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Aalto's inclusive formal structures: the Villa Mairea

John Gamble

The University of New South Wales
Australia
johngamble000@gmail.com

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Aalto University School of Science and Technology
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In his 1941 article 'Karelian Architecture' Alvar Aalto identified the traditional Karelian house as an important and instructive precedent for contemporary architecture and town planning. One of its most significant qualities, he argued, is that its formal structure 'is the outcome of a methodical development of flexibility'.[1] Through an analysis of the Villa Mairea (1938-39) this paper will show that the formal structure of an Aalto project can be similarly characterised.[2]

For Aalto the quality of a work of architecture is measured by the extent to which it successfully accommodates the full scope of its human and ecological circumstances.[3] The formal foundation for an inclusive architecture, he insisted, is flexibility or 'flexible' order, that is, the generation and coordination of many formal differences.[4] Flexible formal structure, then, arises from the generation and coordination of many different formal relations. In Aalto's architecture the many different structural (coordinated) relations are methodically developed (generated) through three major formal strategies: multiple co-spatial structures of the architectural whole, high levels of formal articulation, and the predominance of non-repetitive relations in dynamic equilibrium. Flexible formal structure underlies the inclusive character of the Villa Mairea, which was built for Maire and Harry Gullichsen and their children on the hillside of their family estate in Noormarkku (Fig.1). At least eight co-spatial structures organise the project whole. One of these is the 'Ridge Structure', the following analysis of which is primarily concerned with the ground level spaces and elements.

The Ridge Structure

The Ridge Structure is founded upon the diverse relations along and across the main ridge of the hill (Fig.2a). Aalto Archive drawings suggest that the ridge was a major design factor. Precisely located on it, as indicated in site plan AAA84-422, is the centrally-positioned pool of the garden behind Havulinna, Marie's parents' house (Fig.2b). Aligned with one of the house's axes, the pool establishes a connection between Havulinna and the ridge topography. The Ridge Structure builds upon this architecture/garden/topography connection and in a most emphatic way. In drawing

