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Project and abstraction

Projeto e abstração

Proyecto y abstracción

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Abstract

Departing from a concise survey of the theme of abstraction in architecture, this article proceeds to develop a critical reading of *Toward an Architecture*, written in 1923 by Le Corbusier, examining the architect's arguments in contrast with his projects and built works, focusing on the publication's emphasis on abstract design principles and, conversely, their attenuation or transcendence in his later works. Between the manifesto-like simplicity of the objective discourse and the tectonic and circumstantial complexity of the project and the built work, a critical gap emerges, allowing for a discussion of design practices more engaged with the concrete aspects of pre-existing conditions and diverse material and technical possibilities. In conclusion, the article draws a parallel between Le Corbusier and a work by Lina Bo Bardi – *Casa Valéria Cirell* – to highlight distinct approaches to architectural design processes, contrasting the generic-abstract with the specific-concrete.

Keywords: Design process; Le Corbusier; Toward an Architecture; Towards a New Architecture; *Vers une Architecture*.

Resumo

Partindo de uma breve revisão sobre o tema da abstração em arquitetura, esse artigo desenvolve uma leitura crítica do livro *Por uma Arquitetura*, escrito em 1923 por Le Corbusier, confrontando os argumentos do arquiteto com sua obra construída, focalizando a ênfase, na publicação, de princípios projetuais abstratos e, em contrapartida, sua atenuação ou superação na obra posterior. Entre a simplicidade do discurso objetivo em forma de manifesto à complexidade tectônica e circunstancial do projeto e da obra construída verifica-se um intervalo crítico que permite apontar práticas de projeto mais comprometidas com aspectos concretos das pré-existências e das diversas materialidades e técnicas possíveis. Ao final, o artigo promove uma aproximação entre Le Corbusier e uma obra de Lina Bo Bardi – *Casa Valéria Cirell* – para explicitar as distintas abordagens entre o genérico-abstrato e o específico-concreto nos processos de projeto.

Palavras-Chave: Processo de projeto; Le Corbusier; Por uma Arquitetura; *Vers une Architecture*.

Resumen

A partir de una breve revisión sobre el tema de la abstracción en la arquitectura, este artículo desarrolla una lectura crítica del libro *Hacia una Arquitectura*, escrito en 1923 por Le Corbusier, confrontando los argumentos del arquitecto con su obra construida. Se enfatiza, en la publicación, la centralidad de principios proyectuales abstractos y, en contrapartida, su atenuación o superación en la producción posterior. Entre la simplicidad del discurso objetivo, en forma de manifiesto, y la complejidad tectónica y circunstancial del proyecto y de la obra construida, se identifica un intervalo crítico que permite señalar prácticas proyectuales más comprometidas con aspectos concretos de las preexistencias y con las diversas materialidades y técnicas posibles. Finalmente, el artículo establece una aproximación entre Le Corbusier y una obra de Lina Bo Bardi – la *Casa Valéria Cirell* – con el fin de explicitar las distintas aproximaciones entre lo genérico-abstracto y lo específico-concreto en los procesos de proyecto.

Palabras clave: Proceso de diseño; Le Corbusier; Hacia una Arquitectura; *Vers une Architecture*.

1 Presentation

This article derives from the development of a presentation prepared for a commemorative event marking the centenary of the publication of *Toward an Architecture*[1], by Le Corbusier, in which design strategies are confronted with built works, with the aim of problematizing the relationship between design and abstraction. It is not a historiographical study, but rather one of design theory, with a focus on the design strategies through which a work is instituted, examined through the lens of abstraction. To this end, the *Presentation* begins with a succinct review of the theme of abstraction in architecture, as a means of delineating the conceptual framework that underprints the approach developed herein. It then turns to Le Corbusier's work, setting the propositions of the 1923 text against several of his subsequent design propositions. The goal is to shed light on contradictions, ambiguities, and possible shifts in ideas that may ultimately have contributed to enhancing the quality of his works, which, from the perspective of the designer, constitutes the fundamental and irreducible purpose of architectural practice. Why confront the text with works, and not with other writings? Because the book was, above all, a manifesto on a new way of building. As such, as a manifesto, one might imagine that the architect, in subsequently developing his work, would have sought to confirm the premises he defended. In that sense, his later works would serve merely as ratification of his theoretical proposition, which does not, in fact, appear to be the case. Finally, through a temporal leap, two projects are set in dialogue as a way of illuminating a conceptual leap that reveals a way of evading the traps of abstraction in architectural design: the *Mass-Production Artisans' Dwellings,* designed by Le Corbusier in 1924, and the *Valéria Cirell House,* designed by Lina Bo Bardi in 1958 and built in São Paulo.

Notwithstanding its pervasiveness in the text, the word "abstraction" appears no more than six times throughout Le Corbusier's *Toward an Architecture,* tied to only two themes: the first, more general, which invokes abstraction as a process of ideation as opposed to materialization and the concreteness of the work; the second, more specific, which argues about the abstraction of what the plan represents as a mode of design reasoning and, more precisely, as a representational tool[2]. In the body of work that follows the book, the architect often reiterates such abstract processes, though at other moments he eludes this trap. To conceive of abstraction as a trap is already a contemporary perspective; it is precisely what points to a necessary problematization of contemporary ways of architectural production, particularly impoverished in large-scale production as a consequent of the impoverishment of experience across all spheres of social life, conditioned by the demands of the capital, already characterized in Walter Benjamin's

[1] Seminar "*Por uma arquitetura + 100 – História / Crítica, Cidade, Projeto, Prospecções*" (original title in Portuguese for "Toward an Architecture +100 – History / Criticism, City, Design, Projections") held on the occasion of the centenary of the publication of *Toward an Architecture* by Le Corbusier. Promoted by the School of Architecture of the Federal University of Minas Gerais (UFMG) and its Graduate Program in Architecture and Urbanism (NPGAU), it took place on 16-17 November 2023, with the participation of Ana Tostões, Carlos Alberto Batista Maciel, Carlos Alberto Ferreira Martins, Denise Marques Bahia, Guilherme Wisnik, Horacio Torrent, Laurent Troost, Luciana Saboia, Margareth Pereira, Mauricio Campomori, Nathalia Cantergiani and Rita Velloso. The full program can be accessed at: https://www.arq.ufmg.br/ea/por-uma-arquitetura-100/ (Accessed 5 September 2025).

[2] On pages 25-26 and 47-49, two similar statements appear: "Architecture has graver ends; capable of the sublime, it impresses the most brutal instincts by its objectivity; it calls into play the highest faculties by its very abstraction. Architectural abstraction has this about it which is magnificently peculiar to itself, that while it is rooted in hard fact it spiritualized it, because the naked fact is nothing more than the materialization of a possible idea." and: "The plan is the generator. [...] A plan is not a pretty thing to be drawn, like a Madonna face; it is an austere abstraction; it is nothing more than an algebrization and dry-looking thing. The work of the mathematician remains none the less one of the highest activities of the human spirit." (Le Corbusier, 1986).

reflections in the interwar years (Benjamin, 1999 *apud* Aureli, 2023, p. 208-210) and amply diagnosed in the field of architecture by Pier Vittorio Aureli in *Architecture and Abstraction* (Aureli, 2023). When questioning abstraction in *Toward an Architecture* and in Le Corbusier's work, the aim is precisely to seek possible exits for contemporary practice, insofar as abstraction entails a separation or exclusion of certain constituent elements of the object and its context – geographical, historical, social, cultural, and productive. To deconstruct the boundaries and separation between object and context – understood here beyond its narrower sense as physical surroundings – may offer a way to prevent the externalization of the impacts of architectural artifacts in their construction, throughout their lifecycle and in their obsolescence. In this sense, reducing the layers of abstraction in design processes may prove to be a path toward addressing the most pressing questions that affect architectural practice today, especially its relations with the environment and its environmental impacts.

