Proceedings of the Ninth International Space Syntax Symposium
Edited by Y O Kim, H T Park and K W Seo, Seoul: Sejong University, 2013

LAYOUTS OF OBLIQUE GEOMETRY AND THE CONSTRUCTION OF DRAMATIC SPACE AT HOME

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Abstract

In morphological design analyses, obliqueness is primarily associated with triangular and polygonal forms; in other cases, it is connected to non-rectangular grids that do not necessarily lead to similar formal geometry in the layout's overall form, but establish non-rectangularity in accessibility sequences of the interior space. In the first instance we refer to explicit manifestations of oblique geometry while in the second to implicit compositional structures of the architectural design. Both explicit and implicit facets of obliqueness are explored in this article in relation to the spatial experiences they create and the generation of clearly defined sets of visual fields that, diagonally deployed, break up with the rectangularity of perceptual enfilades. In addition, it is argued that such visual sequences establish a degree of theatricality in the domestic space, which is ultimately thus orchestrated, as to underpin impressive views to the exterior, multiple orientations, or the differentiated status of the house's occupants.

A series of single-family houses from the work of three architects working in the backstage of the European modern during the interwar and postwar period is here 'deconstructed'. The Greek Dimitris Pikionis, the Italian Gio Ponti and the Spanish José Antonio Coderch de Sentmenat illustrate a particular concern for geometry and for sequences of unobstructed perspectives. The layouts of the selected case studies are analyzed first, according to the geometric features of their interior boundaries and overall form and second, according to the configurational properties of the domestic spaces to which they correspond.

Keywords: *obliqueness, visual sequences, dramatic space*

Theme: *Architectural Design and Practice*

Introduction

Movement has often been for the architectural conception a powerful generator of plans; typical example of this conceptual attitude is Le Corbusier's *promenade architecturale*, where the viewer is invited to explore various angles of the plan through the elongation of the layout's vertical and horizontal circulation. Movement affects sight: it is translated into various, subtle or radical, changes on the configuration of the user's visual field as he/she drifts along the built space. Architects 'handle' movement in such a way that they may also control changing viewpoints and the user's serial experiencing of space in time. How such considerations are embedded into the architects' design priorities is the main theme addressed by this essay, which looks at the work of three architects of the 20th century.

The Greek Dimitris Pikionis, the Italian Gio Ponti and the Spanish José Antonio Coderch de Sentmenat were chosen because of the particular attention they all placed on changing viewpoints and of their shared interest in creating, through the manipulation of the layout's geometry, carefully structured visual sequences. These internal design structures are often connected with a special focus on the exterior surroundings and on one particular, or on multiple orientation points; it is here argued that such visual sequences add a dramatic effect on the user's spatial experience. Either the variety of the consecutive snapshots constituting the separate 'pieces' of the visual puzzle and the sometimes contrasting qualities of these pieces, or a definite directionality bestowed upon circulation paths, through a hierarchical succession of specific viewpoints, build up spatial drama capturing the visitor's interest. Additionally, all three architects choose to explore the construction of visual sequences through the use of oblique geometry in the layout. Obliqueness may refer in this case to the building's outline, or to its interior partitions, or lastly, to these both; alternatively, it refers to the relative positioning of the boundaries' openings, which establish visual connections and access points between adjacent sub-spaces.

In this paper obliqueness is analyzed through the geometrical characteristics of the plan: explicit, in the case of the non-orthogonal tracing of the exterior form and/or the interior partitions; implicit, in the case of a general rectangular arrangement of interior and exterior boundaries that are combined with an oblique arrangement of thresholds (doors, windows, transparent or movable partitions) in plan. In parallel, obliqueness is discussed syntactically, based on the topological properties of the examined layouts, mostly in relation with convexity, visibility graphs and isovist sequences, but also based on the geometrical configuration of visibility graphs. The goal is to address various versions of tension and spatial dynamics, as each time introduced in the work of each architect, and to inform eventually on the link established by the design between spatial experience and the geometry of the layout.

Three architects and their design approaches: Pikionis, Ponti and Coderch

The Athenian architect Dimitris Pikionis (1887-1968) is internationally known mostly through his work for the arrangement of the pathways around the hills of Acropolis and Philopappou, in the center of Athens. For Pikionis, experiencing space is fundamentally linked to the human being's movement upon the site's contour: "*As we walk upon this earth, our hearts experience anew that rapturous joy we felt as children when we first discovered our ability to move in space – the alternating disruption and restoration of balance which is walking.*" (Pikionis 1989; 68) In Acropolis Pikionis adopts the system of harmonic tracings developed by his student Konstantinos Doxiadis[i], to sort out a "*succession of 'critical' points where extended views are possible*" (Antonakakis 1989; 90). The land's contour is his guide, as well as selected pieces of

the existing landscape. Pikionis has used the same system for several other projects of his, or for parts of his projects, and especially concerning the arrangement of exterior spaces after 1937. The projects commented in the following come from his residential work; mention is primarily made on his interior spaces.

The Milanese architect Gio Ponti (1891-1979), almost an exact contemporary of Pikionis in neighbouring Italy, is widely known for his exuberant artistic production in many fields of design: ceramics, painting, decorative and utilitarian objects for the home. In his architectural layouts the lines of vision he traces to mark out transversal and longitudinal vistas crossing his housing projects from one end to the other, and extending to the surroundings are equally one of his signature traits (Ponti 2004). For Ponti it is the variety of vistas, the polyphony of views and the surprise element which stands out as design priority. He seeks to catch the user's attention and maximize any effects of the vistas on the visitor's perceptive journey in space: *"We should never block the perspectives, we should make people see 'more than they can', create enfilades, fugal points, openings of light, […] fugal resources of natural and artificial perspectives, […], of viewpoints, lights."* (Ponti 1960; 35). Vision is important and even more important is its dynamic expansion towards every possible direction; the architect has to control and emphasize this expansion by creating switches in the serial experience of space, contrasting elements that are composed together harmonically in the project: "*When architecture is really beautiful, it unfolds along the steps and the glances of the spectator in a sequence of surprises, drops, crescendos, finales.*" (Ponti 1960; 99)

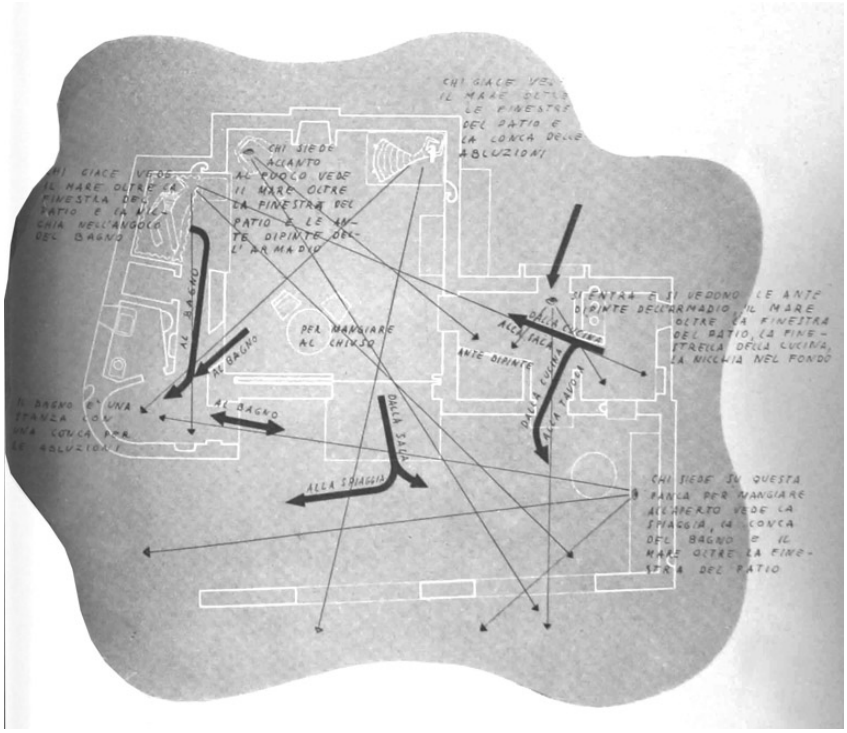


Figure 1: Ponti, 1939. An ideal small house (by the sea) / Una piccola casa ideale, published in Domus 138.