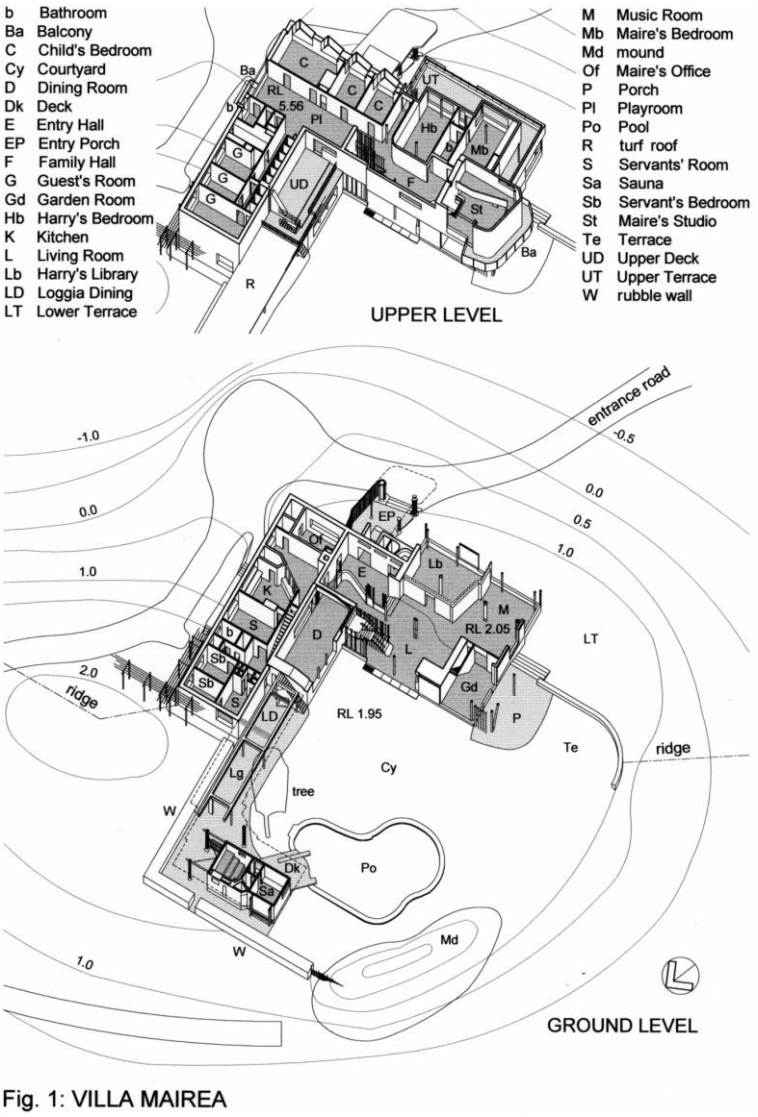

Fig. 1: VILLA MAIREA

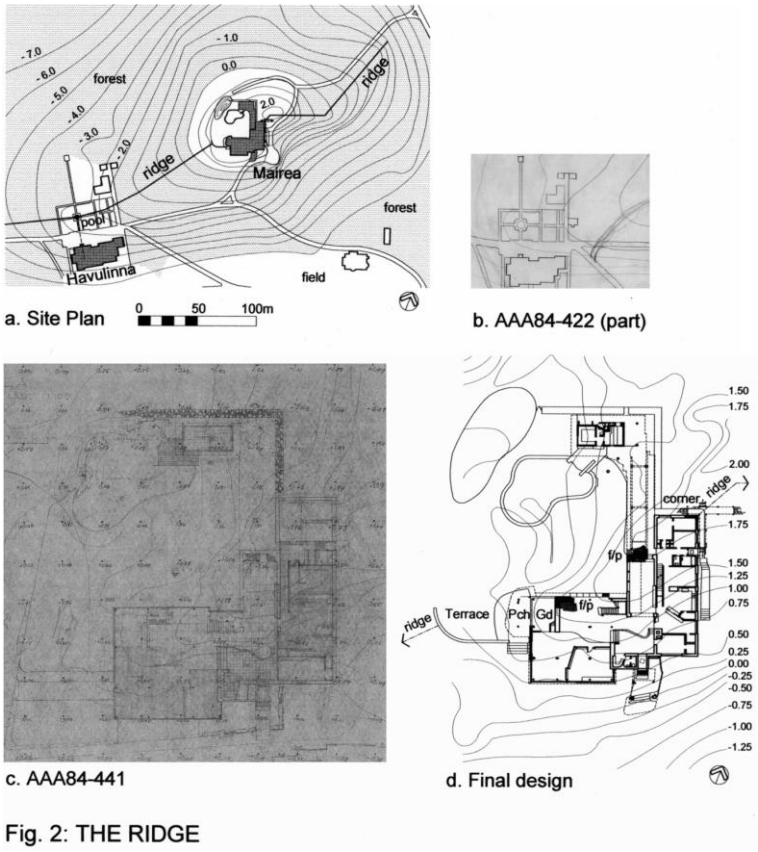

Fig. 2: THE RIDGE

AAA84-441 approximate contour lines have been sketched, apparently by Aalto, over a near-final ground floor plan (Fig.2c). My re-drawing shows the final design with contours extrapolated from the spot levels (Fig.2d). Located on the ridge are key architectural elements: the building's northern corner on the highest terrain occupied by the project, Dining Room and Loggia fireplaces, Living Room fireplace, Garden Room, Porch and Terrace. The curved forms of the last two elements mimic the ridge contours.

The major formal ideas of the Ridge Structure are illustrated in Figure 3.[5] The initial act is the levelling of the land along and across the ridge. This establishes the primary platform for the inhabitation of the site. Defining the platform's two uphill sides is an ensemble of elements built of progressively less refined earth materials (Fig.3a): the house's continuous load-bearing brick wall, spreading out from the northern corner and enclosing the Basement and most of the 'private' interior spaces; the stone rubble wall; and the mound, which is rotated towards the north-east/south-west line of the ridge's descent from the platform. A wooden pergola extends out from the northern corner, parallel to the nearby eastward descent of the ridge from the hilltop. Locked into the brick wall and located on the ridge is an ensemble of masonry elements: the Dining Room and Loggia fireplaces and the rising chimney and stair (Fig.3b). From the fireplaces, the space of the Dining Room extends alongside, and is drawn and stabilised against, the brick wall. The brick and stone elements, mound and Dining Room formally anchor the platform into the hillside. From the Dining Room, which houses the most spatially focused of the project's diverse social gatherings, extend three relatively open spatial ensembles accommodating major communal activities (Fig.3c). Two ensembles extend the axis of the Dining Room: the Entry Hall/Porch and the Loggia/Sauna/Deck/Pool. The third ensemble is the near-square volume located down-ridge of the Dining Room, a relationship that emphasises the square's north-