2 On abstraction in architecture

The first idea of abstraction may be traced back to its etymology, which denotes a process that presupposes isolation and separation, distinguishing it from analysis, as noted by Houaiss (Abstração, 2020):[3]

> Abstraction (feminine noun):
>
> act or effect of abstracting (oneself); state of being abstracted
>
> 1. Intellectual operation, understood by Aristotle (383 BC-322 BC) and Thomas Aquinas as the origin of the entire cognitive process, in which that which is chosen as the object of reflection is isolated from a series of facts that are commonly related to it in concrete reality (as occurs, for example, in mathematical consideration, which strips objects of the sensible qualities [weight, color, etc.] in order to consider them solely in their measurable and quantitative aspect).
>
> [...]
>
> 3. By extension; mental process which consists in selecting or isolating a specific aspect of a relatively complex state of things in order to simplify its evaluation, classification, or to enable its communication. [Abstraction is distinguished from analysis, for in analysis the whole is (mentally) divided into all its parts, whereas abstraction deals with the isolation of only one of them].
>
> [...]
>
> From Latin, abstracione, separation.[4]

[3] Houaiss, *Dicionário da Língua Portuguesa*, s.v. "abstração," translated from the original Portuguese dictionary: Abstração (substantivo feminino): / ato ou efeito de abstrair(-se); abstraimento / 1. Operação intelectual, compreendida por Aristóteles (383 a.C-322 a.C) e Tomás de Aquino (1277-1274) como a origem de todo o processo cognitivo, na qual o que é escolhido como objeto de reflexão é isolado de uma série de fatores que comumente lhe estão relacionados na realidade concreta (como ocorre, p.ex., na consideração matemática que despoja os objetos de suas qualidades sensíveis [peso, cor, etc.], no intuito de considerá-los apenas em seu aspecto mensurável e quantitativo). [...] / 3. p.ext.; processo mental que consiste em escolher ou isolar um aspecto determinado de um estado de coisas relativamente complexo a fim de simplificar sua avaliação, classificação ou para permitir a comunicação do mesmo [A abstração distingue-se da análise, porque nesta a totalidade é (mentalmente) cindida em todas as suas partes, enquanto a abstração lida com o isolamento de apenas uma das partes]. [...] / Do latim, abstracione, separação."

[4] This and all other non-English citations hereafter have been translated by the author and by Isabela de Rezende Gomide.

In his *Dictionary of Philosophy*, Nicola Abbagnano presents an extensive conceptualization of the term. He points to Aristotle's understanding of abstraction as the foundation for the formation of theoretical sciences, such as mathematics, physics, and pure philosophy. According to Aristotle, the mathematician strips things of their sensible qualities, such as weight, lightness, hardness, among others. Abbagnano recalls Thomas Aquinas's distinction between the particular and the universal, understanding abstraction as a means of producing knowledge by extracting "the intelligible form from singular images." He also highlights the Hegelian inversion which restores the relevance of sensible matter, though conceived through the overcoming and reduction of this matter "to the *essential*, which only manifests itself in the concept" (Abbagnano, 2012, p. 4-5). At the end of the entry, Abbagnano refers to Paul Valéry, in his book *Eupalinos or the Architect*, who would have emphasized the importance of abstraction in all human constructions, including art. He cites Valéry: "I am saying that man creates through abstraction; by ignoring and forgetting a great part of the qualities of what he employs, and by applying himself only to clear and distinct conditions that may, in general, be simultaneously satisfied not by one, but by many kinds of matter" (Paul Valéry [1921] *apud* Abbagnano, 2012, p. 6). When these understandings are confronted with the scarce appearances of the term in *Toward an Architecture*, it becomes possible to recognize an overvaluation of the idea over matter, clearly in tune with the Hegelian thinking, as well as the abstraction of geometry and mathematics inherent to the processes of architectural representation.

The theme of abstraction in architecture is not a new one. Pier Vittorio Aureli (2023), in *Architecture and Abstraction*, traces a long history of this relationship, mapping its origins to the need for control over construction processes in large buildings, a certain prehistory of capitalism. The expansion of scale, demanding vast material and labor resources, would have led to the necessity of an *a priori* plan for coordinating construction processes in ancient temples of Mesopotamia. Physical aspects such as orientation toward the cardinal points, symmetry and rhythm of columns, as well as a certain geometric regularity, would have served as means to enable the organization of labor for their realization (Aureli, 2023, p. 5–6). Drawing from Karl Marx's reflections on capitalism and from Alfred Sohn-Rethel's notion of the separation between manual and intellectual labor, Aureli traces throughout history how abstraction has operated as the most effective tool in the processes of separating the conception of the building, its geometric formulation and the calculation of its structures in a stage that anticipates construction itself, thereby distinguishing the figure of the architect from that of the builders. To this end, Aureli turns to the distinction of the master builder in the architecture of Gothic cathedrals, heirs to the development of a diagrammatic reasoning of the medieval monastic tradition, in which the Benedictines systematized rigorously defined daily routines for convent life into a spatial and architectural system that allowed for the reproduction, with variations, of the spatial arrangement and its uses in the construction of new other convents (Aureli, 2023, p. 20). From this rigorous association between spatial arrangements and ways of living, one may infer a certain functionalism *avant la lettre*, whose development, tied to the use of architecture as a tool for the expansion of mercantilism and capitalism in the following centuries, conveniently and effectively served the colonial enterprises undertaken by Europeans. In an article published eight years earlier, in which Aureli (2015) sketches the argument later developed in his book, the invention of perspective during the Renaissance is identified as a crucial moment in which mathematical and geometric abstraction enhanced the configuration of buildings and conditioned the experience of space. Drawing from Sohn-

Rethel's reflections, Aureli identified the experiments of Filippo Brunelleschi and Albrecht Dürer as fundamental in the development of perspective as a scientific tool, allowing for the establishment of a form of knowledge that was generalizable and independent from the artisanal craft of construction, thus distinguishing the architect's role as an intellectual agent who oversees the process of realizing buildings. To some extent, this separation had already been outlined in Vitruvius's differentiation between *fabrica* and *ratiocinatio*: the practice of construction as opposed to its prior conception (Aureli, 2015). Aureli's entire argument rests on the relationship between abstraction and the development of capitalism, viewed through and from architecture in its processes of assimilating order, geometry, and mathematical logics, beyond abstraction as a mere formal device in the production of art and architecture. Nevertheless, in building his argument, Aureli traverses the historical moment of the artistic avant-gardes in the early decades of the twentieth century, identifying the articulation between the premises of abstractionism in the arts and the discourse and production of modern architecture, and recognizing the development of formalism, rationalism, and Russian constructivism as stemming from the assimilation of abstract principles into the poetic processes of art and architecture (Aureli, 2023, p. 165-204). Aureli's thought seeks to clearly identify the *causes* of the assimilation of abstraction in architecture in relation to the forces of the capital. In a complementary movement, beyond criticism or historiography, one might also argue about the *consequences* of abstraction within the poetic realm – in the act of the work's inception, in the construction of buildings and their impacts. generally negative, on the everyday life of their users, as well as in the contradictions that arise in relation to natural phenomena. It is upon this ground that the focus of the present study is situated. In this sense, before proceeding to the analysis of Le Corbusier's text and work, it is still necessary to clarify his relationship with abstractionism and the artistic avant-gardes of the early twentieth century.

Tim Benton opens the chapter *The world of Purism* in his book on Le Corbusier's early houses with a quotation by Amédée Ozenfant and Le Corbusier – by that time, still Charles-Édouard Jeanneret – from the text *Le Purisme*, published in the journal *L'Esprit Nouveau* in 1921:

> The highest delectation of the human spirit is the perception of order and the greatest human satisfaction is the feeling of collaborating or participating in that order... The perception of order is mathematical in kind... The Purist element, derived from the purification of standard forms, is not a copy but a creation whose aim is to materialize the object in all its generality and invariability. Purist elements are therefore comparable to all defined words; the Purist syntax is the application of constructive and modular means; it is the application of the laws which govern pictorial space. (Ozenfant; Jeanneret, 1921 *apud* Benton, 2007, p. 19).

