ABSTRACT - This essay stems from a dissertation that studies the "architectural wall" from a conceptual point of view. The wall acts in space in different ways and can present the purpose of emplacement, reference, articulation, enclosure or of an inhabitable wall. Among the wall types studied in the thesis, the wall that performs as an articulation agent is described in this paper. For that matter, a group of architectural works, that translate in a definite manner the operativity of this theory, is presented. Through the analysis of these case-studies, the definition of the type, by its determining properties, is reached. Besides considering this research as a scientific instrument in the field of architecture to understand the comprehensive element “wall,” which further interacts with man and its environment, it is also regarded as a didactical means. Through the acknowledgement of the properties given in the tables and diagrams of the type, it is possible along the process of design to identify this architectural element within its complex play of variables, and thereby use it in a more scrupulous and consequent manner.

Keywords: architectural space, articulation, concept, wall

Architecture is based upon principles that have originated in specific concerns since its early manifestations. These maintain a permanent connection with the ambits of construction technology, structural system, aesthetics, site, climate, society, and the individual to whom it serves. In this way, finding built structures that best respond to all the concerns of the discipline has been a permanent objective. A complex task of identification
and acknowledgement of the existing conditions and a final proposal that aims to synthetize the answer to every single issue. Sustainable architecture or sustainable materials are ideas which are very present in the conscience of everyone nowadays. But this does not mean though that they were not already present in the discipline or have even been put aside at some point in history. Being core principles of architecture as they are, they have always constituted a clear guidance to practice.

On the other side, architecture is also a wide field of knowledge where experimentation in variousambits frequently happens. In this sense, during the last century, many advances have been made around the construction technology. On this path, widely spread in most of the countries, the connection with the materiality, mass, solidness of architecture has been lost to a high degree, enhancing the accent on the use and expression of processed materials, and relying on technologically advanced installation systems. Nevertheless, and as a normal process within the field, other lines of work, which tracked a different path, have simultaneously evolved. The one where the use and exploration of the massive architectural element is understood as a potent instrument in the fulfilling of many of the everlasting concerns in architecture, is one of them.

THE MASSIVE WALL AS AN OPERATIVE PLANE IN SPACE

In the following paragraphs, a research on the properties of a massive architectural entity, as a most advanced instrument in the completion of architecture, is presented. It focuses on certain types of walls of homogeneous materiality which trigger a freer design process, connected with the sensibility of the author and with the emotional response from the user.

This research starts with the interest in the architectural, landscape or urban manifestation of those walls that have been erected to “limit,” proposing a conceptual approach to these instances. One of the objectives of the study of the “wall” as an autonomous entity is to arrive at an architectural proposal of identification of different case-studies that are considered paradigmatic in their “primary” characteristics. These are understood as the attributes of a wall that make it identifiable in relation to a certain architectural purpose or concept - for example, “articulation,” “conformation” or “emplacement.” In this way, those characteristics will be considered operative, and, at the end of the research work, it will be possible to gather a set of new architectural design tools.

The wall that is being studied is a massive element of predominantly homogeneous materiality, built with the materials that in the current panorama can be considered as traditional (stone, brick, concrete). It presents the necessary architectural entity to constitute a powerful design instrument, manifesting itself as an operative plane in space. In particular, and as shown in this essay, it can perform as an agent for the action of articulation within the architectural work, helping to reach a coherent object.
The massive wall is present in our contemporaneity, after a long evolution in the historical period of the discipline. Along the history of Architectural practice, there have been though some issues related with the identity of this “individual” wall which is being studied here, that are still relevant, in particular the theoretical speculation around its real massiveness. In this respect, the approach of a contemporary architect, E. Souto Moura, intimately compromised with the utilization of the massive wall, can be referred. The architect, aware of the technological changes undergoing its physical constitution, points out the disappearance of this architectural entity: the solid wall, element of a considerable thickness, opposes the contemporary light wall made of transformed materials, in which thickness becomes irrelevant, and that eventually disconnects from the function of architectural plane able to operate in space. The conformation of this element is thus divided in two sub-elements, the structural support, and the “skin.”

The concept of duality on the wall is not new and it has been discussed since the antiquity, when Vitruvius considered the existence of two constituting parts, the structure and the ornament, this understood as a kind of external cover to the tectonic structure. The radical translation of this approach is to be found with some figures of Modern Architecture, when the introduction of the physical separation between the construction frame and the exterior curtain wall occurs. So that when the curtain wall is a glass structure, the “massive wall” entity is in fact cancelled, as it had started to happen with Gothic architecture.

In the current research, the interpretation of the wall as a comprehensive element (with its characteristics of thickness, construction, structure, texture, color) detaches from the theoretical formulation which advocates a division of the wall into two or more entities.