The Barcelonese José Antonio Coderch de Sentmenat (1913-1984), a friend of Ponti's although almost one generation younger than him[ii], equally traces lines of sight towards the most elongated vistas in some of his drawings. In his case, oblique geometry in plan is linked to a conceptual process focusing from the interior to the exterior of the building. Coderch comments

in relation to the angle windows he designs for the building in Compositor Bach street (1958-1963), windows that establish in the interior space an oblique arrangement of views: "*The windows in the angle, I do them for two reasons: first, to avoid the shock or rebound from one façade to the other as the continuous movement of balls which rebound and continue doing the same thing; so that the street can be seen on diagonal, for its width is not appreciated through the monotony of frontal views, and so that there is a chance of taking advantage of the orientations. […] The houses deploy from the inside towards the outside, working in the subconscious as to the outside, but always from the inside to the outside."*[iii] How is this "*subconscious working*" of the architect with regards to the outside applied in his layouts and what is the achieved effect in space?

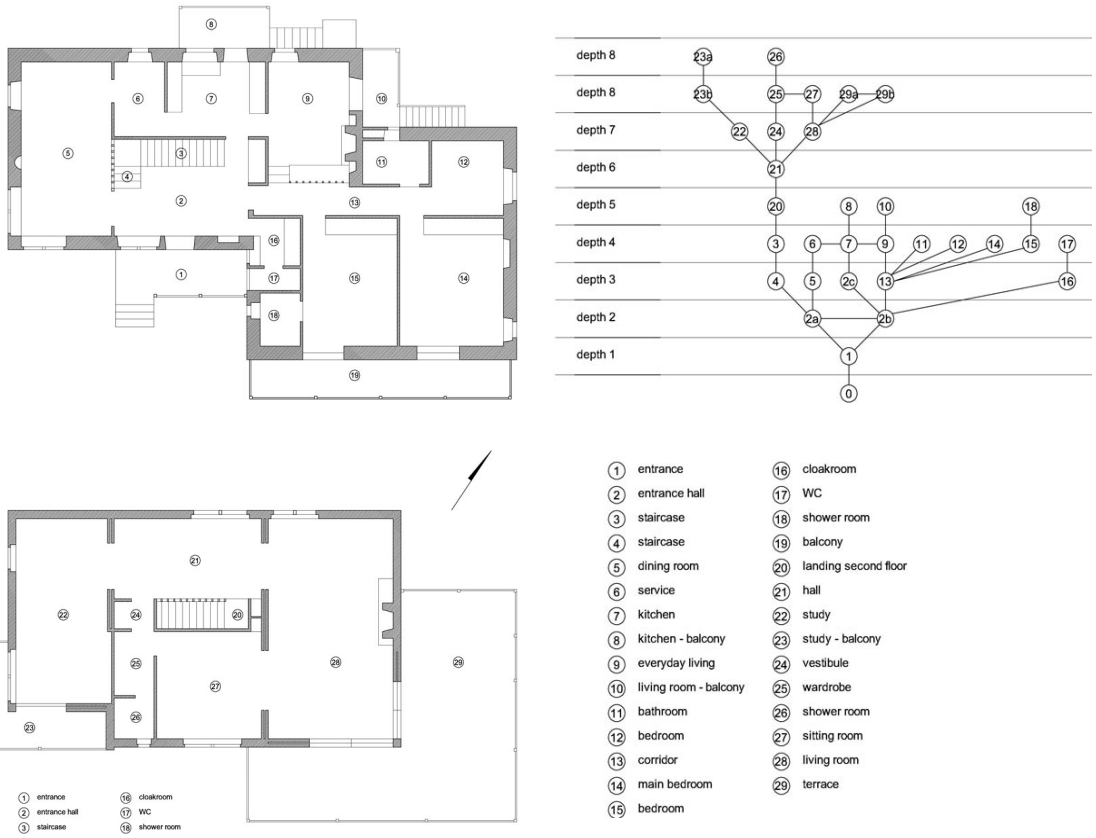
As mentioned above, a series of examples from the residential work of the three architects will be analysed in the rest of this paper: for Ponti and Coderch, case studies from their residential work is an obvious choice as they have worked a lot in this field; for Pikionis, it is an intentional one, in order to fill a research gap, given that visual sequences have been discussed in his work mostly in relation to exterior spaces. All projects are dispersed across a period of almost forty years covering both the interwar and the postwar era. In order to understand the conceptual configuration of obliqueness, emphasis is placed on the geometrical arrangement of sub-spaces in each architectural composition and/or of the geometrical arrangement of its openings: what are the visual sequences created in the layout, which spaces are connected through them, for whom are these sequences destined? The accent is equally placed on the syntactic properties of these spaces, especially on the data provided by visibility graphs and isovists' sequences, to understand how the layout geometry affects the three-dimensional spatial experience and vice versa: in what way the potential experience-in-space and the desired visual fields affect the conceptual process. Respective sequences of isovists have been chosen in relation to visibility graphs as indicative of sufficient paths (Benedikt 1978) that potentially describe oblique sequences of the most visually integrated grid points as presented in visibility graphs. The paper wishes to expand discussion concerning the intelligibility of spatial structure and the ways in which building geometry is grasped by the moving user (Peponis 2010; Psarra 1997, 2009). At the same time, this essay follows the analytical model established by Hanson (1998), in order to check the validity of stated conceptual aims in the residential work of renowned architects and to assess preconceived ideas on the nature of architectural conception. Hanson discusses the dramatization of the domestic space using Loos' Müller house in Prague (1929-30) and the principles of the raumplan, the status of the house's occupants and the complex succession of visual fields in its interior as starting points (1998; 260-266). In the following, sequences of visual fields will also be related to the formal or informal character of the domestic space.

Pikionis: creating the predominant vista

Pikionis usually composes with basic primary forms, such as rectangles and squares. The clear geometrical shapes he applies in his primary school at Pefkakia, Lycabettus hill, Athens, in the 1930s, constitute perhaps, the most faithful manifestation of his experimentation with the architectural principles of modern architecture. In Potamianos house, which is an after-war project (1953-55), Pikionis combines both a modernist approach and a traditional one, using local materials and construction techniques. His design canvas is made up by two interpenetrating rectangles. At the point where the two forms meet on the ground floor, the space's functional assignment changes: communal spaces give up their place to the more private rooms of the family that are uncommonly arranged on the ground floor of this two-storied house. Pikionis's choice not to take up space for the night-time activities on the upper floor is accompanied by locating the formal living room on one side of this tripartite level.

The opposite side is taken up by the study which corresponds to a slightly smaller surface area. The southeastern angle of the living room opens up onto the most spacious exterior area of the house, a bilaterally oriented balcony. From the entrance of the living room, the visitor's sight is directed diagonally towards the southeastern corner of this sub-space, as two symmetrically arranged openings, of differentiated width, pierce either side of the angle. Through the twin openings that propose a slightly varied perspective onto the Mount Penteli, the most important protrusion of the land's contour in this direction, the unobstructed vista over the immediate built tissue is considerably emphasized.

The syntactic analysis of the house reveals additional data regarding its day-to-day functioning. The convex break-up of spaces features the compartmentalization of the first floor that establishes a clear distinction between the groups of day- and night-time activities. Much of the house's everyday life involves the entrance hall, the most integrated space of the layout, the dining room and the kitchen that is located in recession behind the staircase. The everyday sitting room works mostly in relation to the most private rooms of the family, accessed only by the corridor reserved to the distribution of that part of the house, and by the kitchen. In fact, the access point to the dining room and the staircase are the elements of the plan that seem to prevail on the visitor's view, once he has entered the house. The visibility graph depicts the stair's landing as the most visually integrated part of the plan on this level, as the staircase works apparently also as a light well. The visitor is thus drawn to the upper floor where his vision is ultimately liberated towards the longest and most impressive view.



