

Article

Function Follows Form: Considerations on Hard Heritage Facing the Climate Emergency

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Abstract: In the discipline of architecture, there is an established familiarity with the 19th century's Louis Sullivan's pithy dictum "form follows function". The expression has indeed directly and indirectly inspired many authors and movements, especially during the beginning of the 20th century, when objectivity showed its value in improving the progress of the industrial society. Nonetheless, the reception effects of such architecture with the primacy of function were responsible for decisive transformations in architectural form, human behaviour, social transformations and material and technological manoeuvres and gave rise to very rich developments related to form, history and inhabitants' psychological engagements, among many others. So, what about the reception effects framed in the natural and inhabited environment? Could we make space for a sense of greater need, facing a climate emergency? The present paper brings the example of a bunker's super-resistant heritage, as a paradigmatic sample of material resistance, that supports the idea that "Function (can) Follow the Form" when re-signifying hard architecture, as is the case with Plan Barron of Defence of Lisbon and Setubal, a recently declassified military heritage set of buildings. The study conducts a critical literature review as a qualitative method of research that groups factors into clusters to give evidence to some conceptual theoretical frameworks: "hardness"; "inheritance"; "object trouvée"; "affordance"; and "empathy". These concepts become then the basis to frame a new paradigm: function follows form can be a pertinent approach when dealing with super-resistant structures in the present climate crisis. This inverse paragon, well explained, could work as a *motto* to architects for a new era of global climate action.



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1. Introduction

1.1. Theoretical Framework

1.1.1. Framework, Gap and Relevance

Climate emergence has become a significant topic in urban, landscape and architectural heritage policies and, already, some policy efforts, at an international level, have already been made to address the numerous major problems we are currently facing. Recently, UNESCO published the "Convention Concerning the Protection of the World Cultural and Natural Environment" that establishes a "Policy Framework" and an "Implementation Policy Document", which brings a new proposal for heritage adaptation to the impact of the climate, but also on "climate mitigation", as point 59 describes, by creating "value and inspirational power of World Heritage properties to showcase 'win-win' mitigation practices that both reduce greenhouse gases and safeguard Outstanding Universal Value" [1].

This text considers the particular implications of materially strong architectural legacy in a climate emergency scenario and asks if the pithy dictum "form follows function" [2] could not give way to function follows form, as a new approach for the built environment, for city planners and architects. The reading will consider the example of hard heritage, buildings designed to physically resist bombardments, as in the case of bunker architecture.

This super-resistant architecture from the mid-20th century had a very short life span, regarding the function that was designed for, but has expressed, up until this moment, signs of enormous physical consistency and built characteristics that call into question the pertinence of its ruin, decay or demolition, which once represented the excessive consumption of energy, money or/and materials. In this sense, we feature the example of Plan Barron of Defence of Lisbon and Setubal (Figure 1), a mid-20th century set of eight batteries designed and built in the form of a bunker along the Atlantic coast to protect the capital of Portugal [3]. The set was ordered to be built in 1938 by António de Oliveira Salazar, the prime minister of a totalitarian regime, and the project was designed by the English War Office. In 1943, its construction finally started, after a hard but prompt negotiation that followed Great Britain's request for the construction of the Lajes Military Base on Terceira Island in the Azores Archipelago [4]. The plan was drawn so that Portuguese batteries could reach long-distance ships approaching the coast before their cannonry capacity was capable of attacking Lisbon. This territorial plan constitutes what Gilbert Simondon calls a "techno-aesthetic" work, "entirely successful and beautiful" [5].

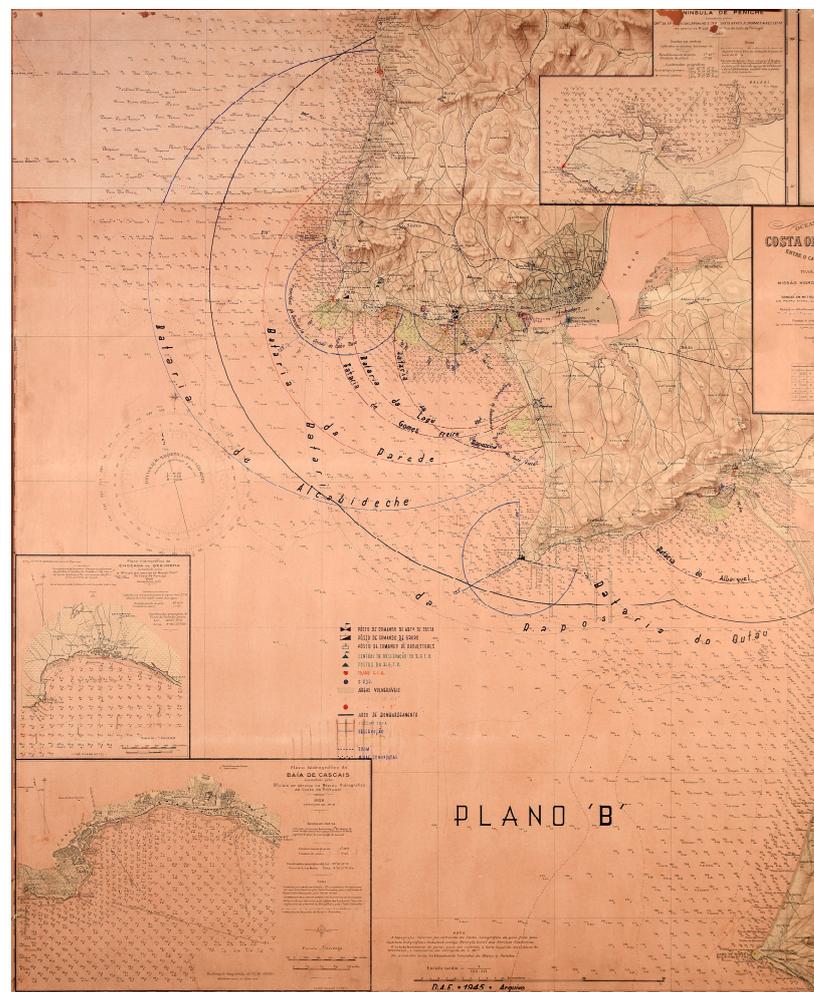


Figure 1. Plan Barron ("B") General Plan (1938). Source: DAE (Direcção de Armas e Engenharia). DAE@.

1.1.2. Material Resistance

Besides the beauty of its technical territorial drawing, Plan Barron is given here also as an example of physical resistance and, when demolished, of financial waste. The conclusion arises from a 2008 episode regarding the process of demilitarization and dismantling of Bateria de Alcabideche, one of Plan Barron's secret and fortified batteries. This military property was offered by the state to Cascais Municipality to house the new hospital for the

region. At that time, the uninformed civil authorities decided to demolish the “military complex” but ran into an unexpected conclusion after the initial demolition attempts: demolition could not be performed [6]. The construction company spent all the budget trying to destroy the first bunker and, in the end, they did not succeed. So, they decided to change the structural design of this huge hospital building, using two of the bunkers as structural footings for the hospital and placing the expected indoor car parking in the surface, surrounding the built volume.

1.1.3. Cultural Resistance

During the undertaking of a recent Horizon 2020 Marie Curie European research project, SOS Climate Waterfront, one of the challenges was anticipating of the rise in sea water level, trying to understand behaviours and forecast dangers relating to areas expected to be damaged. During that research, myself and Isabel Barbas, another researcher, proposed what we called “Future Archaeology” [7], a theory that looks into a place-in-transition, like today’s waterfronts, and proposes an archaeological study that focuses not on past remains, but on the future legacy we decide to preserve. This legacy can be decided and studied in advance, as well as catalogued and archived. It is here, at this point, that both problems merge and the following question arises: “What to do with hard remains as bunkers? As war remains, bunkers are hard in two senses: hard, because the structures were calculated to resist bombing attacks, and hard, because they remind us about the existence of war, control and hostility”. In this sense, there is a particular material and financial interest and also a cultural interest, to preserve the memory of war.

1.1.4. The Rise and Fall of Functionalism

Although functionalism is closely associated with the 20th century’s so-called modern architecture, it is by no means an exclusively modern conception. To gain an idea of its history, many authors advocate that Aristotle (even if crucially concerned with the issue of “awareness” of sensations) might be considered to have been a functionalist [8]. However, the first known document referring to the idea of a certain understanding of “use” or “convenience” dates from the 1st century BCE, in the very well-known *De architectura*. Here, Marcus Vitruvius Pollio advances the theory that buildings need to satisfy three aspects—“firmitas”, “utilitas”, and “venustas” (“stability, utility, and beauty”) [9]. The idea of functionalism is not totally unveiled but the text brings together two readings with a utility value for the architectural object: one linked to materiality and the other to function as a utility to space conception. From this moment, the history of western architecture displays numerous examples of these two readings to a utility value, including, for example, the military architecture of the early Middle Ages, certain periods of gothic religious architecture and much of the industrial, infrastructural and commercial architecture of the 19th century.