In what concerns the wall as an essential operative element, it is important to refer still to a more recent architectural period, in particular the theoretical approach given by the contributions of Theo Van Doesburg and Gerrit Rietveld, associated with the De Stijl movement, when a new interpretation of the (wall) plane in space was proposed. Considered here as an abstract, neutral element that can extend to the infinite, such a formulation derived from more general principles of the movement that, according to Kruft, sought to “establish an art of scientific precision, (...) free of subjectivity, feeling and nature.” In the Schroeder house, with Rietveld, or in the set of Doesburg’s “counter-constructions,” a conceptual function is given to the wall plane, as an autonomous abstract piece with a predetermined form, and space-generating.

The hypothesis in the underlying theory of this research is based upon five essential case-studies that present walls with fundamental characteristics which allow them to be identified as conceptually distinct types. These are formulated as the “wall that articulates,” the “wall that references,” the “wall that emplaces,” the “wall that encloses” and the “wall that is inhabited.”
The type that this essay will focus on, the “wall that articulates,” represented in the hypothesis by the case-study “the Millan house” (CS1) by Paulo Mendes da Rocha (Table 1, Figs. 1, 2), is an architectural element that relates different areas, be it the binominal interior-exterior, public-private, profane-sacred, etc. The value that first leads to the theoretical formulation of this wall derives from its spatial concept, in this case the ability to articulate space within the bigger built structure in which it stands. A second value that, for its affinity with the intermediation in the transition between different space ambits, consolidates the general definition of the type, is the property of “organization of the functional program.” The initial definition of this wall is made then through a primary and a secondary characteristic that is to be translated in the synthetical recognition rule: “the “wall that articulates” is an architectural element that allows the spatial transition between different scopes while it organizes the program in the building.”

The other concepts developed in the research hypothesis, the “wall that references”, the “wall that emplaces,” the “wall that encloses” and the “wall that is inhabited” are succinctly formulated as follows.

The “wall that references” is understood as the element that signals a built structure in any considered context. The characteristic of the wall that leads to the definition of a new type is thus the element’s ability to directly interact with the physical environment where it is to be found, functioning as a vehicle to a meaning. The secondary characteristic that completes this concept, corresponds to the high degree of aesthetical treatment that the wall presents. The synthetic definition of the new type is translated in the recognition rule: the “wall that references,” element of refined aesthetic value, supplies the building with the quality of an architectural signifier in the physical context where it is settled.”

The “wall that emplaces” will be the architectural element that guides the settlement of a structure on a given site, determining the occupation of space. This wall, taken as the point of departure of the project, conditions the whole edification and limits the area to be used by the program. It comprises then the ability to translate a specific condition of the site where it stands, not allowing, at the same time, spatial deviations to its initial form. The synthetic definition of the proposed wall type says: “the ‘wall that emplaces’ is an architectural element intimately related to the site, which determines the limits of spatial occupation of the built structure in the territory.”

The “wall that encloses” is, on the other hand, an element that creates space according to a pre-determined form, while maintaining an independency from the physical context in which it is to be set. Its ability to shape a unitary space of elemental geometrical form, together with the circumstance that doing so, it allows the organization of the whole functional program in the built structure, constitutes the values that make this wall act in a specific way in space. Its definition is to be translated in
the recognition rule: “the “wall that encloses” is an architectural element that, while generating a regular unitary space, organizes the functional program of the building.”

Finally, the “wall that is inhabited” is the wall type that contains usable space in its own depth. This type, defined by one sole property, can be used as a counterpoint to the other described types, given that it generates space in a fundamentally different way from the others. It is a wall of greater elementality in its architectural interaction, only operating in its core, and it can be understood as the situation where the wall, as an agent in the generation of space, reaches its limit. Because of its distinctive character, the type “wall that is inhabited” is not an excluding concept in relation to the other four types. The four walls mutually exclude each other because they are the vehicle for competing spatial concepts. A “wall that articulates” cannot simultaneously be a “wall that references” or emplaces or encloses, while the concept of a “wall that is inhabited” can in fact combine with that of a “wall that articulates,” or any of the other four types, given the essential difference in their concept’s formulation.

For the pursuance of this research, it is considered essential to manage practical examples, using therefore the “case-studies” method of analysis. The analysis thus achieved will later lead to a theoretical scheme that seeks to organize knowledge of the architectural element from a conceptual point of view. The proposal or definition of the wall type, as a conclusion in the research work, will consist of the characterization of this theoretical element through properties: the “primary characteristic” and the “secondary characteristic,” being the secondary characteristic a dependent property, associated with the primary one. The existence of “constraints,” which correspond to any restrictive architectural characteristic inherent to the type, will also be considered. The synthetic formulation of the architectural type in this research is carried out in three different, complementary ways: in the form of “recognition rules,” diagrams and qualitative tables.³

As said, one of the proposed types in the theory, the “wall that articulates,” is presented in this essay. For that purpose, the analysis table of the practical examples that belong to the group (Table 1) is set out, followed by the definition of the type.

