder and a photo camera. Walkthrough inspections were conducted in each housing unit. This approach has already been established by other architecture performance evaluations (Preiser et al., 2009; Peschardt & Stigsdotter, 2014; Tezgelen & Karaman, 2014).
- Phase II; a series of drawing plans were made showing the current, former and future (expected) layout, furnishing, refurbishments and use of every apartment. These drawings show the evolution of the rooms’ form and use along users’ life, defining a schematic history of every home.
- Phase III; a comparative analysis of the data collected in phases I and II, aiming to detect some common trends in the use and the configuration of the domestic space. It has offered significant information concerning real-life experience inside these homes and the relevance of indeterminacy in contemporary housing architecture.

This study focuses on a qualitative analysis of the extracted data, rather than on a statistical analysis. In this sense, the study of every single apartment and its inhabitants gave us original and relevant new knowledge about the performance of indeterminate space. This kind of approach is supported by the French school of post-occupancy evaluation. The corpus of the French POE focuses on the sphere of innovation and evaluation of residential architecture, and is based on the observations expérimentales of Chombart de Lauwe (1960); on the étude socio-architecturale of Philippe Boudon in Le Corbusier’s garden city of Pessac (1979); and the later work of Monique Eleb (1997) and Jean-Michel Léger (one of his latest evaluations: Guth, Léger, Trivière, 2013).
THE INHABITANTS OF THE CASA DE LAS FLORES

The *Casa de las Flores* was built with public funding and had initially a social character. Nevertheless, after the reconstruction of the building following the Spanish Civil War (1936-1939), the apartments were rented to members of the military, professors and public servants of the new regime, according to the account of one of the owners, who was born in his current dwelling in 1947. This change of class and the rapid increase of property value —though it was built on the outskirts of the city, in a few years the complex was integrated in one of the most expensive residential and commercial districts of the capital— have kept this housing building away from its original goal. Current users belong to a well-off middle class, with a high education level and good job positions. Specifically, among the 38 adult users included in the study, 15 have a university degree and 13 are university students, while only 2 are secondary school graduates and 2 have only a primary school degree. The six remaining adults did not answer this question, as a matter of privacy. In connection with their positions —apart from the students—, 17 of the adults have a qualified job (architects, lawyers, doctors, psychologists, economists, military officers, etc.), 2 have or have had a non-qualified job and 3 women stay at home. The 18 apartments under study are named with letters from A to R. Among them, 2 have been transformed into co-working offices, though their owners originally considered also living there, and 1 apartment is used as a medical centre.

According to the dates when the interviewees started living in their apartments, three different groups can be established. The first one comprises four families who have been living in the building for a long time. Three of them, families D, L and P, moved in between 1939 and 1944, when the building was reconstructed after the Civil War. Family J arrived later, in 1979. These families lived the golden years of the *Casa de las Flores*. They experienced the sense of community forged around the big garden —where they and their children played—, and saw it fade over the years. A second group of six families (A, B, C, E, F, G) established there between 1991 and 1995. They were unable to enjoy the garden and other common spaces, as their use had been forbidden some years before due to disagreements among residents. Finally, there are eight apartments (H, I, K, M, N, O, Q, R) occupied since 2000, after the auction in which the government privatised the building and the property of all the apartments. Figure 4 shows the current plans of the eighteen dwellings.

THE FLEXIBILITY OF THE INDETERMINATE SPACE

The variability offered by the Basel plan is the reason why there are 12 different models of domestic organisation in the 18 apartments (fig. 5). In total, we count 21 different apartment configurations, including those used in the past and those planned by tenants for the future. The most repeated layout consists of a non-exploited hall, a large living-dining room and bedrooms. Currently it can be found in four apartments, while the historic analysis shows that it has been used in the same way in eight apartments.