Conceived as a reaction to Cubism, proposing a rational correction of its premises based on a certain analytical fragmentation, Purism advocated order, clarity, formal economy, and the representation of *type-objects*. Two consequences may be inferred from these premises: the first is the very process of formal abstraction related to geometry and mathematics, analogous to the processes of abstraction in architecture identified by Aureli, and in a certain alignment with other movements in which abstraction guided the deconstruction of objects and figures, notably Cubism, Neoplasticism, and

Constructivism[5]. The poetic operations of Purism, however, preserved a certain figurativism modified by the process of geometric purification; a second consequence is the formal simplification aimed at achieving a supposed generality that leads to *type-objects*, which seeks an alignment with the production processes then emerging through industrialization, thus confirming Aureli's interpretation of the diagrammatic power of abstraction as a driving force behind the development of capitalism. In both cases, the formal abstraction defended in the early 1920s is transposed into Le Corbusier's discourse throughout that decade as a project that seeks to elaborate "a theory of culture in industrialized everyday life [...], can be read as a 'reflection,' in both the specular and intellectual sense of the word, on the culture of the new means of communication, the world of advertising and mass media" (Colomina, 1996, p. 160). The attempt to seduce both the industrialists of interwar France and the bourgeois clientele unfolded through a discourse emphatically constructed in the manner of a manifesto – synthesized in the book *Toward an Architecture*, after several partial publications of its arguments in the magazine *L'Esprit Nouveau* – articulating the abstract principles of Purism with the emerging technical and industrial order, though nuanced by Le Corbusier's study of history during his formative years. Let us now turn to the book itself.

3 Le Corbusier's text and work

In his three reminders to architects in the book *Toward an Architecture,* one can identify first layers of abstraction that Le Corbusier introduces for the understanding of architecture. He states: "Our eyes are constructed to enable us to see forms in light./ Primary forms are beautiful forms because they can be clearly appreciated./ Architects to-day no longer achieve these simple forms." (Le Corbusier, 1986, p. 23). Here, one perceives an abstraction that approaches architecture from the idea of form – abstract – rather than as matter – concrete. There is also an evident preference for simplicity over complexity, as if here, a judgment of value is implied in which simple things, those most easily identified, clarified, and without contradiction, are, very coherently with Cartesian thought, those of greatest value. Furthermore, three-dimensionality is addressed in formal terms – volumes in light. It excludes an inhabited three-dimensionality, the notion of lived interiors.

When addressing the surface, Le Corbusier (1986, p. 35) states,

> Architects to-day are afraid of the geometrical constituents of surfaces.
>
> The great problems of modern construction must have a geometrical solution.
>
> Forced to work in accordance with the strict needs of exactly determined conditions, engineers make use of generating and accusing lines in relation to forms. They create limpid and moving plastic facts.

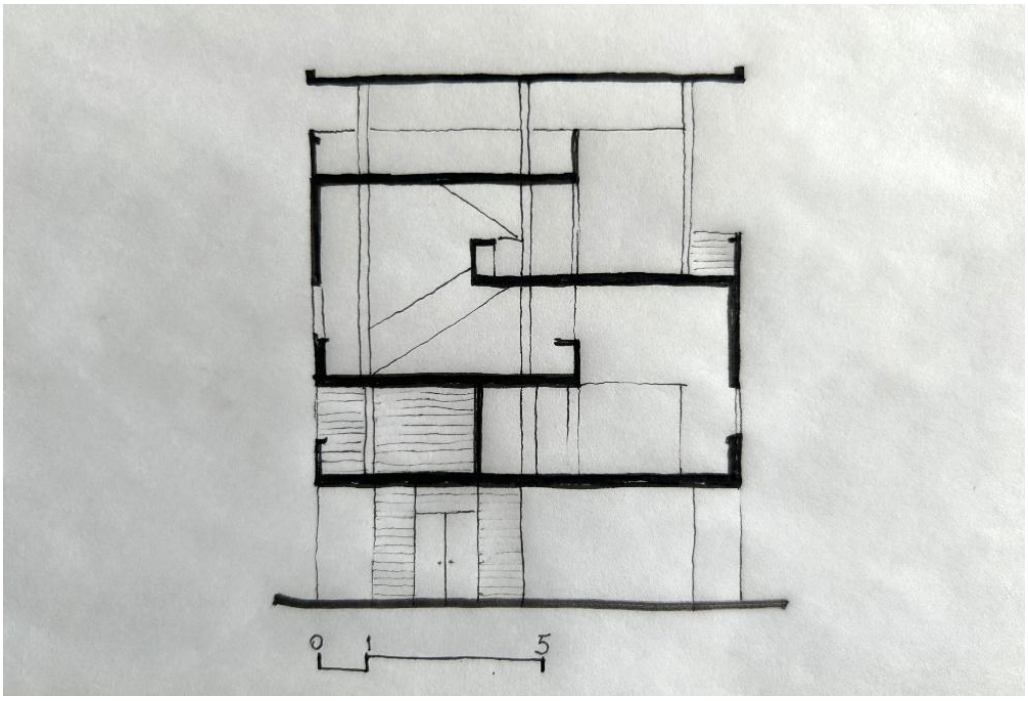
Instead of creating *limpid and moving plastic facts,* he could have said: they create *complex and impressive constructions*. What is at stake here is the abstraction of construction and materiality in favor of an approach that elevates geometry to a superior status in defining built surfaces.

When referring to the plan, Le Corbusier (1986, p. 45) asserts: "The Plan is the generator./

[5] It is not within the scope of this work to delve into the differences among the movements and their main theoretical texts and figures. The principles that underpin them are presented in the compendium of key modern art writings compiled by Chipp (1968).

Without a plan, you have lack of order, and wilfulness./ The plan holds in itself the essence of sensation". We know, however, that the plan is only a representation of a whole constructed three-dimensionally. There is an abstraction of the building's totality in favor of reading one of its aspects, emphasizing its potential to order the whole. I would risk saying that Le Corbusier erred by placing this excessive emphasis, perhaps due to his rhetorical effort. The plan *can generate* and *contribute* to the essence of the spatial experience, but not exclusively. The *Villa Baizeau* in Carthage, designed by Le Corbusier in 1928 only five years after writing *Toward an Architecture*, reveals this inflection. In this project, the plans convey very little about the space. To conceive what Geoffrey Baker later termed "cascading spaces" (Baker, 2017) (Figure 1), the architect edits a spatial arrangement that was surely conceived in section, and which is scarcely discernible in plan. In *Villa Baizeau*, the section is the generator; it embodies the essence of the spatial experience, producing an articulation of varied heights that is central to the house's singular spatial configuration.[6]

Figure 1: Transverse section of *Villa Baizeau*, highlighting the alternation between double-height and single-height spaces in a cascading sequence.



Source: Author's drawing, 2023.

Moreover, Le Corbusier (1986, p. 67) argues that "The regulating line is a guarantee against wilfulness. It brings satisfaction to the understanding" and seeks to understand it as a way of establishing order in construction. The manner in which he addresses the theme of the regulatory grid in the text presents it as geometry, abstracting from natural forces or contextual aspects. On the other hand, as Curtis highlights, undoubtedly drawing from Colin Rowe's analysis in his classic 1947 article *The Mathematics of the Ideal Villa* (Rowe, 1976), the deliberate use of regulatory elements stems from the interpretation of Palladio's work and other classical references in an operation that presupposes a process of abstraction:

[6] Max Risselada (1991) develops this argument in detail by revisiting Le Corbusier's distinct design strategies in the *Villas Savoye* and *Baizeau*.

> From the evidence of his travel sketches, his earliest experiments in Classicism, his transactions with Perret, Behrens and Garnier, not to mention the theories and preferred images of *Vers une Architecture*, it is clear that Le Corbusier's mind was stocked with lessons from many periods. He roamed up and down Classical tradition in search of the substructures, the fundamentals, as well as recurrent types and varying conventions. Whether it was ancient Greece of Gabriel, Pompeii or Palladio, Behrens or even the Beaux-Arts, the aim was the same: to abstract principles that could be transformed into the elements, rules and hierarchies of his own language. [...] The design sketches for his houses, studios and villas reveal his struggles as he tried to reconcile Classical symmetry with the explosions of the free plan, frontal façades with turbulent inner events, the *machine à habiter* with the archetypes of Pompeii. (Curtis, 1986, p. 84, emphasis added).