Following the great specificity of the architectural element that is being analyzed, clear boundaries are established for the case-studies that are considered valid in this research. The wall in the set of examples of the type, must then present certain essential characteristics. The first a priori requirement that it has to show in order to be an element of analysis is an “intrinsic autonomy.” In other words, although the wall is inserted in a set of connected walls, it must be possible to understand it as an isolated element that can operate independently in space. This aspect will be the characteristic common to any wall here considered, essential although not decisive, for its inclusion in the group.
### CASE-STUDIES

<table>
<thead>
<tr>
<th>Wall in Single-Family House</th>
<th>Wall in Single-Family House</th>
</tr>
</thead>
<tbody>
<tr>
<td>São Paulo, 1970</td>
<td>Portugal, 1978</td>
</tr>
<tr>
<td>P. Mendes Da Rocha (CS1)</td>
<td>A. Siza Vieira (CS1.1)</td>
</tr>
</tbody>
</table>

#### Figure 1. Ground floor plan

#### Figure 2. Section through wall

#### Figure 3. Ground floor plan

#### Figure 4. Section through wall

<table>
<thead>
<tr>
<th>FORM</th>
<th>Wall in Single-Family House</th>
<th>Wall in Single-Family House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined and open form; plane with very few openings; different heights</td>
<td>Rectilinear irregular form, open; plane with some openings; different heights</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXTENSION IN THE BUILDING</th>
<th>Wall in Single-Family House</th>
<th>Wall in Single-Family House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big extension: alternation of different scopes (public-private; exterior-interior)</td>
<td>Big extension: alternation of different scopes (exterior-interior; interior-interior; exterior-exterior)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RELATION WITH THE SURROUNDINGS / PHYSICAL CONTEXT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>AESTHETICAL FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual processing of the material surface (visible casted concrete);</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPACE GENERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space generation from both faces of the plane</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROGRAMMATICAL FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relates contiguous spaces in the program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSTRUCTION SCOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casted concrete wall with more than one construction dimension (exterior wall, retaining wall, plot wall)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRUCTURAL FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural concrete wall</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONSTRUCTION SCOPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painted plaster brick masonry wall with more than one construction dimension (exterior wall, interior wall, plot wall)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRUCTURAL FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural wall (concrete frame in perforated brick masonry wall)</td>
</tr>
</tbody>
</table>

Table 1. Analysis of case-studies of the “wall that articulates.”
<table>
<thead>
<tr>
<th>Wall in Arch. School Building</th>
<th>Wall in Chapel</th>
<th>Wall in GM Exhibition Pavilion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Porto, 1994</td>
<td>Ronchamp, 1950</td>
<td>World Exhibition Fair, USA, 1940</td>
</tr>
<tr>
<td>A. Siza Vieira (CS1.2)</td>
<td>Le Corbusier (CS1.3)</td>
<td>Albert Kahn (CS1.4)</td>
</tr>
</tbody>
</table>

Table 1 continues.
The second characteristic, which will make it eligible and which, in the end, is the particularity that will give rise to one type being different from another, is manifested through the aforementioned “primary characteristic.” That is, the attributes of the wall that make it identifiable in relation to a certain architectural purpose or concept – in this case, the “articulation.” Apart from these specifications, no other limitations on its characteristics (such as shape, dimensions, construction method, structural function) will be set out.

The group associated with the proposed wall type presents five case-studies that seem decisive to illustrate the spatial concept in question. These examples diverge from each other in their architectural complexity, in the sense that the wall may interact either with many or few ambits of the architectural structure. On the other hand, and since the goal is not to elaborate the evolutionary line of the wall concept, but to gather the most resounding examples of a concept that is being proposed, the selected cases can either belong to different historical periods or be found in one single architectural period. In this way, in the group of the “wall that articulates,” case-studies of works from the twentieth century are set out. Although the data collection has occurred both in the historical period, in the architecture of the twentieth century and the contemporaneity, the cases identified as most relevant were to be found within the twentieth century.

As mentioned, to define what in this research is proposed as the type “wall that articulates,” the case of a wall in a single-family house – Fernando Millán House, São Paulo, 1970, by Paulo Mendes da Rocha (CS1) is selected. The wall (marked in plan and section), which extends on the ground floor of the building is considered a single element that unfolds into rectilinear and undulating sections. In a certain extension of its development on the ground floor, the wall rises to form the parapet of a corridor on the first floor; in another section it partially goes down to the basement floor, forming the retaining wall of a lowered patio.

Differing from all the other walls in the house, its flexible shape and the different heights in the different planes, contribute to establishing its own entity, contrasting with the rigidity of the regular square volume. Likewise, the wall follows a sequence in space that conditions and organizes the built volume: it starts as a pool wall, entering then the private space on the ground floor, adjoining next the boundary of the plot and finally resuming the plot line which faces the street.