The use of the domestic spaces in the *Casa de las Flores* has changed over time, with the transformation of family structures, domestic trends in Spanish society and the professional needs of the inhabitants. The similarity between the orientation, the area and the position of the doors has favoured permutation in the rooms' use. Though we can suppose that the number of changes in the dwellings essentially depends on time, the facts show that time is not a decisive factor in this sense. While apartments P (fig. 6) and L have experienced seven permutations since 1941, apartments D and J have only undergone one since 1944 and 1979, respectively. Some dwellings occupied much more recently have experienced more changes in the use of the rooms, as apartments H —six changes since 2012— and F —five permutations since 1995. The high degree of polyvalence of these spaces is shown by the fact that every space in the dwelling, from the hall to the last room, has been used as a living room in one of the housing units.
Figure 4a: Current plans of the apartments (Source: Author)
Figure 4b: Current plans of the apartments (Source: Author)
Figure 5a: Current use of the apartments’ rooms (Source: Author)
Figure 5b: Current use of the apartments’ rooms (Source: Author)
In total, 42 changes in the rooms’ use were registered in the 18 apartments studied. Upon summarizing in a single drawing all the uses that each room has served over time (fig. 7), it becomes apparent that the living room is often placed close to the hall and the rooms at the end are used as bedrooms. But in apartments D, L and P, occupied two generations before, the living-room was placed in the last room of the façade strip, which is slightly larger than the others and the most distant from the entrance door. The change in the situation of the living room within these dwellings matches the evolution described by Paricio & Sust (1997): in the second half of 20th century, domestic space tends to functionalisation; families tend to organise the rooms hierarchically, to extend the living room and to place it closer to the apartment entrance door. Therefore, the functions of two ends of the dwellings are strongly conditioned by social customs: the living room in the first place and the bedrooms in the last one. The flexibility of the Casa de las Flores is particularly noticeable in the middle section, in the intermediate rooms which gather a wider variety of uses: living rooms, bedrooms, studies, housework spaces, etc.

On a different note, the drawings also show how easily the housing units of the Casa de las Flores adapt to cohabitation and usage models outside those of the nuclear family. Specially, the dwellings are easily convertible into shared apartments. The study of this kind of home (apartments C, H, I and R) reveals that the Basel plan allows a very balanced distribution of the space and a great autonomy for each user. Besides, a high rate of professional activity is found in the building, but this is due to its urban situation and the fact that most of the users have liberal professions that they can carry out at home, rather than the architectural features of the housing units.
REFURBISHING THE DWELLINGS

The refurbishments carried out in the apartments offer an idea of what parts need to be updated, either to host new family structures or to adapt to new trends. Among the 18 apartments subjected to the analysis, only apartment D has never been renovated and keeps the original architectural features. We find two refurbishment types: those that modify technical, furniture or comfort aspects of the dwelling, without altering the space configuration; and those that modify the typological characteristics of the apartment. The former—which do not affect this research—are mainly used in this building to modernise the kitchen and bathrooms; and among the latter, the most usual refurbishment is the opening of a double door or an arch in the wall between the two first rooms, to create a dining-living room. Then, the most common refurbishments are the complete removal of walls between rooms, the construction of built-in closets in the bedrooms, the reduction of the last room to extend or to create a new bathroom, and the kitchen extension. The majority of these works aim to functionalise the home: from a neutral plan characterised by the indeterminacy of the rooms to a conventional plan where the rooms have a hierarchical structure. There the common space is perfectly defined by its large size and the bedrooms by their smaller size and built-in closets. Besides, the kitchen extension is linked to a cultural change (Putnam, 2006), related to the unformalisation of domestic habits, the disappearance of the domestic service and the view of the kitchen as a clean, nice, living space.

ABOUT THE BIG ENTRANCE HALL

One of the special features that set these dwellings apart from the conventional type found in current Spanish housing is the big entrance hall (fig. 8). Its area, 11 m², is larger than the 10 m² double bedrooms established by the local social housing design regulations (Empresa Municipal de la Vivienda y Suelo de Madrid, 2008). This area represents a significant percentage of the net usable area of these medium-sized apartments: 12.5% in the four-room apartments and 10% in the five-room apartments. Due to their size and position within the home, we expected these halls to be used in a broad range of ways: dining, living, game room, atelier or even as a bedroom for occasional guests. This kind of supplementary spaces of indeterminate use is, for example, highly appreciated in France (Léger, 2010) and Switzerland, where the regulations stimulate its existence (Martín Blas & Rodríguez Martín, 2012).

Reality, however, surprised us: aside from the three housing units converted into offices, where the halls function as reception and secretary's office, in most of the apartments the halls have no particular role, and users seldom develop any family, professional or leisure activity in them. Not even in the apartments where only one person lives, and where their activity would not be disturbed by other users passing by.

Only two owners, C and F, use their halls regularly. They are, respectively, a psychologist and a professional translator who have furnished them with an office desk and a desktop computer. However, most of the time they do not work there, often choosing to work with their laptops on the table in the dining room, which is a nicer, wider, more autonomous and better illuminated place. Moreover, even while not serving a specific activity, the hall is furnished as a small parlour in apartments D and P, inhabited since the 1940s. This arrangement has been maintained in these two cases ever since they were first occupied, seventy years ago, when it was common to distinguish the living room, for daily family use, from the parlour, more formal, used to welcome guests and seen as a measure of the family’s status (Diéguez Patao, 2006). Currently, user P never uses this space and user D does it once or twice a year, "when her nephews visit her".