The 18th century brings particularly interesting roots to functionalism, beginning with Carlo Lodoli, a Franciscan priest, mathematician and teacher from Venice, who, although little known, had a clarifying vision regarding both of these conceptions: the one related to the truth to materials and the other to the idea of utility of the space and furniture. Despite the novelty for his time, Lodoli did not have many followers, since his writings and his treatise were not published, and his theories are only known from the registers of other persons. The most important of these persons are Francesco Algarotti and Andrea Memmo. The first wrote about Lodoli’s ideas and mixed them with his own ideas and the second, a Venetian politician, was perhaps the one who best interpreted his work, in the book *Elementi d’architettura lodoliana* [10]. The relevance of this work rests not only in its intrinsic theoretical interest, but also in the fact that it publishes, for the first time, the word function as a thematic value in architecture. In the frontispiece of the second edition of the book, in 1787 [11], Andrea Memmo presents an etching of Carlo Lodoli’s portrait by an anonymous author (Figure 2), with the sentence “*esta funzioni la rappresentazioni*”, meaning

“this functions the representations” and, on the other side of the portrait’s oval frame, we read: “*devoansi unir e fabrica e bagione*”, meaning “fabrication and wealth must unite”.

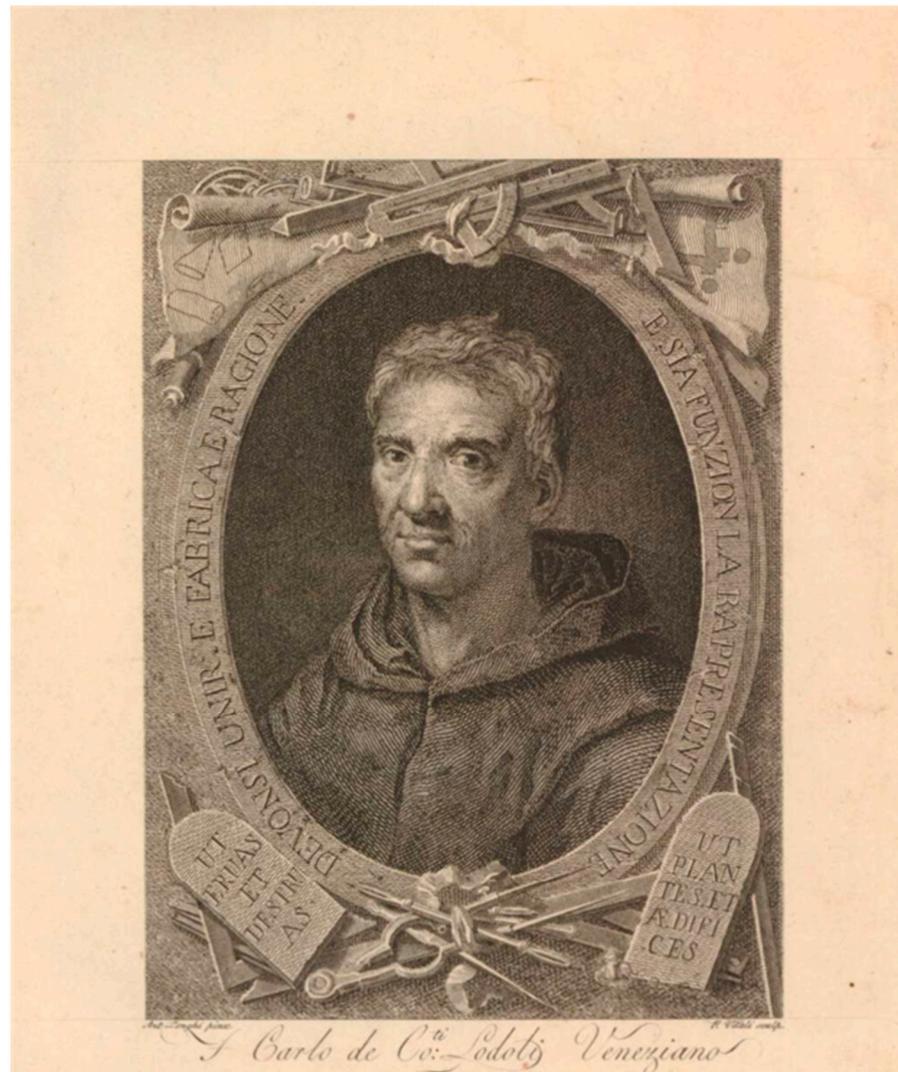


Figure 2. Portrait of Carlo Lodoli, bust, facing front, wearing Franciscan habit, within an oval, surrounded by architectural tools and drawings; frontispiece to Andrea Memmo’s “Apologhi immaginati e sol estemporaneamente in voce esposti agli amici suoi”. Etching by anonymous author (Bassano, 1787). Source: British Museum. The Trustees of the British Museum©.

Almost at the same time in France, in Marc-Antoine Laugier’s *Essai sur L’Architecture* [12] stands, in the frontispiece, the famous engraving that Charles Eisen made for the second edition of the book (Figure 3). The image represents the primitive hut, a Vitruvian conceptual idea, that is not necessarily material but a human creation; a mediation between man and nature. The frugality of the cabin can be interpreted in its plainness as a way of representing a basic architectural and structural form, which eliminates arches or pedestals and leaves doors and windows only for functional necessity ([12], p. 52). This formation could mean that he was in favor of purifying architecture in a rationalist framework.



Figure 3. “The Primitive Hut”, frontispiece of the second edition of Marc-Antoine Laugier’s *Essai sur L’Architecture*, 1755. Etching Charles Eisen (Paris, 1755). Source: Wikipedia Commons. public domain©.

A few years later, again in Italy, a disciple of Carlo Lodoli, Francesco Milizia [13] took up the idea of the admirable qualities of the primitive, suggested by Germain Boffrand, but interpreted it differently from that of his predecessor in the Rococó era. He defended the idea that that modern architecture should imitate the admirable qualities of the primitive, not of “*caractère*”, but stressing its rational approach, explaining that “they satisfied the needs of the day as well as they could” ([14], p. 179).

So, if the 18th century represented the seeds of functionalism, the 19th century represented some more stabilized roots, with a first stage in the French academy and a second one in a German–Italian axis. The century started with two books of Jean-Nicolas-Louis Durand: *Précis des leçons d’architecture données à l’École Polytechnique* Volume One and Volume Two [15,16]. In his first book, Durand rejected any theory which attempted to explain architectural beauty in terms of imitation of some kind of model, be it a natural shelter, primitive architecture, or the human figure. He also rejected decoration and found utility to be the basis of all architecture, the true end and the source of pleasure [14]. But the innovation of Durand regards his defence of the act of systematization as the source for the architectural translation of these principles (Figure 4). Moreover, Durand’s idea of

systematization also makes it possible to create a universal repertoire of architectural and constructive “elements” to be combined to conceive any kind of building. This idea frees objects from any kind of symbolic expressive value, from traditions and from the context of the site, to concentrate on the rationality and the economy of the project, at the profit of a common social utility and of scientificity ([17], p. 12).

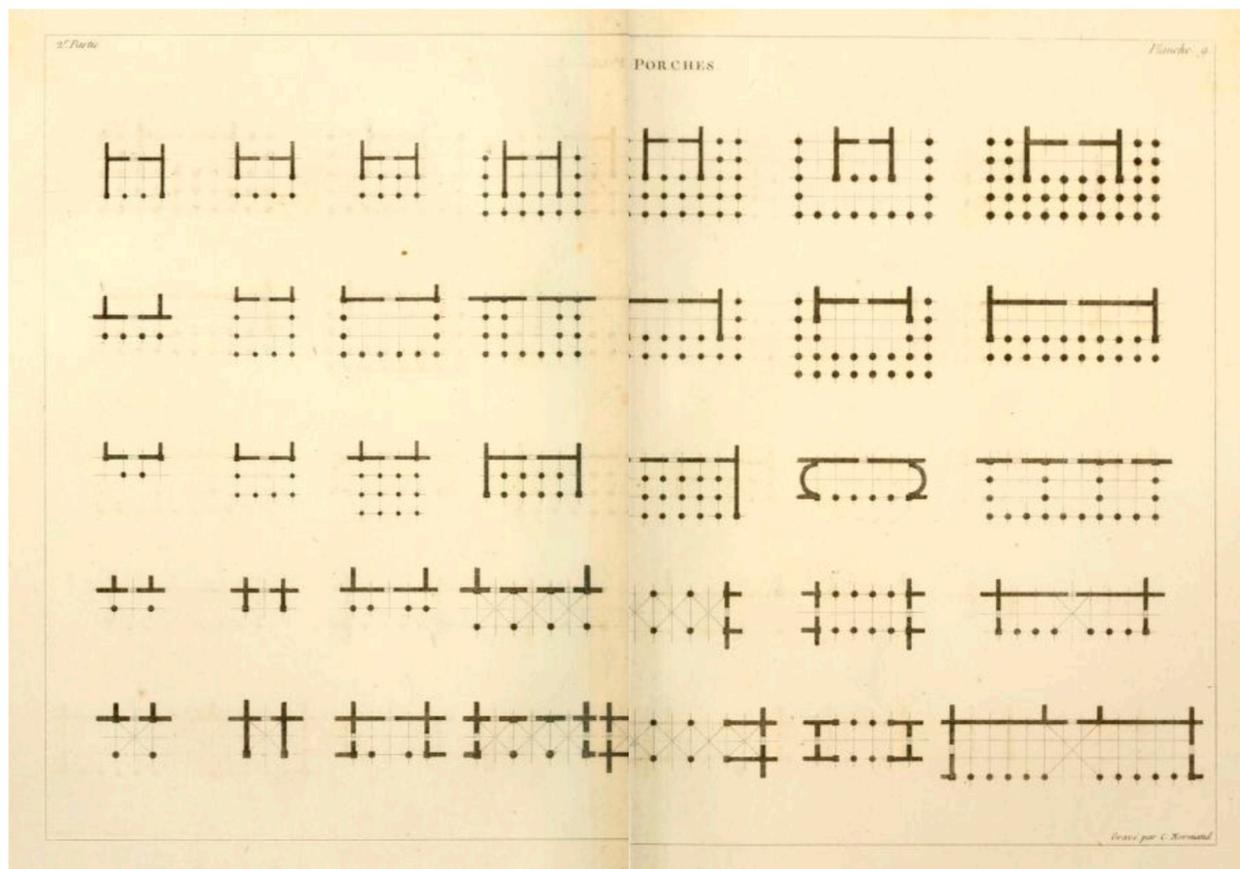


Figure 4. “Porches”; facsimile of *Précis des leçons d’architecture données à l’École Polytechnique*, Volume One, 1802. Paris: Chez l’Auteur. Source: *Précis des leçons d’architecture données à l’École Polytechnique*.