The second example in the group is the case of a wall in a single-story house (CS1.1), emplaced in a plot of small dimensions and irregular shape. The house - Álvaro Siza, 1978, Portugal - is based on a “U” shaped layout that merges with the delimiting walls of the plot. The wall here shown (marked in plan and section (Table 1, Figs. 3, 4), as an element “that articulates” contributes to this end. The wall acts autonomously and regulates space. The direction at its
intersection with the built volume follows the west-east axis, in this way dividing the house into one volume to the north and another to the south. The shape of the wall leads to the appearance of irregular and unexpected spaces that create the singularities in this work.

In the third example (CS1.2), the wall that is analyzed is part of the north building of the complex implemented by the Faculty of Architecture in Porto (marked in plan and section (Table 1, Figs. 5, 6). This element extends through three planes with different directions that consolidate the upper-level limit of an exterior square.

The autonomy of the selected element is appreciable if we take into account the general organization of the built complex. The wall differs from the rest by the non-orthogonal directions of its planes, as well as its apparent ability to organize the connection between the buildings it hides behind. The three planes respond to an order of programmatic development: the main access to the building, the museum space whereas the third plane constitutes the lateral façade of the faculty library. The same wall becomes decisive in the organization of the wide exterior space – the central square of the whole built structure – in crescendo. The wall, as a determining element in the establishment of a set of spatial relationships that create an order in the architectural whole, can be understood as a “wall that articulates.”

The status of the fourth analyzed case (CS1.3) – the Ronchamp Chapel – is that of a permanent reference in architectural theory and practice since the Modern Movement. The reasons for choosing the south wall of this chapel (marked in plan (Table 1, Fig. 7), which forms the main entrance to the temple, as an example of the articulating wall, derives from various characteristics.

Observing the chapel as an architectural object that can be decomposed into isolated parts - in particular in its division into vertical planes - the existence of three entities is proposed. In the first place, is the south wall of the chapel, the façade where the access of the faithful is located. The west entity is the second element identified: an irregular curvilinear plane that, in plan, folds inwards at its ends to form two chapels. Finally, is the north-east entity, which is shaped by the curvilinear north plane and the east plane, curvilinear and bending perpendicularly to form a secondary access to the chapel.

Although all the entities identified are plausible to be considered as autonomous, the same cannot be stated in relation to the presence of the properties of the “wall that articulates.” Among them, the south wall of the chapel, endowed with a wide variety of architectural relationships, presents, a priori, the characteristics that correspond to the articulating type.

The fifth case in the group (CS1.4) shows a wall (marked in plan (Table 1, Figs. 8, 9), in a building by Albert Kahn (1896-1942), a pioneering American architect in the use of the newly discovered reinforced concrete and its
novel advantages. He is known for extensive work on industrial buildings, along with the General Motors pavilion for the Universal Exhibition of 1940. The pavilion building, which in plan shows a symmetrical and axial layout, presents on the façade that constitutes the public access to the exhibition, the exception in the whole built structure. The independent entity of the selected wall is evident, through its curved and rising shape that breaks the orthogonal layout of the big container of the exhibition scenarios. The wall has a most prominent architectural function in the organization of the exterior space of the building, operating as a “wall that articulates.”

**Synthesis of the Characteristics of the “Wall That Articulates”**

The analysis table of the case-studies in the group gives the intensive information needed to define the wall’s most relevant features. The first category in the chart, the “form” of the wall, focuses on its characteristics in plan and elevation. Considering the set of analyzed examples, it is observed that the wall presents various geometric conformations - straight, curved or combined - that develop in a minimum of two planes, being able to present more. The shape of the element is nevertheless invariably open and with different or changing height. The principle of the conformation of the wall is thus represented in plan through a flexible generic form, valid for all case-studies of the type, as shown in Fig. 10. In this representation, another relevant characteristic closely related to the shape of the wall can be added: its performance or the directions in which the “generation of space” occurs. And in view of the analyzed examples, it is then concluded that the general form can operate in both directions of its vertical plane. Both spaces are deeply controlled and guided by this type of wall, independently of their function.

![Figure 10. Generic form and space generation of the “wall that articulates.”](image)
Moving on to the category “extension in the building,” which will describe, besides the value of the length of the wall, the spatial areas through which it develops (public, private, exterior, interior, etc.), it is observed that the extension value alternates, in the different architectural works, between a large development - cases of the two houses, CS1 and CS1.1, and the faculty building, CS1.2 – and a small development – cases of the chapel, CS1.3 and the exhibition pavilion, CS1.4. That is, the wall manifests its concept either through a reduced presence in the building or through a large extension.

In the category “relation with the context,” the absence of a positive value in the presented cases stands out as a dominant feature, counteracted by the example of the faculty building, CS1.2, in which the wall emerges as reminiscent of the pre-existing built structures on the site. The analysis leads to accepting that this element operates mainly in an autonomous way in relation to the site. That is, the set of its properties allows the wall to create coherent space without the need to refer to the context of its surroundings.