It is possible to recognize here that the foundation that moves Le Corbusier from the abstraction of the text to the concreteness of the work is his obsession with history, which, paradoxically, is also what ensures the grounding of abstraction as a fundament of design in the pursuit of ordering principles – the substructures – reinterpreted from works of the past.

One question that could be posed here is: where do principles of order come from? Are they necessarily abstract procedures derived from geometric and mathematical logics? If we remove the layer of abstraction that presupposes every principle of order to be geometric, we may better understand, for example, the *Chapel of Notre-Dame-du-Haut*, in Ronchamp (1950), a work designed by a mature Le Corbusier, at the age of 63, in contrast to the young 36-year-old Le Corbusier of *Toward an Architecture*. Ronchamp is decidedly a work that does not employ a regulatory grid. The shapes of its walls and roof are not drawn from any geometric order. It is perhaps the only work by Le Corbusier in which geometry nearly disappears and its curved forms are entirely freehand designs, perhaps the only one we could effectively call organic, even traced on graph paper so that they could be transferred to the construction site (Maciel, 2000, p. 76). The chapel does not follow a regular grid, and instead, it is defined primarily by freehand-drawn curves. Its design is influenced, as the architect himself explained, by the surrounding landscapes, making the context a regulating element.[7] That is, the context, many years later, also becomes a kind of regulatory framework for the architect. Or, rather than a regulatory grid in the strict sense, since it neither regularizes nor defines the line, it constitutes a strategy for determining the specificity of the architectural form in terms of openness, closure, concavity, convexity, intimacy, and extroversion, beyond merely providing an element that allows potential reproducibility of the form. In other words, at Ronchamp, the generality of the principle of the regulatory grid is replaced by the specificity of consideration for the surrounding landscapes, and abstraction gives way to a deeply contextual approach, which is further reinforced by other aspects that, while not central here, are equally striking markers of this inflection, such as the use of stone from the old church, demolished, to construct its walls.

One of the most relevant aspects for problematizing the theme of abstraction appears

[7] This departure from a strictly geometric approach highlights the specificity and singularity of the architectural form and may have been one of the reasons for the numerous criticisms and refutations of this work. In the Brazilian context, the most vehement opposition to Ronchamp came from João Cabral de Melo Neto, a poet and admirer of the mathematical clarity of Le Corbusier's early works, who wrote the well-known poem *Fábula de um Arquiteto* (in English, "Fable of an Architect") explicitly highlighting the architect's conceptual inflection. For a deeper exploration of the topic and the connection between João Cabral de Melo Neto and architecture, see Cardeal (2015, p. 26-27).

when Le Corbusier, still discussing regulatory grids, states that the builder "has adopted a unit of measurement, *he has regulated his work*, he has brought in order. For, all around him, the forest is in disorder with its creepers, its briars and the tree-trunks which impede him and paralyse his efforts." (Le Corbusier, 1986, p. 71). This passage reveals an understanding of nature as something harmful, disordered, chaotic, and problematic, in clear opposition to the human artifact, which is logical and rational; it also stands in stark contrast to his statement fifty-six pages earlier, defending the "the engineer's aesthetic and architecture": "The diagnosis is clear./ Our engineers produce architecture, for they employ a mathematical calculation which derives from natural law, and their works give us the feeling of HARMONY" (Le Corbusier,1986, p. 15). Here we encounter two notions of *nature*: one concrete, concerning the direct confrontation with things themselves; the other abstract, concerning their underlying forces – especially gravity – supported by an idea of harmony or perfection, perhaps still valid in a scientific context prior to chaos theory, Heisenberg's uncertainty principle, or studies of entropy. At certain points, when discussing the lesson of Rome, Le Corbusier, on the other hand, values natural materials, asserting that architecture consists in establishing moving relationships with raw materials. Yet throughout the entire process, materiality is understood solely as a means to achieve those formal relationships defined by pure and precise geometries. Later, when advocating the industrialization of mass-produced houses, he rejects the presence of natural materials when he states:

> The prime consequences of the industrial evolution in "building" show themselves in this first stage; the replacing of natural materials by artificial ones, of heterogeneous and doubtful materials by homogeneous and artificial ones (tried and proved in the laboratory) and by products of fixed composition. Natural materials, which are infinitely variable in composition, must be replaced by fixed ones. (Le Corbusier, 1986, p. 232).

This negative valuation of the natural, in opposition to the supposed virtue of that which is mobilized and processed industrially, on one hand reinforces that Cartesian abstraction which, ultimately, is entirely consistent with the production of white, pure volumes against the light, and on the other hand aligns with Aureli's diagnosis presented at the beginning of this article. However, in 1930, just seven years later *Toward an Architecture*, Le Corbusier explains, while designing the *Maison Errazuriz,* in Chile (Figure 2), that

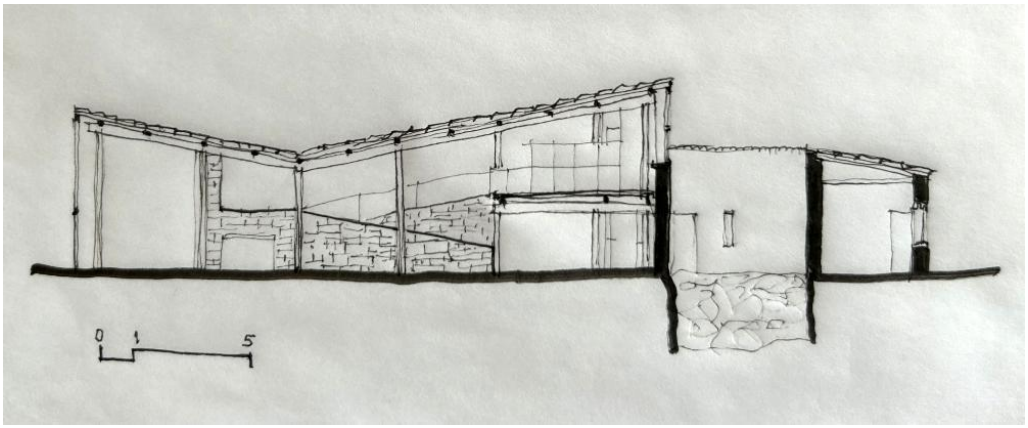
> [a]s there was not, in that location, a sufficient technical workforce, we made do with elements available on site and easy to work with: walls of large stone bricks, a framework of tree trunks, and roofs of local tiles, hence the pitched roof. (Le Corbusier; Jeanneret, 1995, p. 48).[8]

And he argues: "The rusticity of the materials is in no way an impediment to the expression of a clear plan and a modern aesthetic" (Le Corbusier; Jeanneret, 1995, p. 48).[9]

[8] From the original: "Comme on ne disposait pas, à cet endroit, des ressources d'une main-d'oeuvre technique suffisante, on a composé avec des éléments existant sur place et d'une mise en oeuvre facile: murs de gros blocs de pierre, charpente de troncs d'arbre, couvertures en tuiles du pays, par conséquent toiture inclinée."

[9] From the original: "La rusticité des matériaux n'est aucunement une entrave à la manifestation d'un plan clair et d'une esthétique moderne."

Figure 2: Longitudinal section of *Maison Errazuriz*, highlighting the traditional pitched roof converging toward a central gutter and indicating the use of stonewalls.



Source: Author's drawing, 2023.