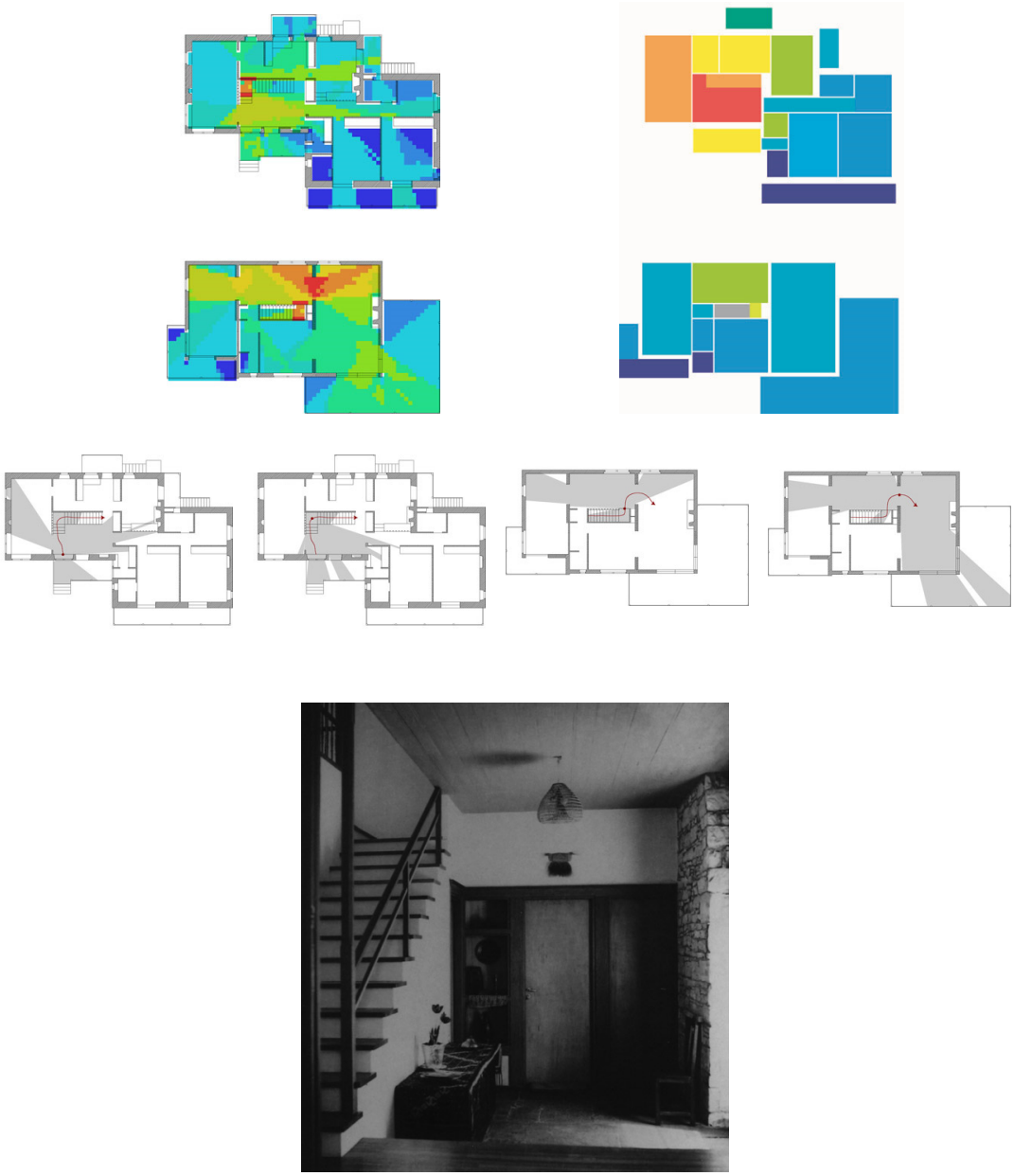


Figure 2: Pikionis, Potamianos house, plans of ground and upper floor (1:200), justified graph from the outside to the deepest space, visibility structure, convex integration map and isovist sequence (from the entrance to the best view; floor plans redrawn by the author, see Pikionis A. 1994; Ferlenga 1999); photo of the staircase leading to the upper floor as viewed from the entrance of the dining room (*source*: Ferlenga 1999; 164).

On the top landing, the view opens up laterally towards the large access points to the study and the living room; as shown by the visibility graph the most visually integrated points of the grid are summed up diagonally between the landing and the living room's entrance, as well as towards the southeastern angle of this formal space. Indeed, the visitor's attention is captured by the light coming from the windows placed opposite to the landing and creating a diagonal counterbalance in plan for the twin bays in the southeastern angle of the building.

In Pouris house that Pikionis composes in the same period with Potamianos residence (1953-55), this time in the northern Athenian district of Maroussi, he applies similar conceptual principles,

based on a diagonal arrangement of openings in plan and the use of twin bays on the southeastern angle of the building, this time on both house levels, to direct the visitor's sight towards that direction. The layout is an almost perfect square form on which, additional sub-spaces as exterior extensions are added to each level, again aligned on oblique axes. The functional organization of the layout is, in this case, more conventional than the one corresponding to Potamianos house, as the private rooms of the family are now isolated on the upper floor. In the convex break-up of spaces, while the main entrance hall is once again the most integrated space of the house, along with the living sequence of the ground floor, the upper floor hall presents, in relation to Potamianos house, a higher integration value, correspondingly to a more frequent everyday use and a stronger relation to the more private rooms of the family. This affects the integration order of the sub-spaces for the two houses:

Potamianos house: entrance hall > dining > kitchen > everyday living / second floor hall > circulation private zone > formal spaces (study, living room) > private rooms

Pouris house: entrance hall > living / second floor hall > circulation private zone > kitchen > private rooms

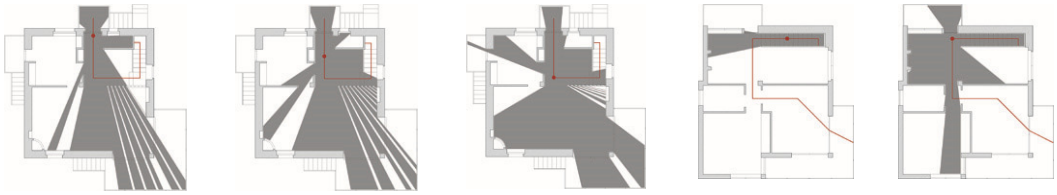


Figure 3: Pikionis, Pouris house, plans of ground and upper floor (1:200), justified graph from the outside to the deepest space, visibility structure, convex integration map and isovist sequence (from the entrance to the upper floor; floor plans redrawn by the author, see Pikionis A. 1994; Ferlenga 1999).

Through the analysis of convex spaces and the different approach Pikionis adopts for the kitchen in each of the two houses, one may conclude on the different levels of formality that correspond to each household's lifestyle. In Potamianos house, the circulation ring connecting the entrance hall, the dining room, the kitchen, the everyday living and the circulation space in the more private part of the house integrates well the entire kitchen space; no additional need for privacy exists for this room as the kitchen is already relatively isolated by the staircase. But in Pouris house, the circulation ring connecting the spaces of daytime activities on this level concerns primarily only one part of the kitchen allowing for strongly differentiated levels of privacy within the same room, which are needed as the kitchen is immediately adjacent to the living sequence serving both formal and informal occasions.