Still in the mid-19th century and despite being directly linked to medieval revivalism, Eugène Emmanuel Viollet-le-Duc’s way of seeing the relationship between form and function in architecture had a fundamental influence on a whole new generation of architects, including one flank more linked to *Art Nouveau* artists (Antoni Gaudí, Victor Horta and Hector Guimard), another more associated with the Arts and Crafts movement (John Ruskin and William Morris) and, finally, one related to Functionalism (Frank Lloyd Wright, Mies van der Rohe, Auguste Perret, Louis Sullivan and Le Corbusier). Viollet-le-Duc wrote over 100 publications about architecture and restoration, but in his *Entretiens sur l’architecture* [18], he concentrated his ideas, in particular regarding the use of iron and other new materials, and the importance of designing buildings to an architecture adapted to their function.

A locomotive therefore has style. Some will call it an ugly machine. But why ugly? Does it not exhibit the true expression of the brute energy which it embodies? Is it not appreciable by all as a thing complete, organized, possessing a special character, as does a piece or artillery or a gun? There is no style but that which is appropriate to the object. ([19], p. 520)

The German–Italian axis had different evolutions. Francesco Milizia, an 18th century critic of architecture with a neo-classic taste, in the introduction to his book, *The Lives*

of *Celebrated Architects, Ancient and Modern* [13], took up the idea suggested by Boffrand and elaborated on by Laugier that modern architecture should imitate the admirable qualities of the primitive, underlying the idea that “they were all that they had the power of being” ([14], p. 179). Milizia was less of a functionalist than Lodoli because he did not insist on absolute truth and function but accepted the appearance of truth and the appearance of function, as ancient Greeks did; not in a literal way, but improving with beauty, convenience and solidity until their architecture could reach a higher degree of perfection.

In Germany, the advent of functionalist architecture, as from the Italian Lodoli, came from Christian Wolff in the 18th century. The German philosopher claimed that every discipline should be displayed and unfolded according to Gottfried Wilhelm Leibniz’s demonstrative, deductive and mathematical method [20]. This is perhaps the reason he is considered the peak of enlightenment rationality in his country. Additionally, for architecture, Wolff recommended the eighth theorem of his *Elements of Architecture* safeguarding; for example, the characterization of the whole by all of its parts without contradiction or counteraction ([14], p. 20). Also during the 18th century, Johann Winckelmann, the German art historian and archaeologist, brought proximities with a classical background and, later, Johann Wolfgang von Goethe, the influential writer from the late 18th and early 19th centuries, expressed his ideas, in many ways, within the tradition of functionalism, writing occasionally on architecture and explaining the idea of the beauty of the architectural form arising from the adaptation to necessities as an organic perfection.

Also, the meaning of function has had different and tangled meanings over time. According to Adrian Forty, “a ‘function’ describes the result of the action of one quantity upon another” ([21], p. 174), and this meaning, more connected with material characteristics, is maybe the reason why this word is more related to the tectonic of the building, up until the beginning of the 20th century. So, we can easily historically frame Romanic arcs as a way to enlarge the interval between two walls or columns; the gothic vaults as a way to enlarge the height; and the *fenêtre au longueur* as a way to open the relation between the interior and the exterior. However, historically, many authors present different ideas about the meaning of function in architecture. Again, Forty recognizes five uses for function: (a) “as a mathematical metaphor—a critique of the classical system of ornament” ([21], p. 174); (b) as “a biological metaphor, descriptive of the purposes of the parts of the construction relative to each other and to the whole” ([21], p. 175); (c) as “a biological metaphor, within the organic theory of form” ([21], p. 177); (d) as a “‘function’ meaning ‘use’” ([21], p. 179) and (e) as a “functional as the translation of the German words ‘sachlich’, ‘zweckmassig’, ‘funktionell’”. Siegfried Giedion [22] also brings a brilliant theoretical construction that introduces the functional idea of mechanization, not from a technical perspective, but from a human and bodily point of view. The meaning of functionalism has evolved and diverged substantially and will continue evolving along with different crises and innovations. Also, the meaning of functionalism varies within different areas of study, such as biology, sociology, philosophy and linguistics. For the present research, I am focusing on the meaning of functionalism as an architectural idea to express a more particular concept, linked to the principle that buildings should be designed solely on the basis of their purpose and function.

1.2. Theoretical Framework

1.2.1. Functionalism and Disposability

The most visible transformation of architecture in the mid-19th century was the mechanization of the production of materials and construction processes. However, to understand architecture as a discipline, from the moment it began to be produced industrially, it is necessary to refer to what underlies the mechanization processes: the cultural evolution. In other words, the idea of a rational society is older than the industrial revolution itself. Such thinking, which extended from the theory of knowledge to the explanation of biological, social and economic processes, reached architecture from 1850 onwards, assuming a functionalist reasoning demarcated by the positivist philosophy of Auguste Comte, regarding the exact extent to which positivism stimulates the technical–industrial organization of

modern society. In the scope of architecture, there is an assimilation of the image of the production process, but it is not just about referring to the form of the machine; rather, functionality concerns the design process—which, in other words, means taking the mechanized mode of production as the principle and rule of the (architectural) project for carrying out and coordinating activities in a building.

So, returning now to the issue of the climate emergency, I would ask more precisely: “Can this current circumstance of distress regarding the Earth’s environment have an effective impact on these kinds of project design decisions?”

For this text, we take military architecture in the form of a bunker as a paradigmatic example of material resistance in this present scenario of the climate crisis. But to be honest, bunkers are only a paradigmatic example. The line of thought used here refers to many other functionalist and hard buildings that have now also been forgotten, due to the uselessness of their purpose.

Calculated to resist to bombing attacks, bunkers are introduced here as “anthropofossils”, a word that intends to signify these and other hard structures as “fossils”, remains or evidence of preserved constructive and experiential activities, related to the human era on Earth. The current perception of the climate crisis has brought different voices into the architectural field as an answer to this continuous conjuncture, and I enhance here Tatjana Schneider and Jeremy Till’s *Architecture After Architecture Research Project*, as they are determined to investigate:

(...) the way that the architectural profession, and other practitioners working in the field of the built environment, might operate in the face of the climate emergency. (...) [The project] looks at the cultural and economic contexts of the climate emergency, and the implications these have for spatial practice (a term that designates multiple ways of operating in the production of the built and natural environment). It investigates in particular the urgent need to reconsider assumptions of growth, extraction and progress on which orthodox economics is based. [23]

Their positioning regarding current crises defines an innovative placement for architects, not in researching mere technical or material solutions, but more speculative answers. Here is also where we are in this paper, relating philosophical questions to political frames, and connecting material knowledge to a theoretical framework. It is in this disposition that the function follows form expression will be here dissected and discussed. So, the final question rises as: “May we think about a new pithy dictum—function follows form—as a way to produce space in architecture facing climate emergency?”

Although it has different evolutions throughout history, as we saw before, this concept has roots in the industrial revolution and emerges strongly with World War I, as one of the tentacles of the modern movement. Functionalist architecture is often linked to ideas of utopian socialism and modern humanism as a purpose, so that functional architecture is also to be used as a means to physically create a better world and a better life for people, in the broadest sense. But, according to Charles Jenks ([24], p. 9), “Modern architecture died in St Louis, Missouri on 15 July 1972, at 3.32 p.m.” (Figure 5). Minoru Yamasaki, the architect of the Pruitt–Igoe housing complex, built between 1951 and 1955, was also the architect of the World Trade Center, also ruined for other reasons of modernity. The housing complex was designed according to the *Congrès Internationaux d’Architecture Moderne* (CIAM) functionalist ideals and even won the AIA (American Institute of Architects) in 1951. In his book *The language of post-modern architecture*, Jenks discuss the death of modern architecture, maybe not in its functionalist genesis, but much more due to a “system of causes” ([24], p. 14) as its lack of “identity” ([24], p. 12) regarding language or “human environment” ([24], p. 14) or the changes in use ([24], p. 15). We can number a thousand reasons for a building to cease to be useful. But if functionalism ceases, what do we do with such a huge matter and space available that is so specific, so conceived to follow a function?



Figure 5. Pruitt-Igoe, project by Minoru Yamasaki (1951–1955). Photograph by anonymous author (1972), Photograph, Source: Wikimedia Commons (1996).