The rejection of natural and raw materiality, evident in the series of white houses designed throughout the 1920s, characterized by atectonic white forms with continuous color surfaces, reaches its apex in the *Villa Savoye* (1928–1931), a clear "[...] abstract object that belongs to the development of an architect's ideas at a given moment, [which] is the synthesis approaching perfection of a period of his patient pursuit" (Jaua, 2009, p. 45).[10] Nevertheless, despite the abstract meaning that *Villa Savoye* acquires as the materialization of the design principles developed by the architect in his *Five Points of a New Architecture* (pilotis, free ground plan, free façade, strip windows, and roof garden, 1925), a careful analysis of the house's long design process reveals numerous decisions that reconcile the matrix of abstract thought related to a pre-coding of strategies to circumstantial demands, whether budgetary (for example, the reduction of the 5-meter module to 4.85 meters to reduce the built area and overall cost) or utilitarian (manifested in the variety of window frames, or even their absence, on the different façades of the elevated white volume) (Maciel, 2000, pp. 35–61). Tim Benton had already highlighted this aspect in his study of houses from this period:

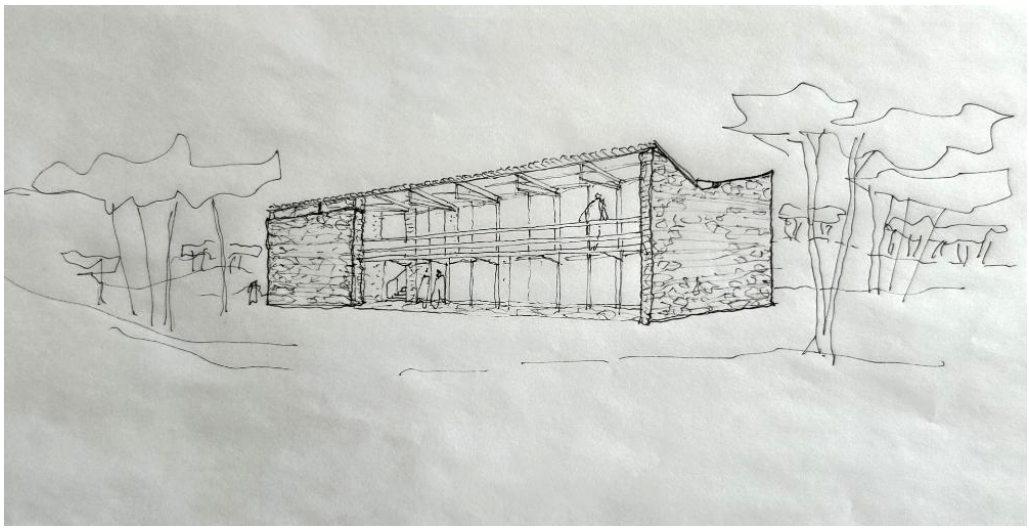
> There is little doubt that these struggles, changes, adaptations, sacrifices, can be partially referred, in Le Corbusier's mind, to an idealistic dialectic between the ideal and the pragmatic. His ideal forms, essentially unrealisable, include the invisibility of structure, the hovering volumes, the untarnished purity of the 'prisms', the opening out of space. But he was also committed to pragmatic discoveries. He was almost obsessively fascinated by detailing. Some of his most impressive drawings are for window mechanisms, gate latches, skylights, lamps and fitments (Benton, 2007, p.15)

Benton highlights the difficult reconciliation between the abstraction of principles and the pragmatic concreteness of the processes through which buildings are made. It is noteworthy that the abstract materiality of the sequence of white houses is, immediately after *Villa Savoye*, subverted by the architect himself in projects executed from the 1930s onward, in which material explorations begin to emerge, signaling a transition to his Brutalist phase. A built example is the *villa* of the artist Hélène De Mandrot (1930–31), where the architects Le Corbusier and Pierre Jeanneret almost apologize themselves for the use of natural materials and the vernacular technique of exposed local stone walls, as noted in Volume 2 of the *Oeuvre Complète*: "*Despite* the use the use of ordinary

[10] From the original: "[...] un objeto abstracto que pertenece al desarrollo de las ideas de un arquitecto en un momento, es la síntesis cercana a la perfección de un periodo de búsqueda paciente."

masonry (*in exposed rough stone*), the theses usually explored in our residences are found here" (Le Corbusier; Jeanneret, 1995, p. 59, emphasis added).[11] In *Villa Le Sextant* (1934-35) (Figure 3), Le Corbusier adds to the rough stone masonry a lightweight roof with a timber structure assembled in a dry-fit logic. The central gutter of the Chilean house is here redesigned along the longitudinal axis of the volume. What is significant in these examples is that rain and wind become design materials, overcoming a layer of abstraction present in the purist houses of the 1920s.

Figure 3: Sketch of *Villa Le Sextant*, highlighting the pitched roof converging toward a central gutter, the indication of stonewalls, and the lightweight roof structure.



Source: Author's drawing, 2023.

The dialectical opposition between nature and culture, essentially modern, is structuring in a small masterpiece by Le Corbusier: his *Cabanon* in Cap-Martin, built in 1951 by the seaside, with a minimal interior space of 3.66 by 3.66 meters, marked by the distinction between the raw exterior and the delicate interior. Constructed with rough wooden logs, the exterior evokes a certain continuity with the surrounding trees. The interior, crafted in industrialized wood joinery, offers a sense of shelter in which the smooth, refined, sophisticated, and carefully designed treatment of the material seems to contrast with the austere and yet formally simple exterior. In this mature Le Corbusier, there is no choice between the abstract *or* the concrete, but a reconciliation that admits ambiguity and draws from it a poetic elaboration.

The rupture between nature and culture, based on the understanding of nature as something wild, is characteristic of modernity and its spirit of the time. An example close to Le Corbusier can be found in Oscar Wilde, who, as early as 1891 in his book *Intentions*, puts the idea of inhospitable nature into the voice of the character Vivian in the first essay, entitled "The Decay of Lying." Vivian says:

> But Nature is so uncomfortable. Grass is hard and lumpy and damp, and full of dreadful black insects. Why, even Morris' poorest workman could make you a more comfortable seat than the whole of Nature can. [...] If Nature had been comfortable, mankind would never have invented architecture, and I prefer houses to the open air. (Wilde, 1905, p.4)

[11] From the original: "Malgré l'emploi de la maçonnerie ordinaire, les thèses habituellement exploitées dans nos maisons se retrouvent ici."

This essentially modern rupture underlies a mode of conceiving architecture detached from some or many natural aspects that should influence it and, in contrast, from an understanding of design as the transformation of a nature subservient to humanity's imperatives, thus conceived as a resource to be mobilized, transformed, and ultimately exhausted.

If the experiments that flirt with the vernacular recover a more concrete understanding of different sites, their climate, and raw materiality, Le Corbusier still needed to redefine his relationship with light. We then return to that better-known definition, which appears in *Toward an Architecture*:

> Architecture is the masterly, correct and magnificent play of masses brought together in light. [...] [C]ubes, cones, spheres, cylinders or pyramids are the great primary forms which light reveals to advantage [...]. (Le Corbusier, 1986, p. 29).

Advancing thirty years, we arrive at the conception of the *Convent Sainte-Marie de La Tourette* (1953–57), in southern France. A brief analysis would confirm the thesis of the use of pure volumes, whether in the lateral parallelepiped housing the church, in the triangular prism rising with a grass-covered roof over the intersection of corridors in the courtyard, or, more eloquently, in the pyramid crowning the oratory (Figure 4). However, in this project, Le Corbusier enacts a profound inflection in his understanding of architecture, which can be discerned in the following design choices: first, by borrowing from other secular convents the geometric structure of the cloister, without, however, opening it to its courtyard, which is treated as a void disconnected from the interior spaces; then, by interpreting the strict distinction between individual and collective spaces observed at the *Florence Charterhouse* (*Chartreuse Saint-Laurent de Galluzo*) (Maciel, 2000, pp. 97–98); and especially, by defining the atmospheres of interior spaces through an elaborate control of light and shadow. This is evident in the musically modulated sequence of *ondulatoires* designed by Iannis Xenakis[12], which reveal the variation of light and shadow throughout the day or in the interior dimness of the church and its ancillary spaces; in the light shafts over the study altars, functionally separated but environmentally connected to the church, where light strikes the surfaces of differently colored skylights and qualifies the space (Figure 5); and in the lateral slits above the choir seating, reflecting the color of the inclined shutters and bouncing light onto the singers' reading surfaces. Here, as in the interior light of one of Ronchamp's towers, whose walls are painted red, light acquires materiality, density, and form, something impossible to photograph but readily perceptible on site. It becomes a design material, transforming both the space and the experience of place. The passage of the day is clearly perceived as the evening light sweeps across the ceiling through the slit at the top of the church's west wall. All these devices, especially the quality of penumbra in certain spaces, contrast with the Apollonian advocacy of clear volumes under the light. At *La Tourette*, the sacred is realized through the mystery provided by shadow, and through one final characteristic, impossible to represent in drawing: the soundscape of the space, which, through its proportions and materiality, recreates the reverberant experience of large French Gothic churches, which he once criticized, and of ancient monasteries. It is no coincidence that Le Corbusier, when presenting the convent, said:

[12] The undulating glass panels – *ondulatoires* – are based on the musical study developed by Iannis Xenakis, engineer and musician, who worked in Le Corbusier's office at 35, Rue de Sèvres, advising him on technical matters. La Tourette was the first project whose architectural development was partially entrusted to Xenakis. Cf. Ferro *et al.* (1987, p. 34; 81-82), and especially Xenakis (1984, p. IX-XII).