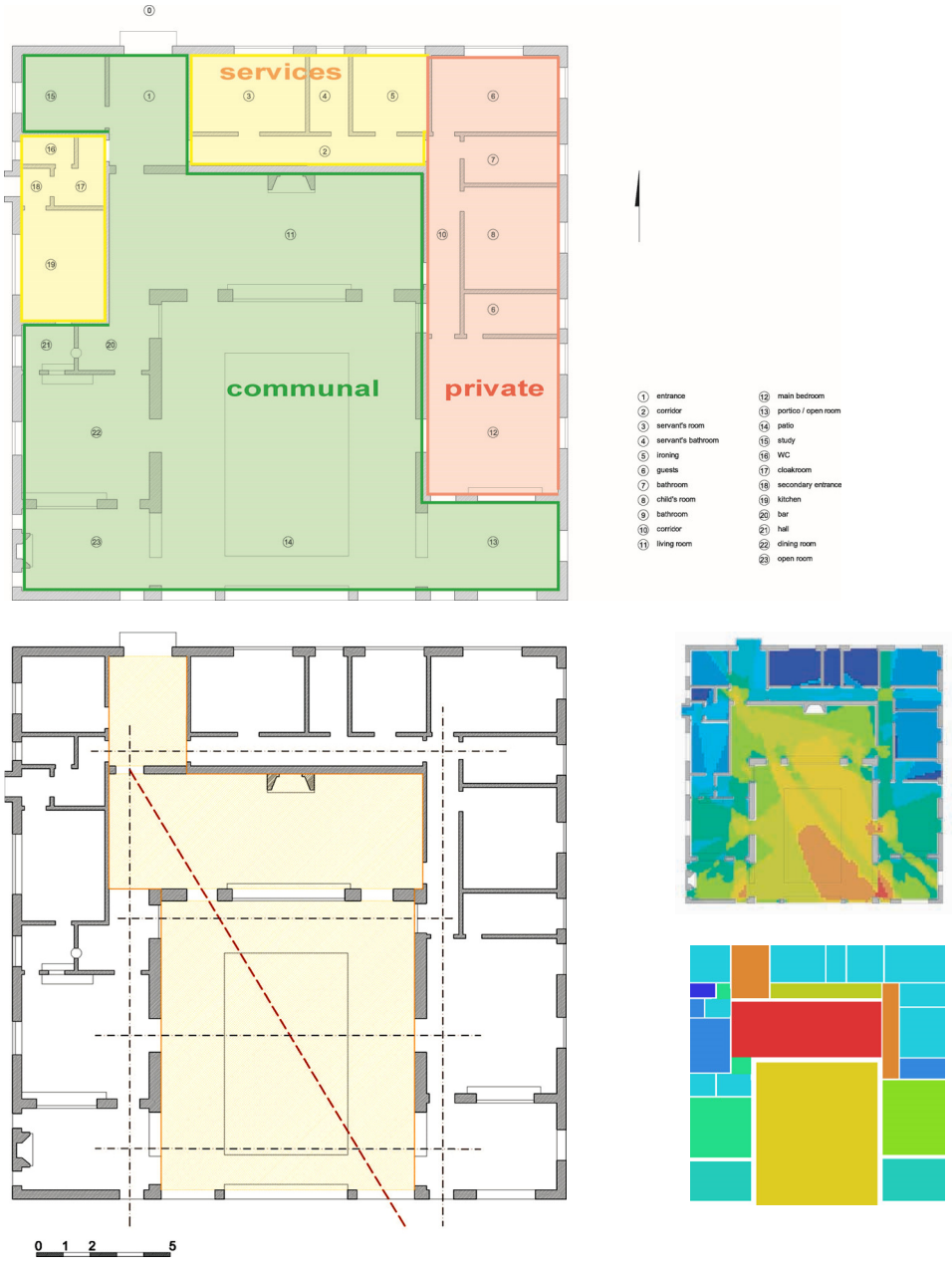
The main entrance is figured out in plan, both for Potamianos and for Pouris projects, as a separate sequence that accentuates a gradual tension in space while the visitor moves towards the most important vistas: it comprises of a separate exterior extension which is accessed by a separate flight of stairs, the threshold (in Pouris house the area in front of the visitors' WC) and the entrance hall. In Pouris house, the additional threshold once the visitor moves beyond the WC is the starting point for the two diagonal vistas that mark the most important elements in the layout, as depicted from the visibility graph and the geometrical distribution of the most integrated points of its grid. The visitor's sight is directed from one side towards the hearth, the most symbolically charged part of the house, and from the other towards the twin bays of the southeastern angle and the best orientation point. Tension is in this case created in space by the two foci of interest and the splitting of the living sequence between distinct seasons of the year: the cold one when the family is assembled around the heating point and the warm season when it is possible to take advantage of mild weather and use the outdoor spaces. In Potamianos house, intensification of spatial experience is linked to the vertical deploying of the houses' more formal (visitor's) itinerary, whereas in the case of Pouris' house it is associated with a symbolic duality working both for visitors and inhabitants.

Ponti: multifocal points of view – contrasting vistas

Dealing often with clients of substantial financial means (Irace 1988; Ponti 1990), Ponti's domestic spaces are considerable larger than those of Pikionis. The layouts here analyzed correspond to this category of houses that comprise usually a separate spatial unit destined to host the household's guests. This goes even for the relatively modest villa that Ponti proposes in 1934 through the pages of his magazine *Domus* as a weekend resort, to the urban population, and which is designed according to a Pompeian villa configured around a central patio.

The layout of the project for a Pompeian villa corresponds, to the opposite of the other two examples that are here commented, the villa Arreaza built in the country club of Caracas,

Venezuela in 1954-56, and the villa Nemazee built in Tehran in 1960, to a simple geometrical form, an almost perfect square. The patio is located in reality off-centre, with its southern side opening up entirely to the natural surroundings and in such a way that the plan corresponds to a rectangular, u-shaped form. Although the patio is framed by two almost perfectly symmetrical aisles, of which one contains part of the most private rooms of the house and the other communal spaces, the laterality of its position in the layout corresponds to a rather lateral emplacement of the main entrance onto the northwestern side of the house's northern front; these arrangements rhyme with the extension of the living room towards the west to comprise the circulation space that distributes the rest of the communal spaces of the western aisle, which emphasizes once more the lateral configuration of the most integrated communal space and the shifting of visual interest towards the northeast through the patio. The threshold guiding the visitor from the entrance hall to the living room is thus arranged as to get lined up on an oblique axis with a series of other openings, giving onto the patio and the surroundings.



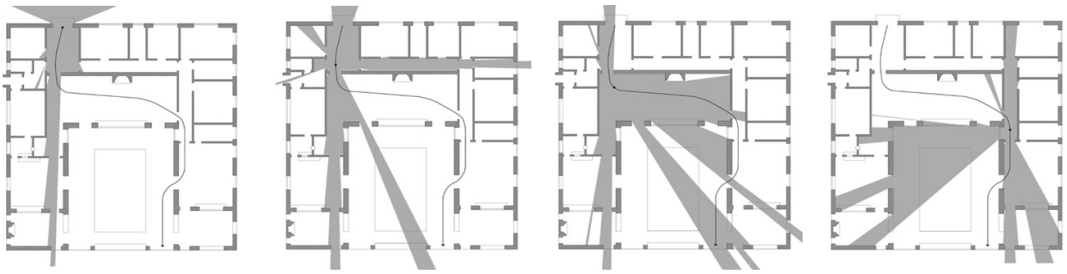
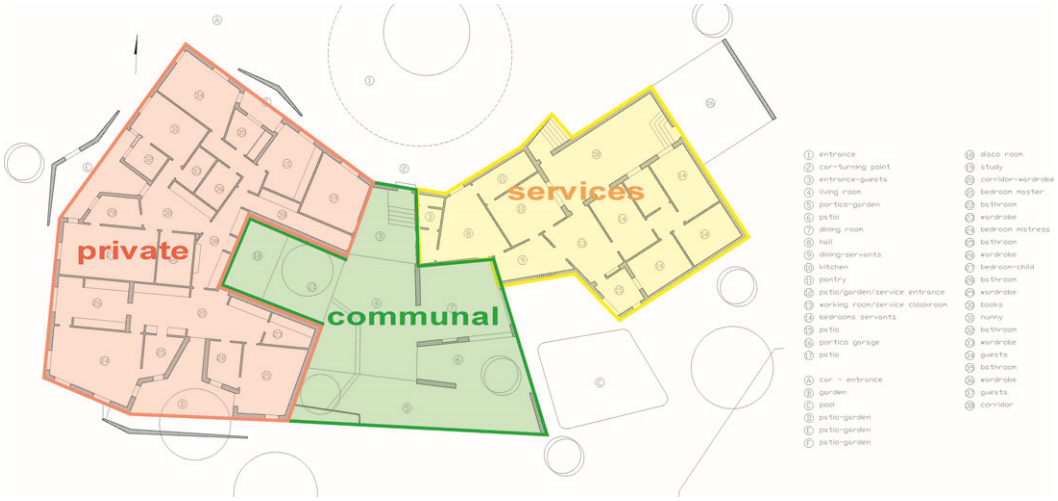