In 1974, a group of young artists produced *Anarchitecture*, an exhibition which encapsulated a critique of the modernist impulses of the contemporary culture, within which architecture was conceived as a symbol for that culture's worst excesses: capitalism, the role of property and the excess of production. Gordon Matta-Clark was one of the group's most active members, an artist trained originally as an architect at Cornell University, where he contacted some of the most eminent architectural theorists at that time and from where he graduated in 1968. The *Anarchitecture* exhibition is seen as a manifesto and the curatorial line seems to also bring functionalism to the table of discussion. The first outline for the exhibition made by Matta-Clark to the group members is visible in a letter to Carol Gooden in December 1973. In this letter, Matta-Clark plays with words, since its title, along the explanation of the curatorial proposal, was a plain board with the words "NO.THING WORKS" (Figure 6). According to James Attlee, "This fundamentally anti-functional statement (...) a reaction to the prime-crime axiom of modern design-fighters [sic], stands in direct opposition to the whole ethos of utilitarian modernism." [25]. Another example of wordplay in this letter can be seen in a footnote where Matta-Clark describes one of the exhibition proposals. It is Louis Sullivan's dictum, "form follows function", distorted and mirrored to become "form 'fallovs' function" [25]. Although the exhibition that was actually shown was much more visual, the reality is that its purpose is verbally established in the artist's initial proposal and is clearly exposed in his personal work. In a 1974 interview, Matta-Clark speaks about "a functional level that was so absurd that it ridiculed the idea of function" ([26], p. 203). In one of his most celebrated works, *Splitting*, Matta-Clark "builds" a vertical slice into an old frame house located in Englewood, New Jersey. The home was owned by New York art dealer Holly Solomon and was going to be demolished.

The construction was simply bevelled, with the angle dictated by a row of concrete blocks, and, through a calculated process, the necessary forces were transferred so that the house presented a cut that conferred on it a sense of uselessness (Figure 7). Matta-Clark himself emphasizes: “The whole event gave me a vision of what a house is, of the solidity of its construction” ([26], p. 207). In this, as in other works, Matta-Clark refers to this uselessness and disposability. This disposability is highlighted by the elevation of the physical remains to a work of art, reordering alignments, spatialities and materialisms.



Figure 6. Index card note, Gordon Matta-Clark, 1974. Source: CCA—Canadian Center for Architecture. @Succession Gordon Matta-Clark/A R S Estate of Gordon Matta-Clark/A R S©.



Figure 7. Splitting, print, 2001 (?), Gordon Matta-Clark, 1974. Source: CCA—Canadian Center for Architecture. @ Succession Gordon Matta-Clark/A R S © Estate of Gordon Matta-Clark/A R S.

1.2.2. Lavoisier and the Idea of Reducing/Recycling/Reusing

The *Law of Conservation of Mass* dates back to Antoine Lavoisier’s discovery in 1789, and states that mass is neither created nor destroyed in chemical reactions. In other words,

the mass of any element, at the start of a chemical reaction, will be equal to the mass of that element at the end of the reaction [27]. This theoretical finding is the reason for Lavoisier to state that “In nature, nothing is created, nothing is lost, everything is transformed”. Despite the beauty of the idea of circularity of the material world and the benefits of being able to reuse, more recently, modern industrial society emphasizes maximizing yields over the efficiency of the ecosystem. The result is the predominance of highly open ecosystems (where inputs and outputs can far exceed internal cycling). For example, with the enormous increase in the population, there has also been an increase in construction and many materials and natural resources (e.g., water, stone, iron) will become increasingly limited over the next century (due to subtracted geologic deposits). We are now facing the challenge of increasing the efficiency of these systems. So, just as mass balance constraints provide a useful tool for ecologists in studying natural ecosystems, they can also ensure that the increase in human population and material consumption that has characterized the past two hundred years cannot continue indefinitely. We are beginning to understand now that we are prisoners of a “disposable society” [28]. “Reduce, Reuse, Recycle” [29] seems to be the only way to achieve ecosystem cycles.

In *Architecture Depends* [30], Jeremy Till discusses the idea of architecture as an authorial artwork, bringing out its dependence on other disciplines and especially on other humans, and the ethics that this relationship involves. According to Till:

In terms of architecture, the analysis is sobering. While architects may dream of their buildings coming into the world as fully fledged durable items with enduring value, the reality is that they always enter the social realm as transient objects, subject right from the beginning to decline in value and an inexorable slide to the status of rubbish. ([30], p. 71)

Although architecture is not determined by its durability, this argument is directly related to its material decline and to its social survival. In this sense, the durability and ephemerality and the use and oblivion of the built world explain the proximity between the “construction and demolition (. . .) the more new architecture there was, the higher the mounds of waste grew” ([30], pp. 69–70). So, how can we look into those buildings that are made to last? Should we stop building them? Should we proceed to “(. . .) Reuse, [and] Recycle” [29] them? What is, then, the role of architects in the current scenario?

Despite the effort, it is evident that we cannot save all buildings or turn everything into heritage ([28], p. 15), firstly because we really need to evolve, and, secondly, because it is physically impossible, due to weathering, intrinsic material degradation, new space needs, or even the expected rise in water levels, for example [7]. Acting with anticipation means that we can choose what to preserve and what to forget. Adrian Forty reminds us, in his book *The Art of Forgetting*, another book of Alexander Lúria that described a man with the capacity to remember everything, a mnemonist [31]. According to Forty, Lúria explained that his major problem was forgetting, due to the congestion of remembering everything. This is also a process that we should take into consideration when dealing with our “disposable society” [28]; we have to choose what has the utility to be preserved and what is better to forget. And here we find the first problem: the individual memory is one thing, and the collective memory is another completely different thing. The second problem is stressed by Paul Connerton in his book *How societies remember*. Here, he stresses that “past factors tend to influence, or distort, our experience of the present” ([32], p. 2). So, we may also stress that the choices made today will influence or distort our collective experience in the future.

Following these two concepts related with memory, as architects and planners, we can act with anticipation when planning and designing for the future. We can even legislate this idea, by deciding what materials and technologies to use in each new building category. But what about the remains of these buildings? Mário Caetano in *Arte na Cidade* (Art in the City) also remarks that the practice of an “environmental architecture” leads “to the production of experience, memory, context, in an era in which, for the first time in human history, memory is about, not with the past, but with the future” ([33], p. 367). And, in this

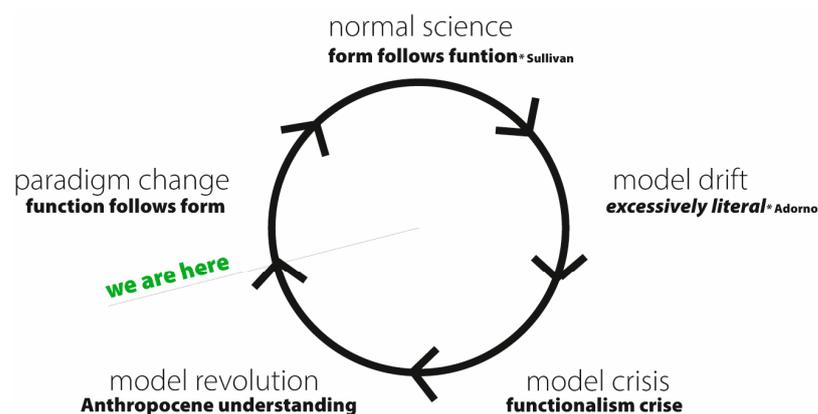
sense, maybe we could decide what to do with the past by thinking about the future. In the end, reusing a construction or a landscape means that we are registering a memory by thinking about its future. The present speculative text aims to raise some ideas in a debate regarding the implications of the meaning of heritage, with respect to practices and their sustainability.

Current times have made evident the weight of things left behind from past generations. The industry of recycling is a powerful solution, of course, but despite that, we, as individuals and as a society, need some memory of the past, to better understand the present. Contemporary historians, researchers and institutions are making great advances in preserving the best examples, by scrupulously physically preserving some buildings, landscapes and even immaterial heritage, trying to extend the life of these examples to future generations.

In parallel with this idea of recycling or reusing, the case study of Plan Barron brings us to another point of view, a perspective more linked to the hardness of the technical advances that the industrial revolution brought to the Earth and to the current state of the art.

2. Materials and Methods

The idea of turning upside down a pithy dictum such as “form follows function” is of enormous responsibility. I could not do it without a personal impetus; I suppose mine is the one that Thomas S. Kuhn calls “awareness of anomaly” ([34], p. 67) and that plays a role in the emergence of new sorts of positionings in his *Paradigm Cycle* theory. For Kuhn, scientific revolutions involved paradigm shifts that point out periods of “stasis” or “normal science”. According to Kuhn’s *Paradigm Cycle* (Scheme 1), we suggest here an interpretation that the period of “normal science” happened in a period around Louis Sullivan’s words “form ever follows function. This is the law” ([2], p. 408), since this paradigm had a good reception among society and science at that time. Following this line of thought, the model starts having exceptions, misunderstandings and excessive uses, driving the model to a “model drift” period, followed by numerous objections and a “model crisis”. I argue that we stand now between a “model revolution”, due to the recent Anthropocene understanding, and a “paradigm change” to a function follows form approach facing climate action. Naturally, and again following Kuhn’s idea, a new paradigm will follow the cycle and one day drift, before being in crisis, and a new model revolution will start.



THOMAS KUHN'S PARADIGM CYCLE

Scheme 1. Thomas Kuhn’s paradigm cycle, applied to the function follows form approach. @Maria Rita Pais.