"This convent of raw concrete is a work of love. It does not speak. It lives from within. It is within that the essential takes place" (Petit, 1961, p. 20).[13]

Figure 4: *Convent Sainte-Marie de La Tourette*, exterior view with the enclosed volume of the church in the foreground.

Source: Author's collection, 2000.

Figure 5: *Convent Sainte-Marie de La Tourette*, light shafts.

Source: Author's collection, 2000.

At the end of the book, Le Corbusier makes a strong case for mass-produced housing. He draws lessons from automobiles and airplanes and attempts to transpose the logic of

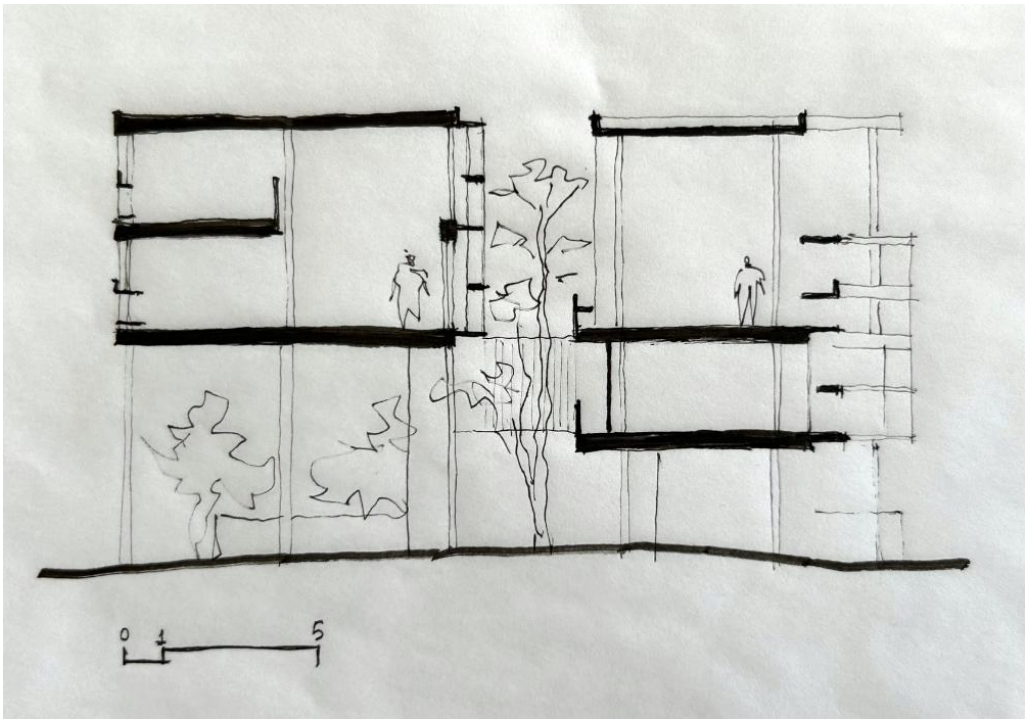
[13] From the original: "Ce couvent de rude béton est une oeuvre d'amour. Il ne se parle pas. C'est de l'intérieur qu'il vit. C'est à l'intérieur que se passe l'essentiel."

their conception as highly selected, industrial products, onto the production of housing. Hence arises the famous expression that the house is a “machine for living in.” He states: "Architecture operates in accordance with standards. / Standards are a matter of logic, analysis and minute study” (Le Corbusier, 1986, p. 131). In other words, as previously formulated with Ozenfant within the framework of Purism, standards derive from an abstract reflection that, in order to achieve objective and generalizable knowledge allowing repetition, must disregard what is not specific and generalizable. In architecture, what is not generalizable typically involves circumstantial issues related to context – topographic and geological conditions of the site, particularities of urban configuration, climatic aspects, material availability, infrastructural factors, but also modes of life and local ways of organizing space and time. It is remarkable that in 1948, thus a 61-year-old Le Corbusier, rather than the 36-year-old author of *Toward an Architecture*, he designed a house for Mr. Curuchet in La Plata entirely by correspondence, without visiting the site. Paradoxically, the main elements defining the design do not derive exclusively from an idealization, that is, a logic of selection refining the standard, but rather from a reading of the site’s pre-existing conditions based on detailed planimetric and photographic documentation sent to the architect.[14] Both the visual openness provided by the square in front, which motivates the stepped configuration of the ground-floor office and the two upper residential floors, using a terrace over the office (Figure 6), and the continuity of volumetry established between party walls (Figure 7), with the two neighboring houses at different heights guiding the variety of the volume designed by Le Corbusier, the *Curuchet House* signals a contextual inflection, in which the non-generalizable or specific data of the site take precedence over the abstraction of implanting an object against the landscape – as seen, for instance, in *Villa Savoye*. An indication of this shift is that in the letter sent to the owner along with the first project drawings, Le Corbusier dedicates nearly half of the text to Item 1: Occupation of the Land, where he includes a full description of spatial disposition and floors, consistently referencing contextual aspects as justification or value for design decisions.[15]

[14] A comprehensive account of the background, the contextualist approach of the project, and the communication between architect and client can be found in Leão (2007). A detailed record of the project documentation and the collaboration between Le Corbusier and Amancio Williams, the local architect responsible for developing the construction drawings, is provided in Johnston (2018).

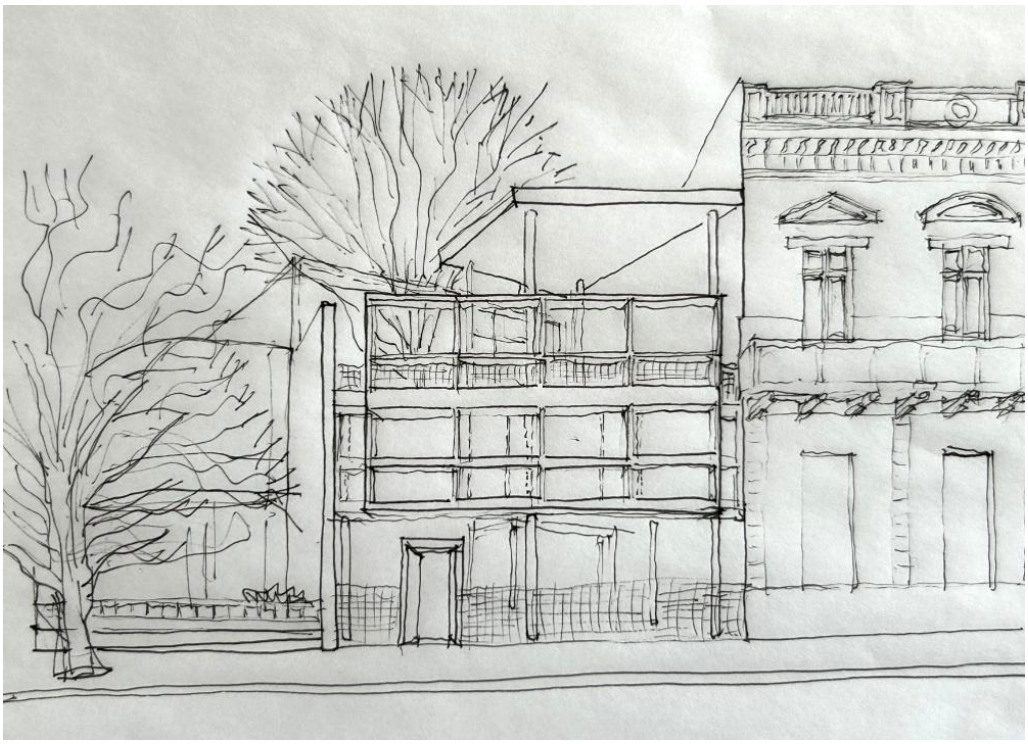
[15] The structure of the presentation text includes: 1. Occupation of the land; 2. Various details; 3. Construction; a summary; and a postscript explaining the *Modulor* measurement system and advocating for the adaptation of local regulations to permit its use (Le Corbusier, 1948).