east/south-west diagonal. Located along this diagonal are the Living and Music Rooms. In all three ensembles the extensions from the anchoring elements are characterised by frame construction, terminations that open out in a direction near to parallel with the ridge's descent from the platform, and internal elements (including the Living Room's masonry fireplace located on the ridge) that anchor the extensions and openings. In general terms, the house stands on the south-eastern side of the ridge while the main external spaces are located over the less steep, more uneven ground on the north-western side.

This integration of architecture and topography frames two distinct sets of diverse structural relations. One set comprises relations between spatial layers on and beyond the platform and organised along the direction of the ridge's descent, diagonal to the house's dominant rectilinear directions (the anchoring elements forming the uphill layers). The other set comprises relations between spatial layers on and beyond the platform and organised across the ridge (the house and the main

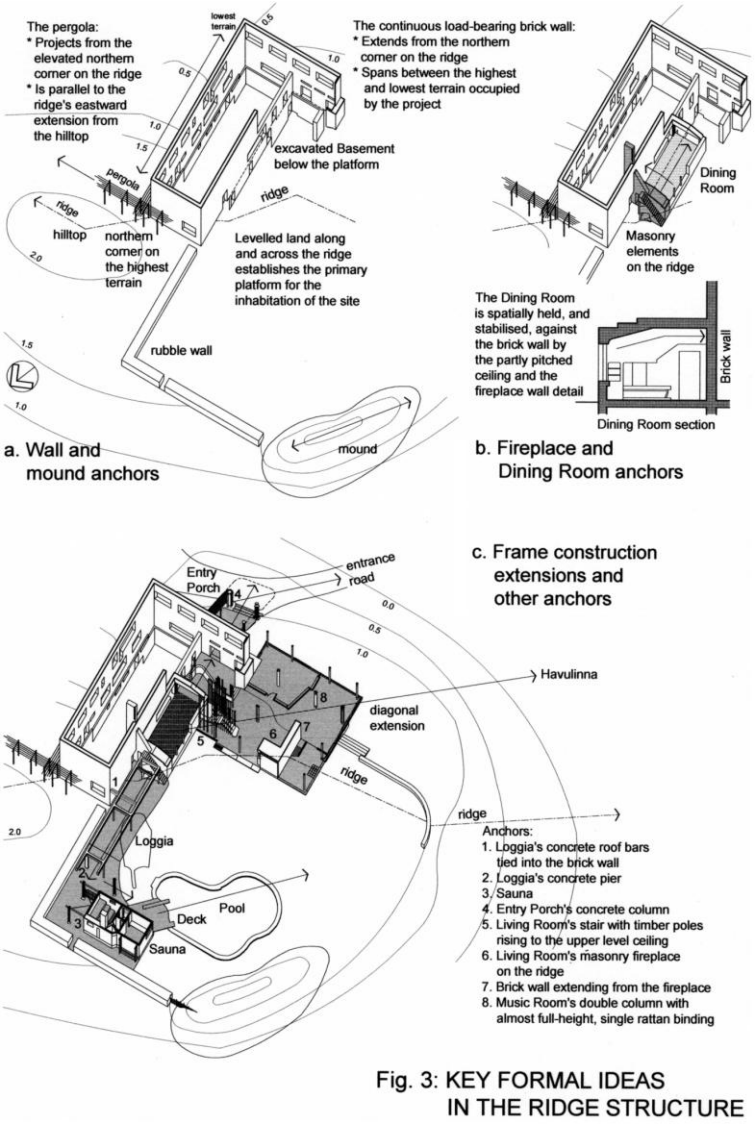

Fig. 3: KEY FORMAL IDEAS IN THE RIDGE STRUCTURE

external spaces forming the two major layers). The compactness of the project's overall plan form reflects the relatively equal significance of the two directions.