When it comes to the analysis of the “aesthetic function” of the case-studies in the table, it is observed that the wall is an element that allows, and is the support for, plastic surface treatment as well as compositional treatment of the vertical plane, being this evident in four of the architectural works. Within the vast concept of Aesthetics, pending between rational and emotional aspects, the case-studies offer diverse kinds of experience to the observer. With the visible concrete wall of Mendes da Rocha, CS1, the limiting element is freed of any constituting layers, becoming more understandable to the user. Furthermore, the raw texture of the material that faces both the interior and the exterior space, evokes a sort of connection with the environment, in the analogy it creates with the use of natural materials (stone blocks, brick, wood). The possibility of a haptic and visual experience of the rough surface in the habitable space allows a more realistic perception of the built limit. In the case of the curvilinear wall of the exhibition pavilion, CS1.4, a conscious/unconscious association of its exterior surface with the subject of the fair, is searched. The metallic paint of the wall simulates the “Duco” finish of the cars, relating, in this manner, to the strong industrialization and emergence of new materials, characteristic of those years.

This versatile character of the type, in its aesthetic aspect, is repeated in an obvious way in the architectural category “construction dimension.” Most of the studied cases comply with more than one construction function: the wall alternates between the entities of “interior wall,” exterior wall, garden retaining wall or even a plot limiting wall. In spite of it, it is clear though that the materials and building techniques have two main sources: on one side, the local contemporary systems, like the plastered masonry wall, and on the other, the international technique of reinforced concrete.

The wall in Ronchamp, CS1.3, is pointed out as an example of the intensive
exploration of massiveness for the achievement of different features: the “excavation” of niches, the insetting of irregular sculptural openings (that through its inclination and the use of tinted glass allow the flow of natural light with different angles and colors) and for the inclusion of the concrete frame. On its turn, in the wall of Siza’s house, CS1.1, built with plastered brick masonry, the element’s complexity and changing character through its extension is made visible in the construction details – the layered wall adjusts its composition to every geometrical cut, turn or rotation.8

Returning to the wall’s capacity of “generation” indicated in its general form, it is enquired now how does this category actually manifest in the “organization of the building program.” And through the comparative analysis of the examples, two types of programmatic relationship between the areas that are generated on both sides of the wall, have been identified. The first situation is one in which the architectural element organizes “complementary” spaces in its programmatic function – Siza Vieira’s house, CS1.1, is an example of it. In the north side of the house, both interior rooms – adjacent patios, and bedrooms – corridor generated on both sides of the wall, are biunique related spaces. The three entities that are present in each section of the wall, be it the trinomial “room-exterior wall-patio” or “room-interior wall-room,” are inseparable in its programmatic function.

The second type of programmatic relationship that the wall provides is the generation of “contiguous” spaces, those which will function independently on each side of the wall. In the case of the Ronchamp chapel, CS1.3, it is understood that the spaces on each side of the South wall do not interact in a direct way: there is no communication from the outer space with the nave inside or between the altars on the east side of the chapel. In this case, the visitor is compelled to walk or circumvent the whole extension of the wall, to be able to access the sacred areas. The situation of the wall in Albert Kahn’s exhibition pavilion, CS1.4 is quite similar, and still another example of generation of spaces that operate in programmatic contiguity. There is no visual relationship between inside and outside, nor it is desired since the wall is meant to be a separation between the opposite areas of the real exterior space and the simulated reality of the exhibition space.

Finally, looking at the “structural assessment” category in the analyzed cases, it is concluded that this wall invariably comprises a structural function in the building – either as a screen wall, retaining wall or containing the structural frame. Nevertheless, the element maintains its quality of extending in space in a non-constrained fashion, at the same time as it clearly detaches from any intention of structural representation. These characteristics point out to an architectural element that has a role in the fundamental structural achievement of the building along with the ability to operate on its own, with unrestricted possibilities of form, extension, and as a plain support to an aesthetical dimension.
The Operability of the “Wall That Articulates”

Through the analysis table of the cases belonging to the type, an objective description of the most relevant characteristics of the “wall that articulates” has been reached. The operability of the wall type will now be defined considering the relevance of its “primary” property and “secondary” property, together with the “constraint factors” acting within it, versus its scope of use.

The determination of the type in this research is given by the “conceptual justification” of the wall as presented in the hypothesis. At this point, it is understood that all the walls here analyzed have the same intervention purpose in space. In its autonomy and preponderance in the buildings in which it is identified, the wall relates areas that correspond to different scopes: it mediates the public space with the private, the profane with the sacred, the interior with the exterior and the nuances between the two extremes. Furthermore, it is shown that these confronted spaces can either function in a complementary way or a contiguous manner.