Figure 4: Ponti, Pompeian villa, plan (1:200), visual symmetries and enfilades contrasting the predominant diagonal configuration of the openings, visibility structure, convex integration map and isovist sequence (from the entrance to the parents' bedroom; (from the entrance to the best view; floor plans redrawn by the author, on the project's original publication see Ponti 1934).

As indicated by the distribution of visual integration using visibility graph analysis, this axis corresponds also to a sequence of visually well integrated points in the grid; another diagonal sequence of well integrated spots involves the main bedroom in the eastern aisle and the largest bay of the living room, which is centrally placed on the boundary overlooking the patio. The distribution of integration also makes clear that the viewer has to go beyond the entrance hall to discover the house's global structure and begin to understand its space. In fact, once he/she enters the living room, he/she takes hold of an unobstructed vista that expands towards the nature around and allows him to take advantage of the natural scenery, into which Ponti planned the villa to be integrated. The visitors' area is grouped with the more private rooms of the family, more specifically it is located close to the children's room, and clearly distinguished from the servants' rooms, although potentially distributed by the same circulation space. This indicates that for Ponti the differentiation of status between visitors and owners is not a definite priority; nevertheless, the diagonal view from the parents' room to the living sets them in control of the domestic space by offering a view over the house's main entrance point. What seems to be the principal concern of the architect is the magnification of the predominant unobstructed vistas in the interior by taking advantage of oblique lines and by discreetly breaking the symmetry of the plan in order to achieve such obliqueness.

Symmetry and asymmetry of the plan, the element of surprise as the visitor discovers additional vistas revealing fresh angles of the domestic space and the regrouping of the visitors' area with the more private areas of the house in proximity with the children's area (although in each case an alternative moving circuit is also set in place) are common conceptual themes also in the cases of the villas Arreaza and Nemazee. However, a marking difference exists in the configuration of the exterior form and the tracing of the interior partitions, as Ponti employs in these two postwar projects large polygonal forms and explicit oblique geometry. The spatial pattern that organizes the communal life of the house around an open-air space still exists, although in these cases the predominant patio of the Pompeian villa is replaced by several, open-air or simply dilated in section, double-height spaces that concentrate the daytime activities both of the visitors and the family. Symmetry refers in both cases to the entrance sequence, a series of sub-spaces leading from the main entrance point to the most integrated spaces of the houses, which comprises a threshold, the entrance hall, the living room and the extension of this last, either in the case of the villa Arreza, to an open-air patio and the house's southern garden or in the case of the villa Nemazee, to a double-height interior space opening up with large floor-to-ceiling bays to the southern side of the plot.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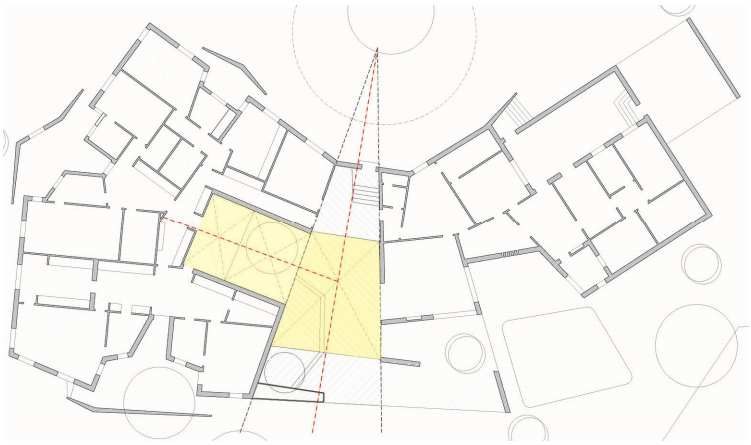
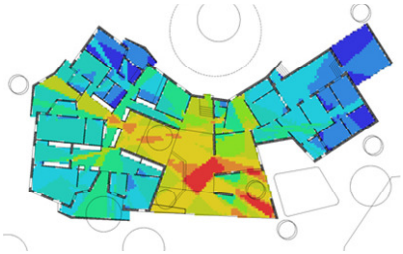
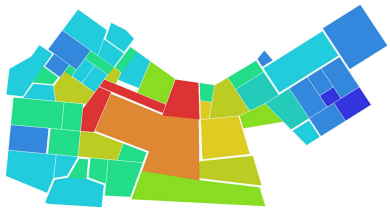
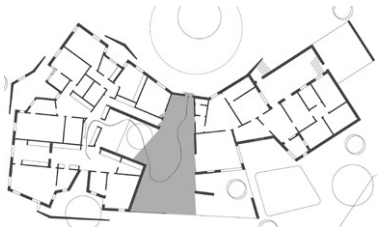
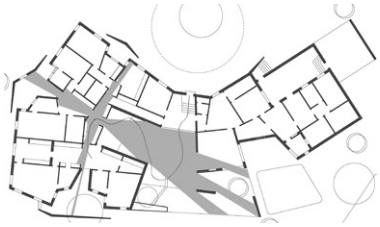
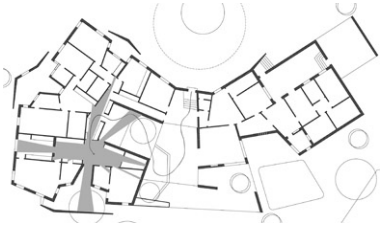












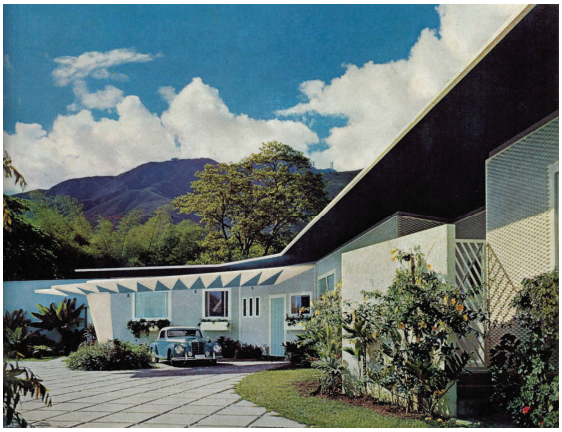
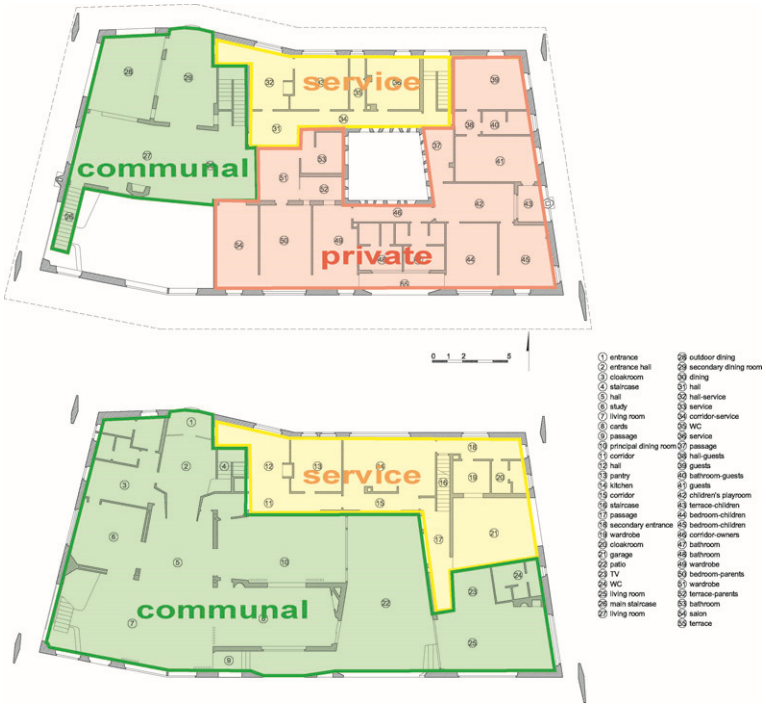