Diverse structural relations along the ridge and platform

The levelled land establishes three fundamental relationships between adjacent parts of the terrain in the direction along the inclined ridge: excavation, level land and elevation (Fig.4). The three relationships have different propensities for the accommodation of significant human situations: excavation - enclosure, shelter, withdrawal, intimacy and associations with the materiality of earth; level land - horizontal extension, activity, movement, social gathering and interaction; elevation - outlook, exposure, connection to the outside world and associations with the aerial. These propensities are actualised in several layered/sequenced ensembles of communal spaces along the platform: Dining/Living/Music Rooms (interior ensemble); Loggia/Courtyard/Terrace (exterior ensemble); Sauna/Deck (interior/exterior ensemble) (Fig.5). It should be noted that excavation is evoked as much as actual for, with most of the ground platform raised to just 100-200mm below the hilltop level, it was only required for the Basement and Pool.

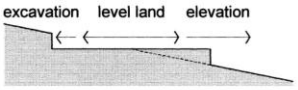

Fig. 4:
RELATIONSHIPS ALONG
AN INCLINED RIDGE

The first space in each ensemble – Dining Room, Loggia, Sauna - is distinguished by its excavation qualities. Its relative enclosure supports the intimate and focused gathering of its activities as well as varied opportunities for retreat from the other spaces in the sequence. The cave-like space of the Dining Room can be closed off from the other interior spaces by folding doors. The Loggia's column and beam system articulates spatial layers that vary in their degrees of withdrawal from the Courtyard. The Loggia also provides shelter for external activities and its

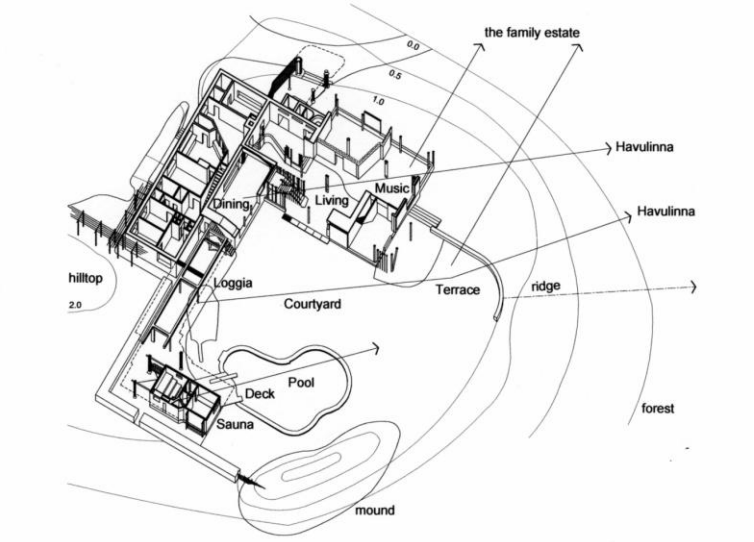

Fig. 5: EXCAVATION, LEVEL LAND AND ELEVATION
IN THE GROUND LEVEL SPACES

excavation association is evoked by its earth materials: turf roof, rough stone fireplace, deep concrete beams and moss-covered rubble wall. The Sauna's tiered benches and high small window provide varying degrees of visual connection to the Deck and Courtyard spaces. Its turf roof evokes the semi-excavated construction of early Finnish saunas.[6] The second space in each sequence manifests the horizontal continuity and generous expanse of level land. This enables the Living Room and the Courtyard to accommodate many diverse activities, diverse acts of gathering and many of the main access routes. Interaction and spill-over of activities is further encouraged by the open connections to the elevated space in each sequence, the Music Room and Terrace respectively. The Deck's horizontal extension reflects its role as a bridge between the Sauna and Pool. The last space in each sequence establishes connections to the outside world. Elevated 1.5 metres above the original ground level the Music Room and Terrace have outlooks towards Havulinna and the estate's more open and occupied southern environments. The Terrace also has direct physical access. These outward connections contrast with the more inward and forest-enclosed orientations of the other spaces in the sequences. The Music Room's bay articulates the corner and edge situation as well as the place of greatest removal from the Living Room. The outlook from the Deck, cantilevering over the Pool, is to an imagined Finnish landscape of lake/Pool, hill/mound and the forest beyond.

The excavation/earth qualities of the Loggia and Sauna elements are contrasted by the aerial associations of the elements at the other, elevated end of the house: the tree-like Porch columns; the Studio's skylight, vertical timber boards and tower-like and canopy-like qualities; the climbing vines; and the elevated brick wall, which bridges between these elements and the anchoring brick wall.[7] These qualities locate the platform between the earth and the sky.