The synthesis table for the definition of the type (Table 2) is presented, and the validated recognition rule that describes it is stated as follows: “the “wall that articulates” is an architectural element that allows spatial transition between different areas, organizing at the same time part of the program of the building (such as a single-family house, a religious building, faculty building or an exhibition building).”

The primary property targeted for the “wall that articulates” – shaping the spatial transition between two different areas – is a basic and essential function for architecture. The architectural wall, in general, has fulfilled this function for ever, a fact that would consider most of the architectural walls as identifying with the “wall that articulates.” However, this type does not limit its performance to that essential capacity. Throughout its extension, the wall also organizes the program of the building – fact that translates into the second referred property. This being so, what will differentiate this wall is the presence of the two circumstances. A wall represents the type “that articulates” if, by the mediation of two different areas, it is also able to organize the building program.

<table>
<thead>
<tr>
<th>WALL TYPE</th>
<th>THE “WALL THAT ARTICULATES”</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIMARY PROPERTY</td>
<td>Spatial transition between different areas</td>
</tr>
<tr>
<td>SECONDARY PROPERTY</td>
<td>Organizes the building program</td>
</tr>
<tr>
<td>CONSTRAINTS</td>
<td></td>
</tr>
<tr>
<td>SCOPE OF USE</td>
<td>Single-family house; religious building; faculty building; exhibition building</td>
</tr>
</tbody>
</table>

Table 2. Definition of the “wall that articulates.”
This wall, although an element with a decisive presence in the architectural structure, has inevitably some aspects that can be considered less advantageous in relation to the specific use of the building. In the different functional programs where it has been analyzed, restrictive situations have been found in the cases of the single-family house of Mendes da Rocha, CS1 and the faculty building of Álvaro Siza, CS1.2.

Regarding the house CS1, it is understood that the construction aspects of the articulating element are considered as a secondary issue, in favor of its material and aesthetical “purity.” With the aim to maintain the homogeneity of the casted concrete in all its extension, the various construction functions correspondent to the different scopes through which the wall extends, are apparently ignored. The wall does not adapt to those functions by means of the addition of different layers giving, in this way, the chance for building damages to occur. The water recollection on the semi-green roof, thought as a measure for thermal control, overcomes this aspect in the main volume of the building but it cannot respond to all demands posed by the long and varying wall. On the other hand, the high massiveness of the pure element, which is only perforated for the insetting of a few doors, leads to a more difficult access to direct sunlight or ventilation. This is partially solved with the use of skylights on the roof and mechanical ventilation. As described, these are not the most favorable conditions for an expected prolonged stay in the habitable area of the house, not making however its use impossible. As a pertinent counterpoint, in the Siza Vieira’s house, CS1.1, the wall adapts its construction characteristics each time it encounters new program conditions (alternating between single wall and cavity wall, massive and perforated), without it affecting its autonomy as an operative element in space.

In what concerns Siza Vieira’s Architecture School, CS1.2, once again the great massiveness of the concrete wall, allied to its big extension, will prevent the best performance of the spaces it generates. Used to link together the different functional areas in the interior, it impedes the fluidity of movement in the large outdoor area. In the spatial context of a plaza, which traditionally works for social gathering and through communication by various routes of entry or exit, this may represent an issue. Considering the described constraints versus the scope of use of the wall in these two cases, it is nevertheless concluded that this wall type still has conceptual validity. The wall’s articulation quality is maintained, whether it is used in a shorter or longer extension, through a massive or more perforated plane. It follows then that the better or worse functioning of this wall in an architectural structure with a certain program, will depend on the value of those characteristics: extension and permeability of the massive plane.

It is assumed now that the “wall that articulates” conditions and determines the architectural work in which it is identified. Although this wall is not understood as the starting point of the design process where it has been used, research has shown its capacity in the achievement of one of the
essential goals of architectural design: the synthesis of different variables. In the house by Mendes da Rocha, CS1, the wall solves the relationship between the orthogonal volume, that responds to a traditional plan of a single-family house, and the outline of the plot limits on the ground, creating a continuous physical entity with different heights, that unifies both circumstances. The intrusive character of this element, for its combined geometry and height variation through the different scopes of the building and the site, has a wide and destabilizing role on the basic orthogonal order. It is the element chosen to achieve the synthesis between the design variables “form” and “program.” The house by Siza Vieira, CS1.1 presents a very similar situation, in which the geometrically irregular plot wall is taken as an entity that, not only sets the guiding directions where an open patio-house typology is inserted, but that breaks, here in a brusquer manner, this same order when it crosses diagonally the house construction.