Figure 5: Ponti, villa Arreaza plan; symmetry of the entrance sequence, secondary axis of communal spaces and centrality of the more private part of the house; visibility structure; convex integration map and isovist sequence (from the entrance to the parents' unit; floor plans redrawn by the author, on the project's original publication see Ponti 1958); view from the exterior (source: Ponti 1958).

As illustrated by the examination of the visibility graphs and the isovist sequences, in both cases, the viewer obtains on entering the house a relative restricted in width vista clearly oriented towards the facing natural scenery. This well-delimited visual field contrasts the impression has formed of the house and its considerable size as he approaches it laterally from the exterior.

Advancing beyond the entrance hall, the viewer starts discovering new dimensions of the domestic space through oblique, penetrating vistas that cross the visual direction established by the entrance sequence and its symmetrical boundaries. In the case of the villa Arreaza these crossing, transversal vistas connect the living sequence with the distribution hall of the spatial unit corresponding to the parents or with the distribution hall corresponding to both the children's and the visitor's room groupings. Thus, the parents have once more the possibility to control movement in the rest of the house, with the exception of the servants' and services' areas that remain almost completely isolated from the rest of the house. In the case of the villa Nemazee, penetrating diagonal vistas connect the living area with a more isolated patio, centrally located in relation to the rest of the domestic space, as well as with an everyday living room, easily accessible by a secondary entrance. The multiplication of vistas and visual directions increase the chances of perceiving various activities taking place in parallel in the domestic space and eventually of interface between the users of this space. Again, the servants' rooms and the service areas constitute a separate part of the domestic universe, being among the most segregated rooms of the house.

It is made obvious that, more than the distinction between visitors and inhabitants, Ponti is interested in the distinction between main and subsidiary activities, servants and owners/guests. He sets up visual sequences and dramatizes his spaces by alternating broad and restricted visual fields, penetrating vistas to the interior and broader, unobstructed vistas expanding to the exterior surroundings. Contrast and surprise seem to be the most important conceptual devices underpinning the visual fields that are in the heart of the spatial experience offered to his clients, as well as differentiation of status, except that the difference between the broadness of the proposed visual fields does not refer primarily to guests and owners, but to "viewing" and "being viewed". As people pass from the areas of the house crossed by the penetrating vistas to spaces of broader visual fields, they pass from controlling movement and activity to being themselves visually controlled as they move in specific rooms. Thus, spectators are potentially transformed in actors, and vice versa.


service
communal
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1 entrance
2 entrance hall
3 cloakroom
4 staircase
5 hall
6 study
7 living room
8 cards
9 passage
10 principal dining room
11 corridor
12 hall
13 pantry
14 kitchen
15 corridor
16 staircase
17 passage
18 secondary entrance
19 wardrobe
20 cloakroom
21 garage
22 patio
23 TV
24 WC
25 living room
26 main staircase
27 living room
28 outdoor dining
29 secondary dining room
30 dining
31 hall
32 hall-service
33 service
34 corridor-service
35 WC
36 service
37 passage
38 hall-guests
39 guests
40 bathroom-guests
41 guests
42 children's playroom
43 terrace-children
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52 terrace-parents
53 bathroom
54 salon
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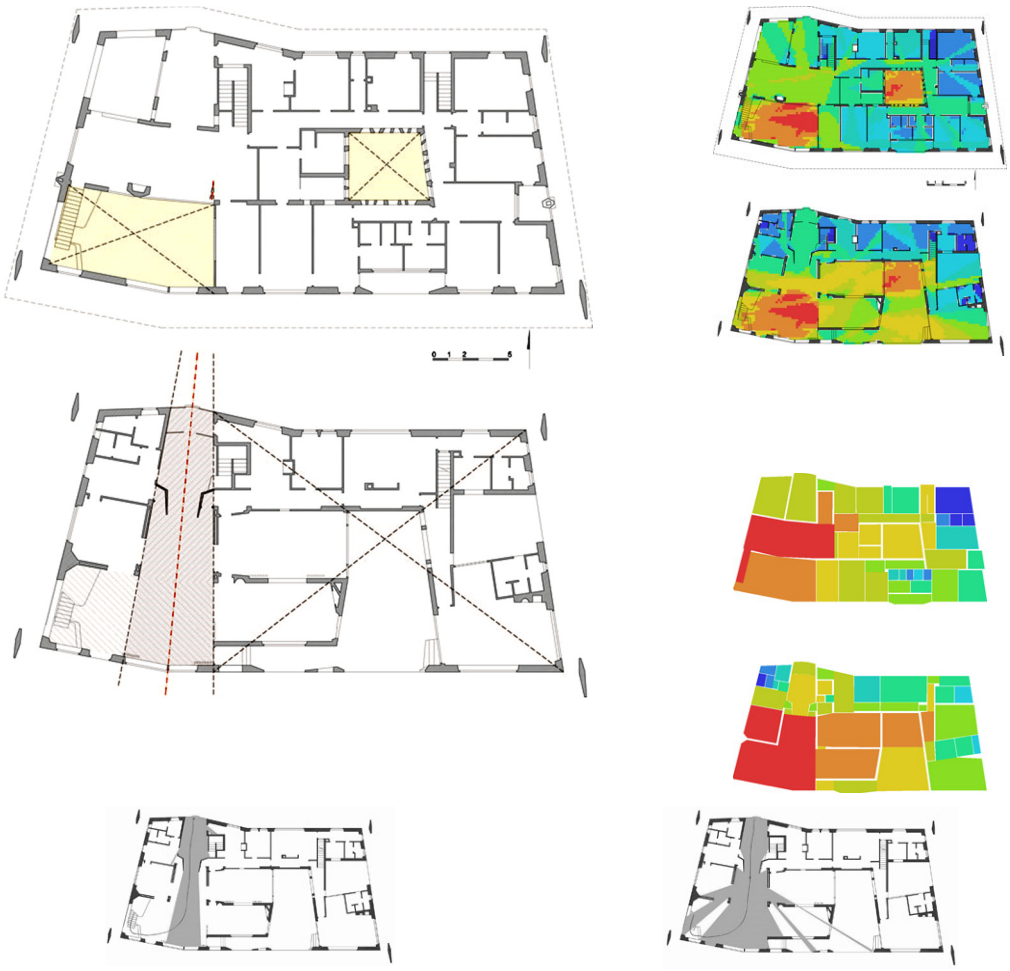

Figure 6: Ponti, villa Nemazee plan; symmetry of the entrance sequence, centrality of the rest of the plan, and diagonal dispersion of the dilated, in section, spaces in the layout; visibility structure; convex integration map and isovist sequence (from the entrance to the living room; floor plans redrawn by the author, on the project's original publication see Ponti 1965).