Diverse structural relations across the ridge and platform

The spatial layering across the platform articulates the main subdivisions within the two major layers. In the layering of the house the rectilinear directions are predominant. There are two main layers. One comprises the spaces along the edge of the Courtyard and includes most of the communal spaces – Dining Room, Living Room, Garden Room, Upper Deck, Playroom, Family Hall and Studio. The second, outer, layer comprises the other spaces, most of which are 'private' in character. The Playroom is the only space that crosses the two layers. With the external spaces, the Loggia, Courtyard and Terrace form one layer while the Sauna, Deck and Pool and the mound comprise the outer layers. The diverse relationships between the layers are based upon the topographical situation of the ridge as both the place where the south-eastern and north-western hillsides meet and the place where they separate as each faces away from the other (Fig.6).

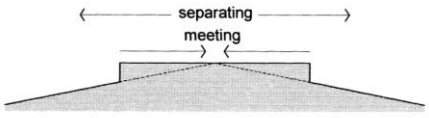

Fig. 6:
RELATIONSHIPS ACROSS THE RIDGE

There are several manifestations of meeting. Located directly over the ridge are all five of the house's fireplaces, four of which are part of major gathering places: Living and Dining Rooms, Loggia Dining and Family Hall.[8] The ridge is thus a place of human, as well as topographical, gathering.[9] Interior and exterior also meet at the ridge, and in diverse ways (Fig.7). Connected at their common fireplace wall by a single solid timber door the exterior and interior dining spaces are separate and distinctly different in their amenity. The closed boundary also reinforces the limited external outlook available from the southern half of the Dining Room. In contrast, a 6.5 metre wide, glazed and fully open-able doorway offers considerable activity and spatial continuity between the multi-use spaces of the Living Room and Courtyard. The Living Room is subtly differentiated. From its most open part, near the stair, the exterior outlook is an expansive one across the Courtyard to the Pool, mound and forest. From the semi-enclosed fireplace/corner space, which provides greater separation from the Courtyard, the exterior outlook is a more closed one to the

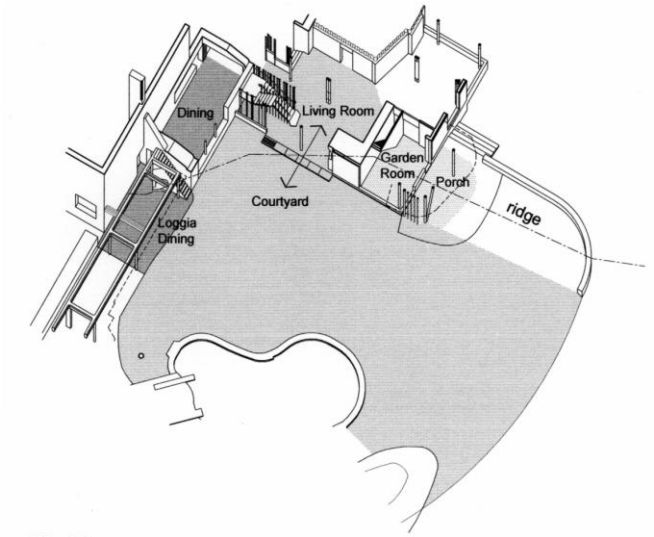

Fig. 7:
INTERIOR/EXTERIOR RELATIONSHIPS ACROSS THE RIDGE

Dining Room and service/guest block. The fusion of interior and exterior is further intensified in the complementary pair of spaces located on the ridge: the Garden Room's material finishes and extensively glazed walls suggest an exterior space while the covered and partially screened Porch possesses some of the qualities of an interior. These diverse interior/exterior relationships are appropriate to the accommodated activities but also offer a variety of environmental qualities that can be appreciated in their own right.