Figure 6: *Curuchet House*, schematic longitudinal section.



Source: Author's drawing, 2023.

Figure 7: *Curuchet House*, front view.



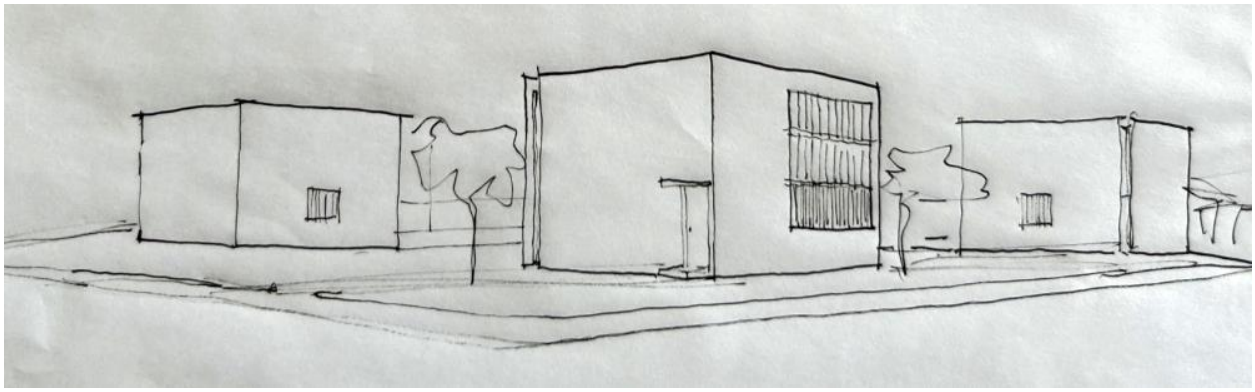
Source: Author's drawing, 2023.

5 A leap through time: from Le Corbusier to Lina Bo Bardi

Finally, in advocating for serial housing, Le Corbusier illustrates the possibility of such repetition, which would lead to the refinement of the standard, through a proposal for the *Mass-Production Artisans' Dwellings*, from 1924 (Figures 8 and 9). He explains:

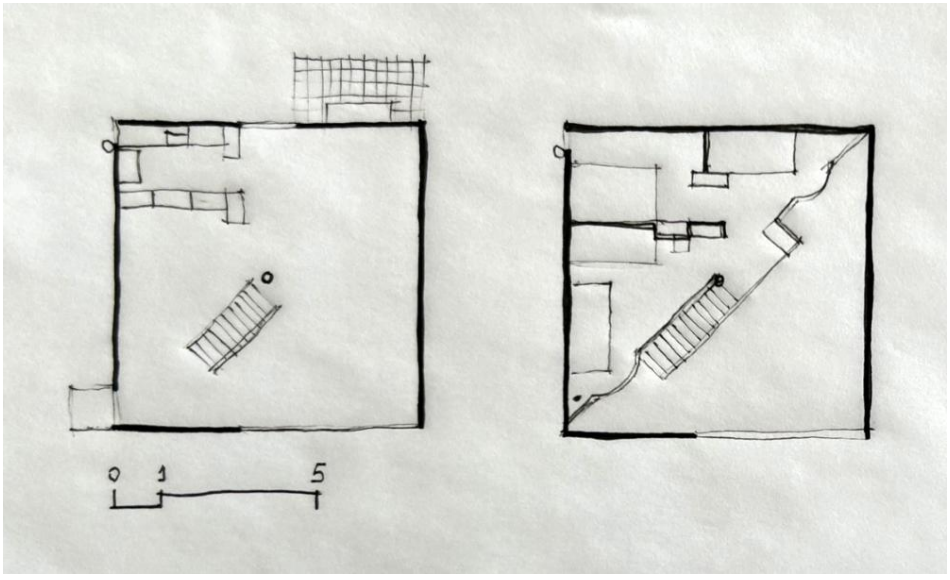
> The problem was that of housing artisans in a large and well-lit workshop; of lowering costs by the elimination as far as possible of partitions and doors, and by the reduction in the normal wall surfaces and heights of rooms [...] There are only two doors to a house. The loft or upper floor, on the diagonal, allows the ceiling to be developed to its full extent (21 feet x 21 feet); the walls also are displayed to their full dimensions, and, moreover, the use of diagonal creates *an unexpected dimension:* this little house, 21 feet square, gives along the diagonal the effect of a dimension of 30 feet in length. (Le Corbusier, 1986, p. 255).

Figure 8: *Mass-Production Artisans' Dwellings*, sketch of the complex revealing the Purist logic of volumetry characteristic of the architect's white buildings of the 1920s.



Source: Author's drawing, 2023.

Figure 9: *Mass-Production Artisans' Dwellings*, ground floor (left) and attic (left) plans.

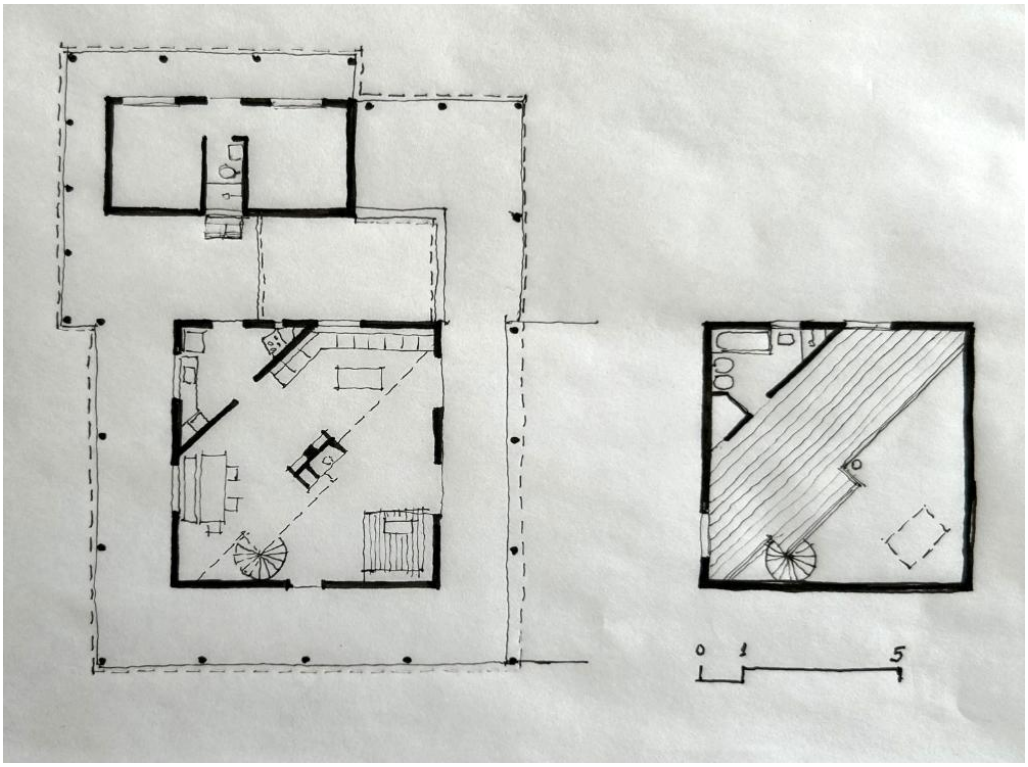


Source: Author's drawing, 2023.