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ABOUT THE POSSIBILITY OF COMBINING THE ROOMS

A fundamental reason to explain the under-use of the hall is its lack of connection with the adjacent spaces: the kitchen and the first room. In the first case, the kitchen door is placed in the middle of the corridor, on the other side of the entrance hall. The distance between them hinders the use of the hall as a dining room. In the case of the first room, usually used as a living room, it is connected to the hall through a single door opened in the building’s load bearing wall. The difficulty of extending this narrow opening visually detaches two spaces that could share the function of being the house’s common space. An inhabitant of apartment H put it in this way: “With such a large hall in these apartments, a double door opened there would give it much more spaciousness; it would be great for parties”. The presence of this load-bearing wall not only reduces the connection between the hall and the first room, but it also brings about the same result in the whole apartment, dividing it into two parallel strips, impermeable to each other. No transversal relation has been established in any of the apartments studied, given the difficulty of piercing the wall and the non-coincidence of the doors along both sides of the central corridor. There is however a great degree of flexibility in the strip of rooms in rows along the façade. The owners have exploited this possibility, so in the building there are several room combinations (fig. 9), from dwellings where all the rooms are separated, to another one where all the rooms along the façade are joined. The most repeated layout—we find it in seven apartments—is that of two rooms joined together by a double door. In apartments B, F, H and R, these alterations have occurred more than once, with the aim of separating again rooms that had been combined at some point.
ABOUT THE SMALL LIVING ROOM

The frequent combination of two of the rooms along the façade to create a living-dining room makes one of the main features of the neutral plan appear as a problem: the inexistence of a large space within the repetition of similar 14 m² rooms. According to the inhabitants, the combination of rooms gives a pleasant feeling of spaciousness, and increases the spatial richness of the apartments. Therefore, most of the owners —13 out of 18— have decided to combine at least two of their rooms. Figure 9 shows some different existing living rooms. Excluding two of the three offices, where every room is separated, only three of the fifteen current homes keep their rooms separated. They are the shared flats R and H, both inhabited by four students who carry out most of their daily activities independently, in their bedrooms; and apartment D, where the living function has been divided into two single spaces: a daily living and a reception parlour, as we said before.

To support the idea that the nature of the living room is more influenced by cultural trends than by family size, it suffices to see how the two large families who arrived the latest to the building (family F in 1991 and family G in 1995, both with five members) keep a double living room even though in the two cases, two adult sons have had to share a single room.

CONCLUSIONS

The great number of variations registered in the apartments show the flexibility of this plan of indeterminate rooms. Generations have used these dwellings along the years, thanks to the possibility of changing and permuting the use of the rooms, joining or separating them at their convenience. Specifically, in 14 of the 18 apartments studied they have taken advantage of the
rooms’ versatility to alter their use, and in 15 of the 18 they have joined and/or separated them. The reasons of these changes are varied: The changes in family composition; the adaptation to different trends in the configuration of the domestic space; the introduction of professional activities within the dwellings; and the adaptation to different cohabitation models outside the nuclear family.

The spatial indeterminacy of the Basel plan has facilitated these changes, and it is specially useful in the case of shared apartments and rooms dedicated to professional use. Its ability to adapt to diverse domestic situations and lifestyles shows that the Casa de las Flores housing type is a useful model to face the housing problem exposed at the start of this paper. However, this housing type also presents certain issues, which architects and developers have to be aware of. To recommend its normative acceptance and its implementation in future public housing developments, the following remarks should be taken into account:

• A neutral plan of indeterminate rooms must be flexible enough to allow users to organise the domestic space hierarchically, in a conventional way. In its essential form, the Basel plan clashes with the preferences of the majority of users, who have extended the size of the living room and have thus established a functional house with determinate rooms: a living-dining room, a main bedroom and a smaller bedroom at the end of the apartment. The success of the Casa de las Flores is that it allows this kind of modification in a simple and inexpensive way, just opening or eliminating one of the partition walls. The owners praise this characteristic of the original dwelling; most of them even accept, in exchange for flexibility, the lack of other elements that usually determine the function of the domestic spaces, as for example built-in closets, ensuite bathrooms and a clear distinction between a public/daytime area and a private/nighttime area.

• The main disadvantage of these housing units is the lack of a transversal relation between the two parallel strips that define the apartments. This hindrance is due to the existence of the load-bearing wall that crosses the apartment longitudinally, dividing it into two poorly connected parallel areas. Currently, the choice of the usual structure of beams and columns would allow establishing multiple transversal connections and combinations. The possibility of associating the spaces would not be limited to the contiguous rooms along the façade, and so the variety of possible layouts of the dwellings would increase significantly.

• Regarding the unexpected under-use of the big entrance hall, it should be noted firstly that its architectural features hinder a stable use and, secondly, that it is a border room hard to merge into the home dynamics. It does not seem then justified to include large entrance halls in new multi-storey social housing projects, where the resources and the housing areas are particularly limited.

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