The ridge's separation of the two hillsides is manifested in the project's solar and wind orientations. With the main external spaces located on the north-western hillside and the Living Room, Dining Room, Family Hall and Playroom positioned alongside, all major communal spaces face and receive the afternoon and/or midday sun throughout most or all of the year. The Music Room, located at the southern end of the house's outer layer, has optimum solar exposure. Facing out over the southern-eastern hillside, all bedrooms and bathrooms receive morning sun throughout most or all of the year.[10] The family's bedrooms and Upper Terrace have the highly desirable south-south-east orientation. The prevailing winds in the eight coldest months of the year (September to April) are from the south-east and south and, to a lesser extent, the south-west.[11] Due to its south-eastern hillside location the house shields the main external spaces from the southern and south-eastern winds, which arrive across the estate's open lower grounds. Shielding from the winds from the other directions is provided by the greater depths of the forest on those sides.

Finer formal articulations

Several examples of additional, varied relations generated by the project's finer formal articulations have already been mentioned. The spatial subdivisions within the ground floor communal rooms also manifest this. The diagonal that extends along the platform between the focused gathering of the Dining Room and the outward orientation of the Music Room is countered by the diagonal connecting the Entry Hall to the Living Room fireplace, the symbolic heart of the house (Fig.8a). The second diagonal is strengthened by the Hall's diagonal wall and its subdivision of the space. Within the rectilinear directions of the layers across the platform, the two bays in the square volume's irregular column grid are articulated as places of pause by their resistance to the general spatial flow (Fig.8b-d): the Living Room bay houses the entry to, and from, the Courtyard as well as the upper level; the Music Room bay terminates the interior spatial sequence. The three, different, multiple columns reiterate the diagonal and rectilinear directions (Fig.8e).

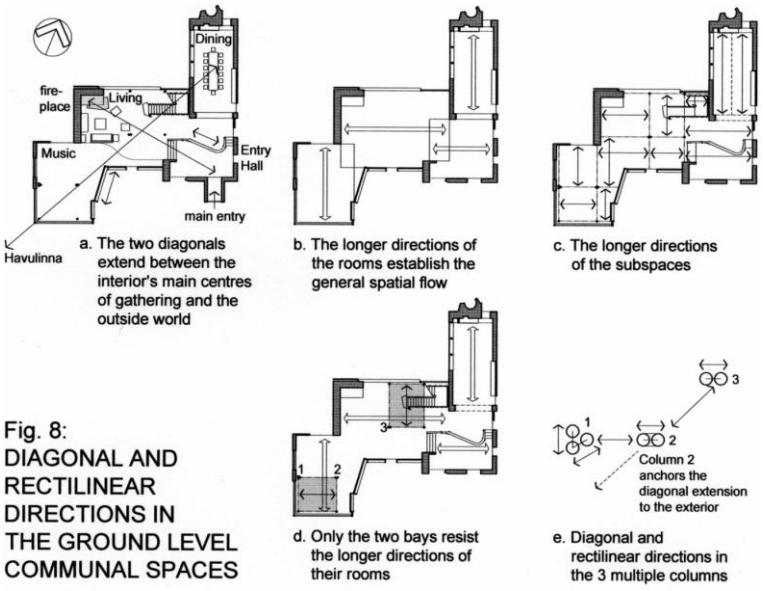

Fig. 8:
DIAGONAL AND RECTILINEAR DIRECTIONS IN THE GROUND LEVEL COMMUNAL SPACES

A methodical development of an inclusive formal structure

The Ridge Structure is one of at least eight co-spatial formal structures of the project whole (Fig.9). Each constitutes a distinct set of parts and relations. Through each the architecture integrates, and is integrated with, particular patterns of living and particular patterns of the site. Co-spatiality is also present within the individual structures, as the two sets of relationships along and across the ridge demonstrate. Multiple co-spatial formal structures of the architectural whole is one of three key formal strategies in the methodical development of the Villa Mairea's many different structural relations. The Ridge Structure illustrates the other two strategies. One is the high level of formal articulation, which generates many parts and, potentially, many relations. The other strategy is the predominance of non-repetitive, often complementary, relations in dynamic equilibrium, such as excavation, level land and elevation along the ridge, gathering and separating across the ridge, anchoring and extending, inward and outward, opening and closing, and the irregular grid. Through this structural multiplicity and diversity many different ensembles/settings, from the project as a whole to individual spaces and elements, are established. It is this that enables the architecture to inclusively accommodate the project's human and ecological circumstances and that identifies its formal structure as 'flexible'. Other Aalto projects can be similarly characterised.[12]