The study for this paper comprises an inductive research method in seven stages:

1. The making of empiric observations in the current panorama due to my two ongoing research projects: “SOS Climate Waterfront” and “Plan Barron: A future for super-resistant structures”.
2. The recognition of a research gap and the rise of the following hypothesis by intuition: “May we think about a new pithy dictum—function follows form—as a way to produce space in architecture facing the climate emergency?”
3. An analytical approach obtained from contributions by two authors regarding the crises of functionalist society and the remains of industrialization. This will influence the next phase.
4. The grouping of factors into clusters for proposing a conceptual theoretical framework to frame the hypothesis supposition made on the basis of limited evidence as a starting point for further investigation, given the current climate crisis scenario.
5. The results: a conceptual framework composed by the clusters gathered in the previous phase. The concepts follow potential new positionings around the understanding of a possible new pithy dictum—function follows form—that, in facing the current climate crisis, may have a shift of meaning.
6. Discussion of the results.
7. Conclusions.

2.1. Research Gaps and Contributions

In 1984, Jean-François Lyotard highlighted an increasing scepticism towards “grand narratives” and “language-games”, putting into question a whole world of universalizing themes and their reliance on some form of “transcendent and universal truth” [35]. The era of questions had started, bringing with it a critical sense, together with “petits récits”, and/or more unpretentious or “localized” narratives, that put into question some universalist ideas, introducing the possibility of absolute freedom or certain nihilism, provoked by the instability of truth. The research conducted until this point has followed one of two scenarios:

Ref. [1] demonstrates the idea that functionalism brings disposability, in the sense that, spatially speaking, the creation of very functional objects brought an easy nothingness when their function was no longer useful. This scenario encompasses some architectural concepts that arrived after heavy industrialization: *Terrain Vague* by Ignasi Solà-Morales [36] and *Junk Space* by Rem Koolhaas [37]. Both texts focus on the idea of the remains of industrialization, the first on the idea of void areas in expectation; and the second on the idea of *generalization*, which functional architecture has embodied, with its functional, technical and technological devices. These two texts confirm the sharpness of some of the formal and spatial issues of functionalist architecture.

Ref. [2] demonstrates the idea that, in science, the notions of transformation and recycling have their roots in more than 200 years of history, and even if we do them unconsciously, we have new notions that appear, thanks to the evidence of the numerous buildings that need now to be re-equated.

The present research is based in the gap where these two ideas do not properly connect, to bring new positionings in the scope of the architectural project, as well as in the management of the cultural heritage, and in new political postures that could value the material goods that were left to us.

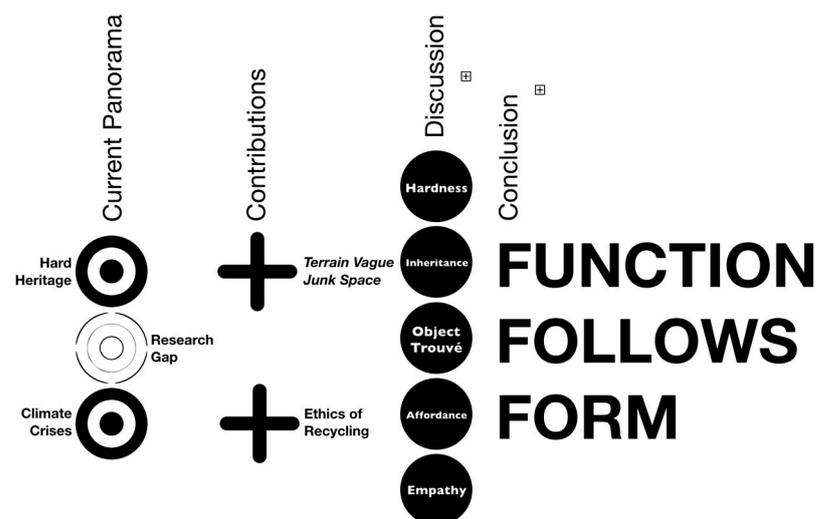
2.2. Grouping the Factors into Clusters for Proposing the Conceptual Frameworks

The idea for this paper is the result of a conjunction of factors coming from my research around climate change and its impact on waterfronts [38] and from the investigation of bunkers and their super-resistant materiality [39]. The hypothesis came intuitively and was overflying for some time: “May we think about a new pithy dictum—function follows form—as a way to produce space in architecture facing the climate emergency?” I thought it should be registered. As architects, thinkers on the built environment, could we make space for a sense of a greater need, facing the climate emergency, when we design the

future? This text features bunker super-resistant heritage as a paradigmatic sample of material resistance. Despite this seemingly sudden emergence, the way it is presented here is, of course, the result of a more systematic and careful disposition, a process that revealed a method based on logical thinking, which aggregates factors into clusters of seemingly loose concepts, but which result from a careful bibliographical review on the subject.

The process started based on the identified gap between two main ideas: the first is based on the fact that “functionalism brings disposability” and the second follows a more urgent and pressing understanding that architecture can be thought of as “transformation and recycling” in a more significant way. The position of the researcher here is also relevant, as they try to bring about what Tatjana Schneider and Jeremy Till call “systemic change” [23].

The reading is supported by conducting a “critical literature review” [40] around the main themes in question here: “hard heritage” and “climate crises”. The literature review on this gap [41,42] unveils two notions: the ideals related to “space configuration” (*Terrain Vague* and *Junk Space*) and the ideals related to the “ethics of reducing, recycling and reusing”. The work performed up until this point opened up a series of concepts that will be used in discussion: “hardness”; “inheritance”; “*object trouvé*”; “affordance”; and “empathy” (Scheme 2). The potential of these five concepts is in highlighting niches, inconsistencies or even novel domains, stepping up the “advancement of knowledge through providing guidance and direction to studies for future development”.



Scheme 2. Summary of the methodological approach. @Maria Rita Pais.

This “critical literature review” as a qualitative method of research “group[s] the factors into clusters for proposing the conceptual frameworks” [43], so that these five sustained concepts can be properly dissected, understood, compared and discussed, designing a new brief conceptual framework for this thematic.

3. Results

3.1. Hardness

Beside ecological advice, “reducing, recycling and reusing” is an action also used to address two kinds of questions: the question of memory and the question of persistent materialities. Even if we think that we could forget something, there are some things that are made to persist. That is the case for super-resistant landscapes, buildings, spaces or structures.

From an empirical point of view, we know that diamond is the hardest substance found on earth. It is an allotrope of carbon and has a microhardness of 10,000 kg/mm², which is 1000 times higher than quartz [44]. Diamond perpetuity is the reason for its use as a trading value, and the same happens with gold, silver and other high durability materials.

Currently, and within this general state of concern about the challenge of building in a climate change scenario, we live a kind of paradox; on the one hand, we value heritage that materially resists, and, on the other hand, we forget it, abandoning it to fossilization. In some cases, these “spoils left behind” [28] are forgotten, ceasing to be considered a value, unlike the “eternal” value of diamonds, but they survive to time, giving rise to a kind of fossil, not from the geological age, but from the beginning of humanity’s impact on Earth and, which in this sense, can be termed an *anthropofossil*.

In 1756, Giovanni Battista Piranesi (1720–1778) produced *Le Antichità Romane*, a four-volume publication that gathered a survey of Rome’s antiquities illustrated through more than two hundred and fifty etchings. The work represented the climax of sixteen years of Piranesi’s archaeological and topographical research in Rome and provided a printed expedition of the antiquity remains spread across the topography of the 18th century city, calling attention to the rapidly disappearing vestiges of the Roman past. The *Plan of Rome* (Figure 8) shows a topographical reconstruction of ancient Rome surrounded by fragments of the Severan marble plan as physical objects occupying real space, drawing shadows on the plane, and the topographic reconstruction represents the elevation of the territory and the footprints of several existing ancient monuments. Unlike the real thing, Piranesi represented buildings on a colossal scale and transposed some of them into invented contexts. Why does Piranesi bring fiction to a real representation? We believe that, although having no new operative function, they serve to remind us of a historical past that no longer exists. According to Gregor Kalas, “Even though ruins existed in dismembered fragments, their function in the entirety of Rome provided evidence of a whole cityscape studded with monuments worthy of preservation which, once documented, mapmakers could use to stave off their further demise” [45].



Figure 8. Plan of Rome. . . , from *Le Antichità Romane* (Roman Antiquities), Giovanni Battista Piranesi, 1756, etching. Credits: Metropolitan Museum, gift of Georgiana W. Sargent, in memory of John Osborne Sargent, 1924, Metropolitan Museum©. Accession Number: 24.63.972. Source: available online: <https://www.metmuseum.org/art/collection/search/363048?ft=piranesi+map&offset=0&rpp=40&pos=1> (accessed on 22 June 2023).

So, another question needs to be asked, not about the hardness of physical materiality, but about the hardness of memory. Some memories are publicly or historically so strong

that they remain attached to the physicality of the building. That is the case for Hiroshima and Nagasaki, two cities destroyed by two atomic bombs which, despite this destruction, now remain and will remain in the memory of people and history. So, the hardness in architecture has a purpose: even if they do not have a practical utility, they remind us of a past in a physical sense.

Within the scope of climate change, our discussion here focuses on the analysis of hard architecture and hard heritage, in particular, trying to understand this ““Crises” of Accumulation of the Past” [46].