Coderch: focusing on multiple orientation points

In relation to Coderch's work, two projects which correspond, the first to a case of explicit obliqueness, and the second to a case of implicit oblique geometry of the plan will be here commented. Coderch adopts throughout his career both of these design approaches, liberating in his projects the users' vision towards various orientation points. Besides, the windows in the angle that he defends as design approach, apart from alternating the external outline of the street's front, are also a means to focus, from the interior this time, on slightly different perspectives, and underline differentiated orientation points while grossly favoring one principal direction of vision. In Olano house, built on a river's delta in the northern coast of Spain in 1957, Coderch makes a special effort to emphasize the best views by employing a twin diamond form for the general layout of the domestic space. On one part of the plan the communal living space is accommodated. On its symmetrical other side, the diamond form is dichotomized to comprise the more private rooms of the family, which are distributed by a central hall accessible by the main entrance hall of the house, as well as the service areas (kitchen, pantry and secondary entrance from the north) and the servants' rooms. This last group of rooms, situated in the northwestern part of the house is, as featured by the convex break-up of spaces, the most segregated one with a tree-like distribution corresponding to a corridor-centered arrangement and contrasting the circulation ring of the kitchen and the secondary entrance. The eating corner of the kitchen is equally well-integrated as the distribution hall of the private spaces; the living room is a less integrated space, while the most integrated rooms of house are the main entrance hall and the staircase leading to the lower, subsidiary level. It is possible that the visual sequences set in place will include these important parts of the layout.

The house opens up towards the best orientation and the river facing southeast; but this does not mean that the diamond's angle, which is almost perfectly aligned to the cardinal point of the south, is completely transparent. Instead of entirely dematerializing the specific projecting angle of the layout, Coderch chooses to arrange the polygonal boundary of the living room by alternating solids and openings along contiguous edges. Thus several oblique sequences of visually well integrated points are created in dialogue with the main entrance; they draw the viewer's attention towards differentiated unobstructed perspectives. In fact, while marking the entrance point with a transversal supporting wall, Coderch prolongs the solid part of the perpendicular boundary and places the staircase along this prolongation, thus driving the viewer away from the solid boundary and towards the center of the entrance hall, where he has the occasion to discover additional perspectives towards the northern part of the house, notably towards the distribution hall of the more private rooms and eventually the master bedroom, placed to the opposite extreme of the domestic space. At the same time, the visitor discovers a new vista towards the southern part of the surroundings, overlooking this time not the river but the continental part of the site and the superb natural greenery of the spot. Thus, the more private part of the house is anchored to the land, in direct dialogue with a perspective

of the site's contour, while the more public one, comprising the entrance and the living room, views the water's flow.

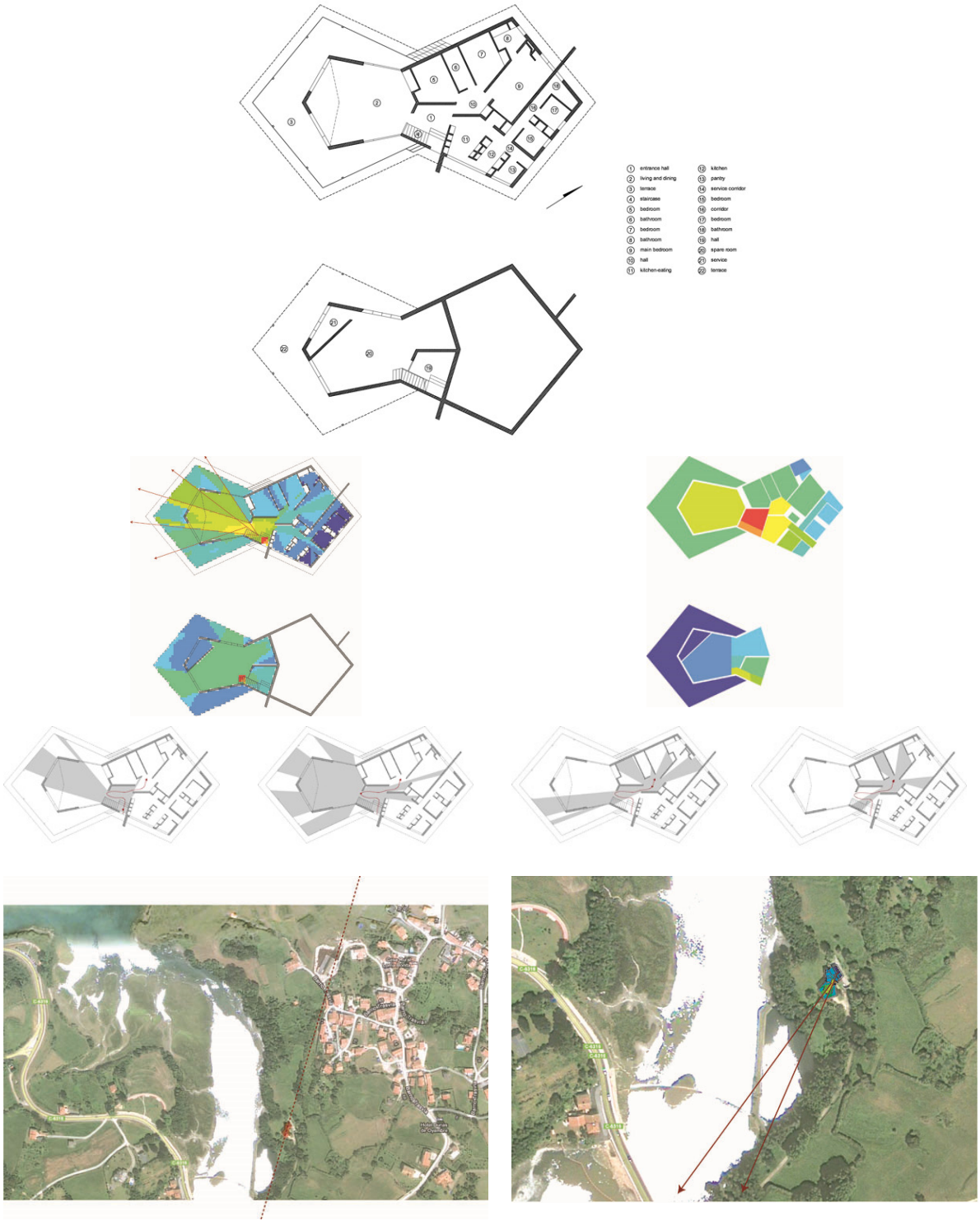

Figure 7: Coderch, Olano house plan (1:500), visibility structure, convex integration map and isovist sequence (from the entrance to the parents' bedroom; floor plans redrawn by the author, see Capitel and Ortega 1978; Fochs 1989; Pizza and Rovira 2000).

Clear distinction between the various parts of the house, is what marks equally the layout of the Uriach House in Ametlla del Vallès in Barcelona region, completed in 1962. This time, and to the opposite of the Olano house that is placed perpendicularly onto the land's contours, the house is arranged in parallel with the site's slope (Diez and Frampton 2005). From a geometrical point of view, the layout is composed by one large square form, comprising both the interior and exterior sub-spaces that make up the living sequence. The southwestern side of the living spaces is left clear in direct dialogue with the landscape while overlapping smaller or larger rectangles, corresponding to the size of private rooms or to elongated circulation spaces, are added onto the three remaining edges of the square. The more private rooms of the house are gathered together in two groups of spaces, one close to the main entrance and the other pushed farther away towards the south.