The precise design and description of a Purist project from 1924 allow for a geographic leap – from France to Brazil – and a temporal one, from 1924 to 1958, illuminating a remarkable conceptual inflection, now no longer in Le Corbusier's work. Thirty-four years after the unbuilt proposal for serial houses, Lina Bo Bardi, in designing the *Valéria Cirell*

House in São Paulo, borrowed that organizational logic from Le Corbusier. A perfect square, in this case, 8 m × 8 m, traversed diagonally by a mezzanine, structures the main body of the house, replacing the linear staircase with a helical one and the central column with a multifunctional element housing the fireplace (Figure 10).

Figure 10: Valéria Cirell House, ground floor (left) and mezzanine (right) plans.



Source: Author's drawing, 2023.

To this abstract transposition of the geometric order from the house originally designed by Le Corbusier and Pierre Jeanneret, Lina adds a round wood and straw balcony – later replaced by a ceramic roof – that not only provides a highly comfortable intermediate space for the Brazilian climate but also creates an element of integration with the exterior environment, surrounding a central courtyard and articulating a secondary volume of the house.

This shift toward a more concrete materiality is reinforced by the treatment of the exterior walls of the residence, which are not intended as smooth surfaces forming pure volumes with perfect edges, articulated as Apollonian objects under the light, but rather as a rough artifact defined by stone-clad masonry that, due to its texture and porosity, could support vegetation, as explicitly shown in the architect's original graphic representation. The same volume also features a roof garden. The ideal of an abstract form supposedly unaffected by the passage of time – so long as constant repainting maintains its apparent detachment from the elements – gives way to another materiality grounded in a concreteness fully integrated with the environment and continuously transforming, not only through its response to the weather but also through the inclusion of vegetation as an integral and constitutive part of the concept defining the house's entire materiality. Whether Lina Bo Bardi was aware of and deliberately borrowed the solution from the project by Le Corbusier and Pierre Jeanneret is irrelevant to this discussion. Beyond geometry, what matters is Lina's entire poetic operation, which assumes an approach exactly opposite to the formal abstraction of the plastic exploration undertaken by Le Corbusier in that 1920s project. At the time, this shift could have been interpreted as

archaism or a return to a supposed primitivism in material usage, as in Gaudí, or as a stance toward the organicism of Wright or Zevi.[16] As Zeuler Lima (2013, p. 73-74) points out, these themes already appeared in Lina Bo Bardi's only academic text from 1957 – *Propaedeutic Contribution to the Teaching of Architectural Theory,* prepared for her appointment as a professor at the University of São Paulo, associated with the advocacy for reconsidering nature and its laws as fundamental to architectural thinking. Lima argues that the *Cirell* and *Chame-Chame* houses were opportunities to test in practice what had already been proposed in theory: "the two houses genuinely represent the aesthetic investigations Bo Bardi was pursuing at that moment, manifested in her desire to distance herself from strict rationalism and to seek references in anonymous buildings and in the relationship between architecture and nature" (Lima, 2013, p. 75-77).[17]

6 Conclusion: on the dissonances between idea and work

When Le Corbusier's propositions in *Toward an Architecture* are confronted with his built work, the aim is not to disqualify his text or to critique his architecture. Rather, the objective is to illuminate the margins, or interstices, between idea and realization, where circumstance inevitably intervenes. There will always be ambiguity and tension between intention and execution. It is particularly relevant to note that every architectural production is historically and contextually situated, and its poetics evolve over time. What Le Corbusier conceived in 1923 may not fully hold for the same architect building in 1950. Similarly, identifying a resemblance between a Le Corbusier drawing from the 1920s and a house designed by Lina Bo Bardi in the 1950s does not diminish the value of Bo Bardi's work. It merely reveals that similar forms may arise from different conceptual intentions, just as divergent forms may emerge from similar ideas.[18] Consequently, it is crucial to recognize and explore the existence of a critical interval, a disjunction or disconnect, between form and idea. Arguments presented in the manner of a manifesto, such as those in *Toward an Architecture*, do not lose their relevance entirely when viewed critically that allow us to discern the distinctions between the manifesto rhetoric and the foundational principles that underpin architectural practice.

On the other hand, the transformation that Lina enacts upon Le Corbusier's Purism can today be understood as a positive update of the modern formal matrix, in the sense of reducing layers of abstraction and restoring in architecture a commitment both to time, to the obsolescence and performance of materials in the face of weathering and the passage of years, and to a concreteness in its relationship with place in the broadest sense, including, and especially, its implications related to climate. She states:

[16] Marcelo Ferraz, commenting on the house, highlights its affiliation with Purism and points out a turning point in the architect's work: "Together with the Chame-Chame House in Bahia, the garage and garden walls of the Casa de Vidro, the Cirell House project marks a major shift in Lina's architecture. These are projects completed after Lina's trip to Barcelona (1957) and her firsthand encounter with Gaudí's work, as well as her fascination with all of life. It is also important to note that during this period, Lina resumed her rich correspondence with her old friend Bruno Zevi, a major promoter and advocate of the so-called 'organic architecture,' which counted Frank Lloyd Wright as its great master." (Ferraz, 2020).

[17] From the original: "as duas casas genuinamente representam as pesquisas estéticas que Bo Bardi perseguia naquele momento, manifestadas em seu desejo de se distanciar do racionalismo estrito e de buscar referências em edifícios anônimos e na relação entre arquitetura e natureza."

[18] I owe this understanding to Amilcar de Castro, who, when questioned about the similarity between his work and that of Franz Weissman, made this exact distinction between idea and form.

> The architect must also, and above all, be the designer of human dwellings, and even the mentor who, at a certain moment, might become an author of rebellion against "imprisonment," perceiving that many of his colleagues, perhaps unconsciously, reduce human life to a fantasyless adventure, *alien to nature*, through a divorce that cannot be considered normal, contradicting organic needs, tending toward a suspicious arrogance, as if in challenge to the origins we cannot forget (Bo Bardi *apud* Ferraz, 1993, p.120, emphasis added).[19]

Finally, reducing layers of abstraction through the reconsideration of aspects related to natural phenomena – light, heat, rain, wind, gravity, and matter, among others – can lead to a renewed exploration of the poetic potential inherent in these inescapable conditions of architecture. When combined with an expanded sensitivity to different modes of making, seeing, living, and relating construction to context, these aspects of nature can be understood as *poetic foundations of design*. With abstraction reduced, the dissonances between discourse and built work discussed throughout this article reveal opportunities to mobilize other principles that, in Le Corbusier, operated in the interstices between text and building, that is, within the critical interval of the poetic action that confronts the circumstances of each work's realization. In Lina Bo Bardi, these principles, which deviate from strict rationalism, are deliberate, explicit, and consciously employed to develop a different poetics. In both cases, a critical awareness of this reduction of abstraction and the reconnection with those poetic foundations linked to nature allows us to imagine new places that are more convivial and generous for human life and less impactful on the environment. It can be concluded that, in architecture, such processes of abstraction entail a denaturalization of making, and that the entire logic of Cartesian thought based on abstraction leads precisely to this separation between object and context, between subject and world, between humans and a supposed nature as if we were not part of it. If we accept Aureli's argument regarding the role of abstraction as a tool for amplifying the force of capitalism, then seeking to overcome it, or at least to reduce it, can be understood as an act of resistance.

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[19] From the original: "O arquiteto deverá ser também, e sobretudo, o projetista da casa do homem, e até mesmo o mentor que, em certo momento poderia se tornar um autor da rebeldia contra a 'prisão', e perceber que muitíssimos de seus colegas, talvez inconscientemente, vão reduzindo a vida humana a uma aventura sem fantasia, *alheia à natureza*, num divórcio que não pode ser normal, que contradiz as necessidades orgânicas, tendendo para uma arrogância suspeita, como que num desafio às origens das quais não podemos nos esquecer." (Bo Bardi *apud* Ferraz, 1993, p. 120).

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