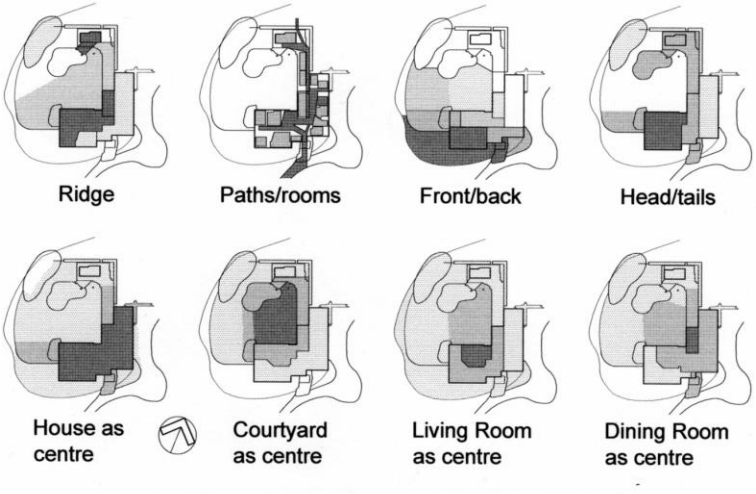

Fig. 9: CO-SPATIAL STRUCTURES OF THE PROJECT WHOLE

Because the different structures are associated with different patterns of living and of the site, there is constant movement among them as the ever-changing events of life in and around the Villa Mairea unfold. As some structures come to the fore others recede. Together in their co-existence, however, they establish an ambience of generosity, and one that is sensed intuitively far more than analytically.[13] The movements can give rise to a perception of formal fragmentation, of a lack of formal coherence in the project as a whole. However, the above analysis suggests that such an experience is just one of the many possibilities afforded by the inclusive character of the architecture's formal structure; rather than, as might be proposed, that fragmentation is the foundation of this inclusiveness.

[1] Alvar Aalto, 'Karelian Architecture' (1941), in *Alvar Aalto In His Own Words*, ed. by Goran Schildt, (New York: Rizzoli, 1998), p.118.

[2] 'Formal structure' is defined here as the mutual relation of constituent parts or elements of a formal whole. Based on Williams' definition of 'structure'; Raymond Williams, *Keywords*: a *vocabulary of culture and society*, (London: Fontana, 1988), p.301.

[3] Alvar Aalto 'Rationalism and Man' (1935), in Schildt, pp.89-93; 'The Humanizing of Architecture' (1940), in Schildt, pp.102-107.

[4] Alvar Aalto, 'The Reconstruction of Europe Is the Key Problem for the Architecture of Our Time' (1941), in Schildt, pp.150-157.

[5] Related ideas are present in Aalto's own house and studio in Helsinki (1935-36).

[6] The connection to the early saunas is discussed in Kari Jormakka, Jacqueline Gargus, Douglas Graf, *The Use and Abuse of Paper*, (Tampere, Tampere University of Technology, 1999), p.47.

[7] These two brick walls have white-washed external finishes. All of the house's other external masonry walls are rendered and painted or tiled.

[8] The Family Hall and Studio fireplaces are directly above the Living Room fireplace.

[9] This strategy is found in other Aalto projects. At Paimio Sanatorium (1928-32) the communal sun terraces are located directly on the ridge and face southwards. The adjacent patient rooms (two patients in each room) are rotated off the ridge and face the south-eastern morning sun. This enables the shared spaces of the entrance court and entrance foyer to be located on the ridge. At Jyväskylä Teachers College (1950-64) the Library, Student Union Building and the Main Building housing the main lecture and class spaces and the main public-use spaces are located on the ridge.

[10] Maire and Harry Gullichsen's bathroom receives morning sun via a glazed hall, which also provides privacy from the Upper Terrace.

[11] Based on data for Pori Airport from the Finnish Meteorological Institute, Helsinki.

[12] My research has also analysed the Aalto House and Studio (1935-36), Jyväskylä Teachers College (1950-1962) and the Wolfsburg Cultural Centre (1958-62), with similar conclusions regarding their formal structures.

[13] Very similar ideas are presented in Susanne Langer's characterisation of a good work of art as an inclusive, ever-changing matrix of emerging and receding projections/structures. Susanne K. Langer, *Mind: An Essay on Human Feeling*, (Baltimore: The John Hopkins University, 1988), p.84.