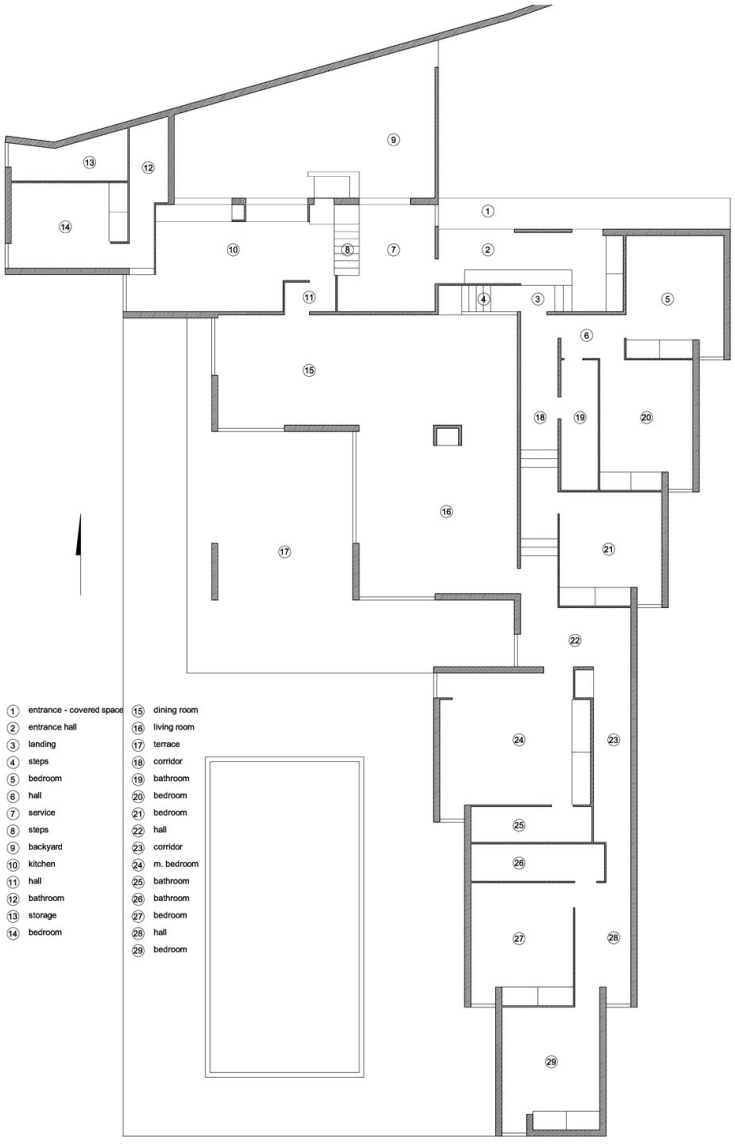

Figure 8: Coderch, Olano house plan (1:200), visibility structure, convex integration map and isovist sequence (from the entrance to the more private areas and through the living room; floor plans redrawn by the author, see Capitel and Ortega 1978; Fochs 1989; Pizza and Rovira 2000).

As featured by the convex break-up of spaces, this last group of rooms is the less integrated one along with the kitchen and the servants' area, while the circulation spaces running on the back of the living sequence remain equally well integrated even to their more remote section. The convex analysis also reveals the equivalent statuses of the interior surface area and the exterior extension of the living room; this house is destined both to indoors and outdoors living. The visibility graph reveals the importance of specific parts of the house, where the moving viewer perceives the extents of the domestic space towards various directions that connect diagonally either communal with communal, or communal with more private sub-spaces. These oblique elongated vistas come as a surprise to the visitor once he climbs the second part of the short flight of stairs leading to the sequence of living spaces. In fact, Coderch prepares the entrance to the house as a sequence of separate spatial 'events' and a gradual procession to the most impressive part of the house, where views to the exterior are possible towards various orientations, and emphasized once more by the alternating arrangement of transparencies and solids along contiguous walls. The visitor arrives first, to a spacious exterior space on one level; he then proceeds to the covered exterior extension of the entrance and to the entrance hall, where a diagonal perspective to the living room and the exterior and a frontal one towards the main linear circulation space are already juxtaposed. He has to change direction and climb three steps to find himself on a first instance to the level of the corridor, and on a second instance, while continuing to the same direction and climbing a few more steps to the level of the living spaces. There he has the chance to enjoy various vistas towards the exterior. As he advances in the dining room, the visitor gradually gains view to additional parts of the house, as the section of the corridor closer to the more private rooms and the corresponding distribution hall. From there, it is possible also for the members of the family to control activity in the formal part of the house, as well as in the entrance, through the channeled vista of the corridor. Finally, a penetrating view to the dining room is possible from the service areas and the backyard with the alternative entrance. Coderch orchestrates views in order to impress the visitor, offer control of the house to the inhabitants and facilitate the everyday functioning of the house.

Discussion

Implicit and explicit obliqueness, established in the plan either through the articulation of sub-spaces and the relative positioning of thresholds (Potamianos/Pouris houses, Pompeian villa, Uriach house) in the first case, or through oblique boundaries (villas Arreaza/Nemazee, Olano house) in the second is used to 'channel' the user's vision in space towards selected directions: to underpin the best view (Potamianos residence) and orientation (Pompeian villa, Olano house), to reinforce the relation between the interior and the exterior or to emphasize multiple perspectives and orientation points (Pompeian villa, villas Arreaza/Nemazee, Olano/Uriach houses). It implies a direct connection between the design and the experiential aspect of the domestic space where the architect composes searching to structure the user's perception of space in very specific ways, varying it and potentially enriching it. From a practical point of view, obliqueness occults in selected spots parts of the domestic space only to restore later the unity of its principal parts adding meaning to the entire composition.

Visual sequences in the spaces of oblique geometry have to do with the gradual building of tension through the hierarchisation of views, contrasting visual directions (frontal with oblique or intersecting oblique perspectives) and strongly varied broadness of fields. In close connection with the houses' main entrance points, and in parallel with other design devices (changes of level, of direction in movement, symmetry/asymmetry, centrality/irregularity of the plan) the concatenation of views through which each architect weaves his spaces takes on a more *sequential* (Pikionis, Coderch - vision is gradually liberated to reach a climax point), or *episodic*

character (Ponti – moving through the house, vision is channeled occasionally towards one or several directions). In this sense Pikionis and Coderch confer in spatial experience a degree of formality quite independent from the configuration of everyday and representational spaces in their houses: such formality is associated with the stronger impact that the sequential ordering of views has on the visitor discovering the domestic space for the first time. Ponti, on the other hand, although clearly distinguishing spaces of subsidiary from spaces of primary function in his houses, he introduces rather an informal lifestyle where the users take on alternatively leading or supporting role in his lasting, surprising spatial spectacles. Such an understanding of formality, as well as the affirmation of the house's unitary compositional character and the potential enriching of spatial experience makes obliqueness interesting for smaller domestic units and more collective forms of inhabiting.

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i Doxiadis created sensation internationally with his doctoral dissertation completed in 1936 at the Berlin Charlottenburg Technische Hochschule under the title "Die Raumgestaltung im Griechischen Städtebau" ("Spatial configuration in Greek urban planning"). His system is based on radii traced by the division of circle into specific angles (30°, 60°, 90°, 120° and 150° or else 36°, 72°, 108° and 144°) and using as start point a spot close to the site's entrance, where the viewer has for the first time a global vision of the site. Such a grid, according to Doxiadis, serves as background for the emplacement of individual buildings in the complex (on the link between Pikionis and Doxiadis' theory see also Tsiambaos 2010).

ii Ponti meets Coderch in 1949 during an exposition organized in Barcelona, Palma de Mallorca and Valencia, in the framework of the Vth National Assembly of Architects and dedicated to the Contemporary Hispano-American architecture. He becomes interested in Coderch's Garriga-Nogués house and starts promoting Coderch's work internationally. It is on Ponti's suggestion that Coderch is assigned with the design of the Spanish pavilion in the 1951 Milano Triennale. After 1948, when Ponti assumes again the direction of the review Domus that he had first launched back in 1928, Coderch has the occasion to publish several of his works in the magazine's pages (Pizza and Rovira 2000; 73).

iii As cited in Pizza and Rovira 2000, 136: "Las ventanas en la esquina las hago por dos razones: la primera para que no haya el choque o rebrote de fachada a fachada como el movimiento continuo de las pelotas que van botando y hacen siempre lo mismo. Que la calle pueda mirarse en diagonal, con lo que el ancho de la calle no se aprecia con la monotonía de las vistas frontales, y que haya una posibilidad de aprovechar las orientaciones. […] Las casas van de dentro hacia fuera, trabajando el subconsciente por la parte de afuera, pero siempre de dentro hacia afuera." (translation in English by AK)