During our research on Plan Barron’s “super-structure” and while working together with an interesting group of experts during a workshop we organized in 2022 [39], we have observed a great potential and diversity in architectural proposals for this inherited hard design structure. Beyond the expected existing spatial skeleton for new functions, we found other added values as (1) a territorial set of green natural areas protected by decades of urban legislation; (2) a new spontaneous and informal appropriation by local communities during 20 years of forgetfulness; (3) a natural curiosity about the invisible historical background due to the unique building characteristics; and, above all (4) a natural assimilation of this space and of its unique history in Portugal.

3.2. Inheritance

Since there are records of past civilizations, it is possible to verify that man has filled the public sphere with monuments to, souvenirs of and evidence for virtues, failures, hopes and uncertainty. These signs that arrive from past generations guarantee today’s balance, in the sense that they remind us of, guide us to or testify to earlier chapters. Even if isolated, these previous traces provide essential information and, if explored in a systematic way, they may even present more sustained information on habits, cycles or relapses. Likewise, if they are found today, it is because they were prepared or made available yesterday. And, even if they have not been voluntarily made available and have been hidden or destroyed, this information can still be relevant today. My point is that what comes to us today is more than an inheritance; it is a legacy. The idea of legacy has not the same meaning in law as in history. In law, it is something that one achieves by natural inheritance, or by a will, yet, in history, it is something that arrives from a previous period of time, and this can be material or immaterial.

In the case of the *Plan Barron of Defence for the Ports of Lisbon and Setubal*, the civilian community is inheriting an extensive number of structures of enormous military and strategic relevance, currently abandoned. But the civilian community is also inheriting a legacy that combines these physical structures with an immaterial knowledge that is yet to be totally understood and conciliates military knowledge with political positioning and social behaviour. In itself, the inheritance of a territory so intricate and invisible may be unnoticed by the community. How can these spaces be adopted by the civil community if they are secret?

Post-military landscapes are those with no military function, but where a former military function remains and leads us to remember its military origins. The study of military landscapes offers us the possibility to discuss the moral ideologies expressed in these places and how they might contribute to an ethic of peace and wellbeing. We should also discuss the tenacity of urban forms and lives of a military inheritance in a civilian present, because usually they were protected by legislation, and for that reason, they arrive often untouched. In this sense, they deserve to be studied, to decide the best form in which to absorb it in existing functional areas as a memory testimony.

We present as an example the case of the city of Vienna and its remarkable case study of heritage and the transformation of military heritage that has strategically changed the city. “It is My will” was a decree by Franz Joseph I, in 1857, which began the construction work of the new democratic city, similar to the case of Paris. The architecture here draws on the society of that moment, with the destruction of the walls of a feudal society. The city could expand outwards into the countryside and open the city to better housing quality. A new

ring road, *Ringstraße*, took the place of the defence walls, and plans were made to fill the wide space left by the old 500m circular ring of military protection. The emperor's architects also created large green and leisure spaces accompanied by cultural projects: a new city hall building, a university, an opera house and large museums, in which the imperial collections of natural history and art were exhibited to the public. This action transformed an enclosed city into a city open to the surrounding natural space and to culture and external dynamics, contributing to a substantial improvement in the inhabitants quality of life.

We found resilience in Vienna's case; since the existing void area that surrounded the walls was kept almost entirely, the inherited memory of the past was maintained, but space was opened for the new orders of the times: political, social, cultural and individual.

3.3. *Object Trouvé*

Object trouvé is a concept that comes from French, meaning "found object", and is also called "ready-made". The idea was first publicly used by Pablo Picasso when he pasted a printed image of chair caning onto his painting titled "Still Life with Chair Caning" (1912). Some years later, Marcel Duchamp, elaborated the concept when he made a series of what he called "ready-mades", consisting of completely unaltered everyday objects selected by Duchamp and designated and exhibited as art.

Ca'n Terra is the house of the earth. The fruit that nature gives us, as a found space which requires tillage and cultivation to imbue the received offering with domesticity. If the history of civilization has greatly evolved transforming ideas into built work, in Ca'n Terra, the process is inverted and history interpreted to transform it into architecture. [47]

Through Ensemble Studio's act of "finding" (Figure 9), we can understand the concept of inhabiting as a certain return to a more primitive action of taming or domesticating a place. The Madrid-based studio's act of designing a house is literally a process of appropriation of an abandoned stone quarry in Menorca. The design has its process based on what they call the action of finding, followed by an exploration process, and is accomplished with its appropriation. There is a certain reversed way to think, considering the Heideggerian way to dwell. *Building/Dwelling/Thinking* [48] presupposes that when man "dwells", he has in mind a profound ontological concept that a man "is" and an intrinsic relation to the act of "building". *Ca'n Terra* represents another way to exist in architecture: *Engaging/Dwelling/Thinking*. The place was found, explored and inhabited, in a reversed order: "In lieu of an imposing action that many times architecture exerts on the environment, we propose a trip to the interior being of matter, and recognize the freedom with which it gives us spaces to live" [47]. I suppose this action could be connected with the action of literally conquering to dwell as a way to claim a place to our control. Heidegger has defended that the purpose of every building is to be dwelt in and, nowadays, this act is more associated with the idea of rescuing a place from abandonment.

In 1976, Aldo Rossi, Eraldo Consolascio, Bruno Reichlin and Fabio Reinhart presented *Analogous City* (Figure 10) for the Venice Biennale of Architecture, directed by Vittorio Gregotti in the same year. The work considers the value of the city as a time accumulation and as an urban artifact, in that it is estimable not by its function but by its permanent form, since the form of the city is closely related to time, while the functions are changeable and can be lost over time. This idea was equally crafted in *The Architecture of the City* [49], where he describes the city as a gigantic man-made object that grows over time and is composed of elements ("artifacts") with their own history and form. The relevance of this, though, stands in the value of the "collective memory" as monuments that give structure to the city, by engaging intellect to discover their meaning and beauty. This position marks the shift from the urban doctrines related with the modern functionalism, presenting the autonomy of the discipline as persistence over time.



Figure 9. Ca'n Terra. Menorca, Spain, by Ensemble Studio, 2018, Photo: Ensemble Studio©. Source: Available online: <https://www.ensemble.info/canterra-house-in-menorca> (accessed on 22 June 2023).

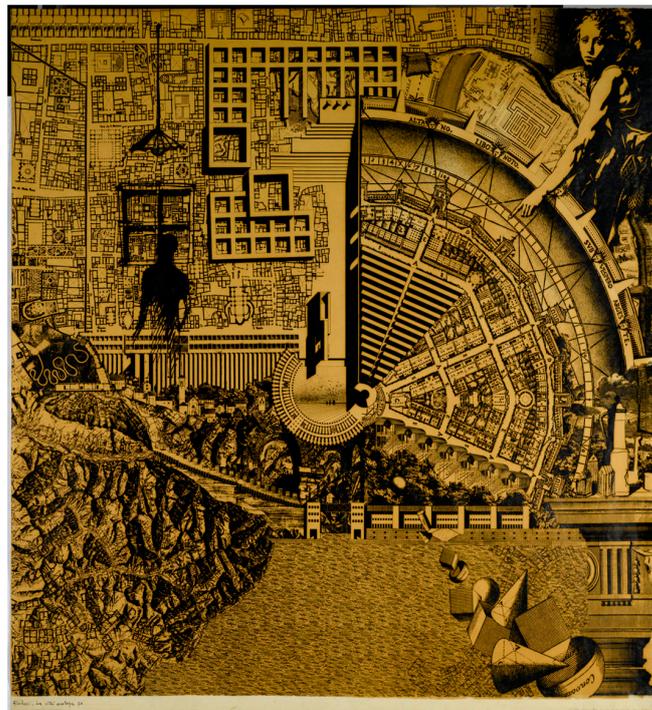


Figure 10. *La città analoga*, Aldo Rossi, Eraldo Consolascio, Bruno Reichlin and Fabio Reinhart, print on paper, 102 × 100 cm, 1976. Private collection. Eredi Aldo Rossi, courtesy of Fondazione Aldo Rossi©.

The instability caused by the present climate situation bounds these different positionings regarding the acceptance of the objects found in the city. This acceptance may not be justified by the same arguments, but definitely motivates us to consider and welcome some of these architectural existences as new beginnings for other uses, symbols and belongings.

3.4. Affordance

These new positionings are already awakening new perspectives, some more functional, others more conceptual and others definitely more linked to developments of community processes. Indeed, I will here call attention to the “affordances”, a concept that can be recognized, in the architectural field, as the result of a process of recognition of an “*objet trouvé*”. According to the Cambridge Dictionary, “affordance” refers to “a use or purpose that a thing can have, that people notice as part of the way they see or experience it”. In the late 1950s, the North American psychologist James Gibson related the term to the perception analyses of the environment around us. According to Gibson, “affordances of the environment are what it *offers* the animal, what it *provides or furnishes*, either for good or ill. . . It implies the complementarity of the animal and the environment.” [50].

The meaning of “affordances” has evolved and has been appropriated by numerous other disciplines, including architecture. Bob Condia [51] highlights the primacy of the body and experience as drivers of architectural design. Other authors, such as Ronald Rietvelt, claim that:

(. . .) environment is also full of affordances that are underutilized or ignored. One obvious example of this is empty buildings, which offer many possibilities for action and can be seen as available social resources. This not only includes empty offices owned by corporations or investment firms, but also government-owned built heritage like abandoned lighthouses, military bases, prisons, train stations, police offices, research facilities, etc. Governmental policies and practices make it so that their affordances are off-limits. (. . .) [52]

Following this idea, we argue that creating new affordances may be a way to deal with super-resistant structures in the future, as we also have in mind the climate crisis, the hidden opportunities of the vacant buildings and, in particular, the military bunkers from the 20th century. *Function can follow the form* if we understand the potential of “affordances”.