In the case of the wall in the exhibition pavilion of Albert Kahn, CS1.4, the creation of an exception in the orthogonal scheme of the building is also observed. The wall complies with the function of organizing and signaling the visitors’ access to the building, essential in its program. Without any references to relate to on the site, the wall is elaborated as the volumetric exception that transmits a meaning and orientation in the whole of the built structure. It introduces a hierarchy upon the orthogonal scheme and carries out the synthesis of the architectural variables “program” and “form.” In Ronchamp, CS1.3, the wall stands out in the whole of the building, exploring various dimensions of architecture, be it its disruptive form and all the reminiscences it evokes from religious buildings of the past, be it for its wide construction scope, aesthetical treatment or as a guiding element within the program. It is an entity that gathers the synthesis and solution for the demands of “organization of the functional program” and “meaning” in the building. On the other side, in the faculty building of Siza Vieira, CS1.2, the wall fulfils the complex task of organizing the functional program, through the union of three different juxtaposed volumes in an elongated structure, on a site rich in pre-existences. It is understood as a necessary and crucial element in the project, combining the solution to the architectural variables “program,” “site context” and “form.”

The “wall that articulates” is thus an element that solves, spatially and volumetrically, different program conditions. It does not respond to a pre-determined formal scheme (orthogonal reticle, regular geometrical layouts), it creates it instead in the coherent combination of opposites: opposite scopes, opposite formal systems etc. In the analyzed works, it is understood that the underlying architectural design in the building has, as a basis, a traditional layout for the program it complies with (such as in the single-family houses, faculty buildings, etc.) and upon this, the “wall that articulates” is introduced as a necessary deviation, according to the author’s criteria and sensibility, to achieve a final work with the specificities of a singular architectural object.
In this way, the wall relates to the user in offering guidance in space - CS1.2, transitioning to interior areas - CS1.3, CS1.4 - or controlling the intersections between different functions - CS1.1. The rigorous attention given by the architect to the composition of the perforations in the wall plane and the mastering of its construction deep to the detail level, call furthermore, the user, to experience the sculptural materiality of the comprehensive architectural element - CS1, CS1.1, CS1.3 - altogether showing that the building can be an “organic” body with a complex functioning, guided by intuition and surprise as much as order and efficacy.9

Along the current research, the analysis and understanding of the wall was sought, in order to conclusively present it as a working instrument for practice. This instrument sustains the necessary reasoning that is carried out in the design process while searching for synthesis. The current research does not present a design formula, it shows instead the possibility that a single architectural element, in this case the articulating massive wall, manages the agreement between distinct architectural categories so to reach a coherent whole.

In this sense, an innovative approach to architectural design is indicated in the conclusions of this work. The “wall that articulates,” of open form and bearing structural core, is to be used for conceiving and determining a building, through the intervention of various entities. In this equation – which is not a formula – there are two entities that must be present to sustain its use. On one side, it is those architectural categories that are the object of the operability of the wall – its “form” and the “program” of the building, being also possible to include the “physical context” as well as the communication of a “meaning.” The wall as instrument will allow the manipulation of these categories through the creation of various possible combinations so as to reach a decisive one. The final election of this specific or unique combination (the architectural solution), will then be possible thanks to the other entity in the process, the agent of design, that is to say, in our present time, the architect.

Being this said for the massive “wall that articulates,” it cannot be stated though, by contrast, that the “light wall,” understood as a technologically advanced element, built with layers of transformed materials, which follows a systematized construction and structure, does not have the characteristics that allow it to reach a coherent architectural work. The question is, can it be isolated as a singular comprehensive element capable of thoroughly influencing the whole work? As part of a repetitive and systematic use, it is not understandable that the “light wall” will work as a “special unit.” The premise is precisely that it works as the “common unit” that is repeated indefinitely. The finished work can be one of high relevance in the synthesis of various architectural variables. Nevertheless, it cannot be stated that the unitary element, alone and unrepeated, is the one that characterizes the solution – it is its ordered assembly. And what about the “sensitive” aspects of this element, demanded to achieve
a relationship with the user, whom is not only guided by efficiency and rationality?

According to the description made before, the “wall that articulates” is to be used as a design instrument by the contemporary architect, whose ability is at stake given the complexity of the goal. Intuition, rationality, and an intensive design research process must be carried out so to find a valid synthesis. The industrialized light wall, as said, does not seem to be a competitor to the massive articulating wall but, could the agent of design be replaced? Could the architect task be done by an “intelligent machine”? It probably can. The wall’s concept could be used by an “intelligent machine”, that would apply the underlying equation to a given set of existing conditions in the project. And in this case, where the architect would apparently disappear from the process, another entity would take part as the “decision maker”, and as the vehicle for the “sensitive” dimension of architecture: the final user. In this way, the user would be able to carry out the final choice among the various design combinations presented by the “intelligent machine”.

In general terms, it can be said that technology is desirable in our contemporary world as long as it does not irrevocably detach man from his environment or from society – the latter understood as the source and genesis for a common culture. In this sense and thinking of the possibility of considering the “intelligent machine” as the agent that creates the architectural design through the utilization of the wall’s concept, no danger seems to arise in the process. And neither something that, in some way, has not been made before.