During the course of the aforementioned workshop, five groups worked hard to glimpse affordances to Plan Barron: (1) Alpha Group tried to bring communities to an improvised agreement and find a consistent future, (2) Beta Group found the intrinsic nihilism in the natural establishment of Bataria da Laje; (3) Charlie Group betted on controlled decay to overcome ruination; (4) Delta Group found the power of a new ecosystem preserved by decades of forgetfulness and, finally, (5) Group Echo tested the potential of a new openness to achieve possible interests from the surroundings. The present paper may then clarify how can we engage with this long-lasting heritage, its memory, its ruin-ness, its appropriation and its oblivion, as a part of a process to follow the form.

3.5. Empathy

Today, the meaning of the word “empathy” is very connected to one’s capacity to grasp and understand the mental and emotional lives of others. But its significance and use have been reported since the classic period, with the reference to Aristotle’s “mimesis” [53] or to Plato’s idea of representation of nature rather than “copying” [54]. But today, the term has some more heterogeneous interpretations and evolutions. According to the Oxford English Dictionary, “empathy” refers to the “the power of projecting one’s personality into and so fully comprehending the object of contemplation” [55]. The word derives from the Greek *empathēia* (from *em-* ‘in’ + *pathos* ‘feeling’) but comes into a more current use as a translation for the German psychological term *Einfühlung*, literally meaning “feeling-in”, defined as the response or the ability to feel into objects and describe how the spectator “felt-into” ([56], p. 23). According to the German philosopher and scholar on aesthetic, Theodor Lipps, *Einfühlung* means “projecting oneself onto the object of perception”, and

more precisely, is the projection of one's own unconscious feelings and inner imagined movements into the art object, which are then experienced within the object itself.

There are several texts documenting the bodily effects of art. In the early 20th century, Vernon Lee, the pseudonym of the British writer Violet Paget, wrote that "Empathy can be traced in all of modes of speech and thought, particularly in the universal attribution of doing and having and tending where all we can really assert is successive and varied being" ([57], pp. 94–95), bringing a relative strong idea of empathy as a part of human being that feels what happens outside oneself, instead of being empathy based on its analogy with sympathy. The dissection, made by this author, about the response of our bodies to the experiment and perception of art can explain some of the distinguishing characteristics between empathy and sympathy, as "sympathy" means to be "feeling *together with* another" and "empathy" means "be[ing] oneself *into* a situation" ([57], pp. 94–95). And so, one can ask, how can one be empathic with an inanimate object, such as architecture? Dance critic John Martin affirms that "The building becomes for a moment a kind of replica of ourselves and we feel any undue strains as if they were in our own bodies." ([58], p. 49). Martin himself defended an emphatic viewer, when referring to the modern dance public, advising them to go to performances to feel the movement.

Nor this is true only of our relations to other persons; it applies to impersonal objects as well. If we look at a building with columns supporting a mass above, we shall form a definite opinion as to whether the proportion is good or bad according to whether the proportion is good or bad according to whether the mass is supported the mass that is supported seems easily supportable by the column in question or heavy for them. This reaction has nothing to do with any knowledge of architecture; it is a motor response. The building becomes for the moment a kind of replica of ourselves and we feel any undue strains as if they were in our own bodies. ([58], p. 48)

According to Martin, we understand the idea that what happens in the human body, when facing inanimate space, "must have some part, conscious or unconscious, in the mind of the designer" ([58], p. 48). These experiences seen by an architecture outsider are comprehensible, if we see these phenomena as an imaginary transference. Also, we can assume that our senses and our own erected structure standing before a space can have different receptions, and so different behaviours, regarding any other outside world. That is one of the reasons architects like to travel and experience different spaces, so to have a more precise comprehension of a space when conceiving it.

These kinds of perception can be detected in modernist architecture discussions, as many authors put more effort into form and aesthetic criteria, than into the interaction between the built form and life happening in it. This idea, of course, keeps in mind that functionality was focused on physical tasks, more than in mental or embodied engagement. As in other arts, a "painting is paint on canvas, but at the same time, it is an image and narrative in the imaginative mental realm. Sculpture is similarly, a piece of stone and a mental image, and a building is likewise a utilitarian structure and a mental suggestion—a spatial metaphor of human existence" ([59], p. 8). This phenomenon seems to generate a momentary short circuit between the cognitive and emotional orientations of the architect/creator.

And what happens to the inhabitant? In the case of the reuse of buildings, who is the true inhabitant, the architect or the one who truly enjoys the space? This question leads us to the desire to argue firmly that the true qualities of architecture are not only related to form, but to the way in which we, architects and inhabitants, engage with this form. These engagements

(. . .) are existential and poetic, embodied and emotive experiences, which connect us with the deep human historicity of occupying space. They arise from our existential encounter with the work, rather than merely through vision. ([59], p. 10)

One can understand this engagement as a human characteristic when facing a space as a conceptual approach, but how can empathy reformulate our built environment? Can

we use empathy to engage existing spaces? We argue here that maybe Christian Norberg-Schulz's idea of genius loci can be referred to on this point, since it transcends the modern idea of architecture and is more linked to functionalism ([60], p. 5). As Norberg-Schulz state, "Dwelling therefore implies something more than "Shelter". It implies that spaces where life occurs are places (...)" ([60], p. 5); this particularity is not a quantitative assumption, but rather a qualitative expression. Also, Aldo Rossi reveals the relevance of this genius loci as "[m]ore than just a function of a specific architectural culture, this relationship is manifest in works like the Villa Malcontenta and the Villa Rotonda, in which it is precisely their "situation" which conditions our understanding" ([49], p. 107). Even if this assumption creates the relationship between the new and the old, one achieves a clear understanding of the potential of an existing "place". We can look at an architectural object, not just as an action of building, but also as an action of dwelling on an existing place.

4. Discussion

Function Follows Form

It is the pervading law of all things organic, and inorganic, of all things physical and metaphysical, of all things human and all things super-human, of all true manifestations of the head, of the heart, of the soul, that the life is recognizable in its expression, that "form ever follows function". This is the law. ([2], p. 408)

Despite being strongly supported by the modern movement, and particularly by functionalism, the meaning of "form follows function" started long before that point and continued to be debated up until the present day. The first steps took place right after the first signs of the industrial revolution that began in Great Britain, and then in France, in the second half of the 18th century. The increase in technology and in the bourgeoisie's standards triggered scholarly research, giving rise to an enormous development of cultural typologies, such as theatres and museums, in the urbanized areas that, at the time, were receiving a large number of people from the countryside. The knowledge that arose from scholarly research also brought new disciplines that, together with the increasing idea of cosmopolitanism, came with an enlarged debate and a stylistic pluralism. Material and technological advances, such as iron, glass and concrete, supported this huge scientific evolution, and started to be incorporated and presented in "universal exhibitions", such as the Great Exhibition of the Works of Industry of all Nations, held in London in 1851, which was considered to be the 1st Universal Exhibition and the event for which Crystal Palace was built, with great impacts on art and design education. Similar repercussions happened in Paris, in 1855, and in other inter-continental cities, such as Philadelphia (1876), Sydney (1879), Melbourne (1880), Chicago (1893) and many others. Repercussions took place in multiple areas of arts and design. The eclecticism made by the different voices and in different places around the world had something in common: an idea of "humility" and "truth", ([61], p. 31) in England; the observation of "laws of logic" and "rational construction" ([62], p. 72) in France; the achievement of a "purposiveness" ([63], p. 21) in Germany; the importance of the "utilitarianism" and "extreme pragmatism" ([64], p. 181); and of the "spirit of utility" ([65], p. XIV) in the United States of America.

Louis Sullivan owes the mechanical endeavour of his pithy dictum expression to all of these previous authors and thinkers, as they, in different ways, brought to architecture the idea of subservience, from the architectural form to some useful goal. This usefulness meaning is, too, the intention of many developments of architecture from the late 19th century and from the first half of the 20th century: the Wagner school, the Deutsche werkbund, modernism, the Chicago school, Soviet constructivism, the De Stijl and modern movements, among many other evolutions that consider this "aura of essentiality" [66].

The considerable volume of construction and, in particular, of purpose-oriented buildings puts us now in this situation: have we not fallen into a scenario of over-occupation of these "forms that follow function"? The functionalist period has stuffed us with functional buildings, and the truth is that we have arrived at an accumulation point of countless

empty, unoccupied and abandoned constructions, which forces us to think about what to do with our architectural spoils.