The point is rather the progression paths one testifies in the present society. Among others, we are now faced with some radical (or fashionable) visions of the near future that show the natural environment as some sort of elite’s jewel in the middle of a wider technological artificiality and physical weightlessness. Or, another possible scenario, where technological artificiality goes along with extreme urban chaos. As a consequence, in view of this possible near future, perplexity and anxiety arise, and a timid sense of necessity to readjust some of these paths is being acknowledged.

The “wall that articulates”, strongly grounded in materiality and mass, and as an outcome of interconnected ambits of architecture and man, cannot be found though in such a polarized state of affairs. As an acknowledged comprehensive element in architecture, that searches knowledge in the local building tradition or environment, and is close to the reality of the user, it can give back a certain degree of liberty from the dominant system, highly guided by uncontrollable mass production and profit. It can “personalize” the architectural design process, against the blinding and overwhelming current state of “normalization”. And paradoxical as it may seem, this “personalization” would not even pose a threat in the case an “intelligent machine” was used in the process. Overall, it could give us some distance
from that sensed binomial future of “natural vs. artificial" that we may be doomed to face.

Underlying the body of this theory, more case-studies that respond to the present wall type have been collected and constitute a valuable resource for further development and validity check of the research.

Notes

1. For an extended description of the wall in the course of history of architecture, see Manuel Iñiguez, *La columna y el muro. Fragmentos de un diálogo* (Barcelona: Fundación Caja de Arquitectos, 2001).
5. This interpretation that the De Stijl movement makes of the wall plane is related to one of the concepts of form that followed the philosophical thought since antiquity and, subsequently, art theory. According to a classification by philosopher Władysław Tatarkiewicz, this concept is called the “substantial form.” It arises in general philosophy with Aristoteles and is later assimilated to the aesthetics with the Scholastics in the thirteenth century. The idea of “form as substance” has its maximum expression during the Middle Ages, not being considered in the aesthetics discipline until the emergence of the De Stijl theory. The underlying idea derived from Aristoteles' formulation, and adopted as a premise to the De Stijl movement, assumes that form means the conceptual and immutable essence of any object in opposition to the “accidental features.” The scope of the present research on the wall identifies itself with this philosophical definition of form, since it studies precisely what is there of essential or conceptual in specific cases of walls. See Władysław Tatarkiewicz, *Historia de Seis Ideas*, trans. Francisco Rodríguez Martín, 3rd ed. (Madrid: Editorial Tecnos, S.A., 1992), 253-79; or. ed. (Warsaw: Panstwowe Wydawnictwo Naukowe, 1975).
6. These “instruments” will be used based on the definitions given by William Mitchell in the work he dedicates to the study of the “logic of architecture.” According to the author, the so-called “recognition rules” consist of (linguistic) phrases that inform of the properties of the type. While the “diagrams” consist of synthetic graphic diagrams that will help to visualize the formal characteristics of the architectural type.
7. The wall’s own entity becomes evident by existing interpretations contemporary to its construction, which most likely also translate the public’s reaction. For a review of the building of that time, see Jeffrey Meikle, “Microcosm of the Machine-Age World,” in *Twentieth Century Limited: Industrial Design in America 1925-39* (printed by author, 1979), 200-01.
9. For the properties that here have been presented as determinant to classify the wall as an agent of spatial articulation, there have been other interpretations and explanations in architectural theory. Robert Venturi’s critical text *Complexity and Contradiction in Architecture* (1966), in particular the chapter “The Inside and the Outside,” develops this subject in a way that can be pertinent to contrast with the definition of the “wall that articulates” advanced in this research. See Robert Venturi, *Complexity and Contradiction in Architecture*, 2nd ed. (New York: The Museum of Modern Art, 1977), 86; or. ed. (1966).
References


Credits


Figures 3 and 4: through the courtesy of © Álvaro Siza Archive, Calouste Gulbenkian Foundation, Lisboa; Gift Álvaro Siza.

Figure 5: reproduced by permission from © AAVV., Álvaro Siza, 1986-1995 (Lisboa: Editorial Blau Lda., 1995).

Figure 6: through the courtesy of © Arquivo Digital da U. Porto - http://repositorio-tematico.up.pt/handle/10405/2084, https://hdl.handle.net/10405/9726.

Figure 7: © FLC / BONO, Oslo 2022. Coloring added by the Author.

Figure 8: illustration retrieved from sottostudios.com, image of public domain.

Figure 9: FPG/Archive Photos via Getty Images

Figure 10: illustration by © the Author.

Joana Pinheiro is a practicing architect with a PhD in Architectural Design from Universidad Politécnica de Madrid, Spain. The thesis “The Wall as architectural reference” was defended in 2016 with Distinction. She has practiced in Spain, Portugal and Norway, developing also several projects on authorship, in a wide scope that goes from Architecture to Master planning and landscape design. E-mail: miites@yahoo.es