In 1965, in a lecture to a group of architecture practitioners, Theodor Adorno called into question the idea of functionalism. According to Adorno, "(...) architecture is in fact both autonomous and purpose oriented" ([66], p. 16). In this lecture, Adorno calls our attention to the fact that "the concern of functionalism is (as) a subordination to usefulness" ([66], p. 17), bringing the idea of architecture surpassing this opposition of "purposeful" and "purpose-free" ([66], p. 19). And, in this sense, "Once redeemed from their own 'thinginess', 'things' would find their purpose" ([66], p.17). According to Adorno,

(...) in present society all usefulness is displaced, bewitched. Society deceives us when it says that it allows things to appear as if they are there by mankind's will. In fact, they are produced for profit's sake; they satisfy human needs only accidentally. They call forth new needs and maintain them according to the profit motive. (...) Nothing is more aesthetically unbearable than the present shape of things, subjugated and internally deformed into their opposite. The raison d'être of all autonomous art since the drowning of the bourgeois era is that only useless objects testify to that which may have at one point been useful; it represents correct a fortunate use, a contact with things beyond the antithesis between use and uselessness. ([66], p. 17)

Another two authors are very worth bringing to this discussion, at this point. The first author is again Aldo Rossi, who assumed in 1966 that the "classification according to function is far too superficial" ([49], p. 47), instead bringing the idea of a "naive functionalism" by suggesting that "if urban artifacts were constantly able to reform and renew themselves simply by establishing new functions, the values of the urban structure, as revealed through its architecture, would be continuous and easily available (...)" ([49], p. 47). This is one of the reasons that Rossi's idea of type does not only implies the idea of function, but also the idea of structure, space and materiality.

The second author is Peter Eisenman, who pointed out in 1976, in his "Post-functionalism" article that opens the sixth issue of the storied *Oppositions* journal, that the "two indices of this supposed change" are the exhibition "*Architettura Razionale*" at the 1973 Milan Triennale and the "Ecole des Beaux Arts" exhibition at the Museum of Modern Art in 1975. Eisenman highlighted the fact that the first exhibition "declared that architecture can be generated only through a return to itself as an autonomous discipline or pure discipline" and the second exhibition showed modern architecture as an obsessional formalism. Beyond this interesting disciplinary report, Eisenman also pointed out "some over simplified form-follows-function formula" and that in fact "deriving from a non-humanistic attitude toward the relationship of an individual to his physical environment (...). Thus, it cannot be related to functionalism." Eisenman also highlighted that "post-functionalism begins as an attitude which recognizes modernism as a new and distinct sensibility (...) a modernist *dialectic* as opposed to the old humanist (i.e., functionalist) opposition of form and function" [67].

Through these authors we find some interesting absences of functionalism, but also some interesting glimpses about the value of some modesty of the function. Also, we can more easily contextualize some of the varieties of answers to breaking functionalism, as is the paradigmatic case of the apparent simplicity of the pillar/beam false facade of the Seagram Building by Mies van der Rohe (1954–1958), which can be seen as an ornament more than an example of the *function-follow-form* approach; or the apparent total ignorance of the function that Frank Ghery's Guggenheim Museum in Bilbao brings to the world of architecture, clearly placing us into a third possible pithy dictum: form follows form.

Going back to almost three hundred years before Vitruvius, we find that Plato had already discussed some of these issues, especially when he distinguished the physical world from the real world, asserting that the physical realm is only a shadow, or image, of the true reality. This is called the "Theory of Form" [59], and it refers to a world in as constant a change as the seasons, where nothing is ever permanent: buildings, people, animals and nature crumble. Plato argues that, because the material world is mutable, it is also unreliable. But behind this unreliable world of appearances is a world of permanence

and reliability, the world of ideas, a more real (because it is permanent) world. This is Plato's world of "Forms" or of "Ideas", and here it is important to remember that the word used by Plato, "*eidōs*" is translated to "form" in English, by which he identified the "permanent reality that makes a thing what it is, in contrast to the particulars that are finite and subject to change" [68].

But you do understand that we begin by telling children stories, Adeimantus. These are mostly false, I imagine, but they contain some truth. So we use stories with children before gymnastics (...). ([68], p. 48)

Look at it this way: if a thing abandons its own form it must be changed either by itself or by something else. (...) Aren't things in the best condition the least changed or moved by something else—strong, healthy bodies least by diet and exercise, healthy plants by sun, wind, and similar forces?". ([59], p. 52)

The importance of Plato's concept of form is positioned, not in an apparent accordance with the direct meaning of the two words, but in the potential of the existence of "eternal archetypes", and maybe that is the reason that Plato defends himself with "That's what I meant when I said we must start with poetry before gymnastics" ([59] p. 48), or if I can dare to interpret, understanding that "imagination must come before epistemology learning". This possibility of undertaking the inventiveness and daydreaming before functional determination undergoes many developments in Gaston Bachelard's bibliography. In *The poetics of reverie*, for example, Bachelard reveals the relevance of the "poetic reverie", "(...) a reverie which poetry puts on the right track, the track [of an] an expanding consciousness follows (...) facing the great universe of the blank page" ([69], p. 6). In the study "The power of daydreaming: the aesthetic act of a new beginning", Jenny Helin, Matilda Dahl and Pierre Guillet de Monthoux argue that, because during reverie, all our senses are awakened, then

(...) [O]ur eyes act in an interplay with all our senses in such a way that we have a capacity not only to see but also to deform that which is clear and distinct. In this way, our own poetic images are not based on what we see, as in a sensory activity, rather, what we see is shaped by our imagination. [70]

This act of reverie may be a process that can support a process of creating new "affordances" for a "hard" and "inherited" object that simply does not disappear from the physical world. The relevance of this process of action facing an "*objet trouvé*" is essential to allow "empathy" to take place. The possibility of this process is a theme for future studies, that one may find useful for a full comprehension of the phenomena.

Let us finally have a look at a particular case study, made by Rem Koolhaas in 1982, when the city of Rotterdam asked OMA to study high-rise buildings. Koolhaas chose an old infrastructural area with many unused awkward constructions (Figure 11).

Rem saw the chance to expand the footprint by including the infrastructure, instead of dealing with the left-over tatters. It shifted the focus of the work from designing facades for a predetermined building to redefining a massing envelope that would operate at an urban scale—an appearance in the landscape. (...) There was no programme, there were no plans. It was a tectonic exploration of form, articulation and presence. [71]

This instinctive inversion of the use of the bridge with a simple rotation is not original. In 1917, Marcel Duchamp made a similar statement with his *Fountain*, a ready-made sculpture that forever changed the way we see art. The art was created in three steps: (1) the ordinary piece of plumbing changed its orientation, (2) a renowned photographer, Alfred Stieglitz, registered it in a printed photograph, and (3), finally, the piece was signed by "R. Mutt", an unknown artist. Marcel Duchamp arrived in the United States less than two years before and worked during those years with Francis Picabia, Man Ray and Beatrice Wood, as part of an anti-rational, proto-Dada cultural movement in New York City. The urinal was bought from a generic Fifth Avenue company, the J. L. Mott Iron Works, and

was reoriented 90 degrees from its original functional position to another new symbolic functional position.

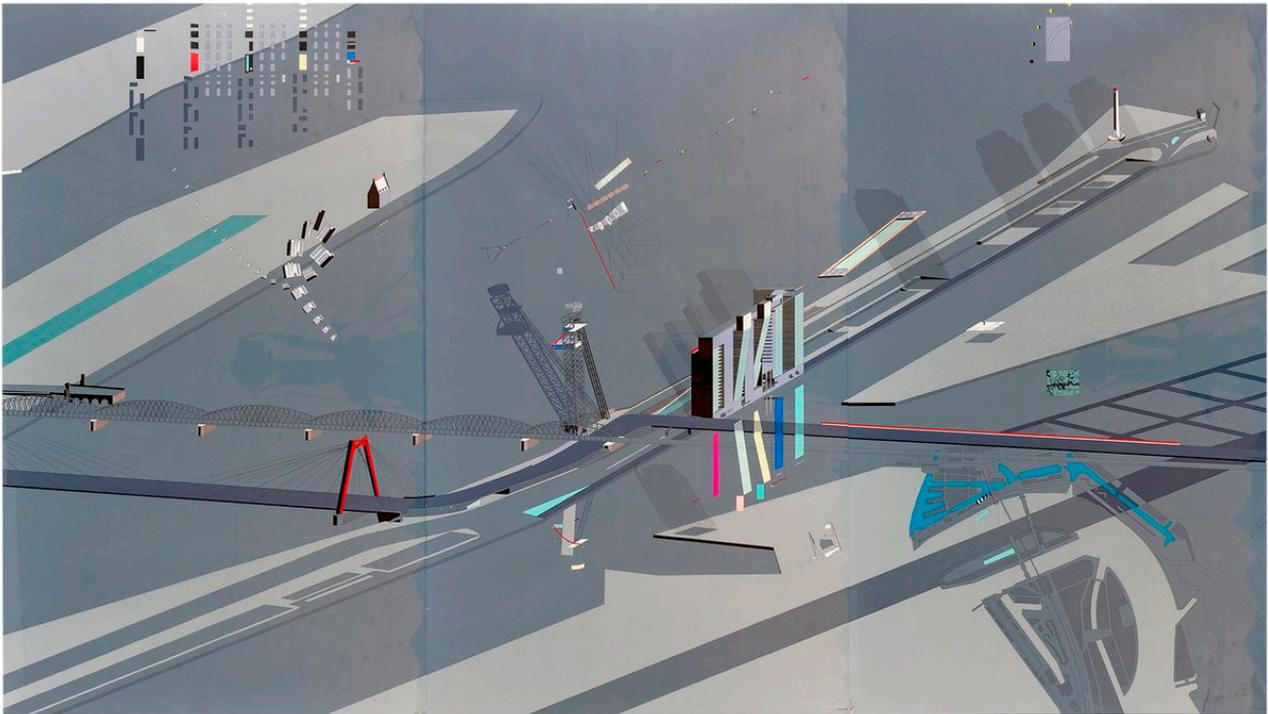


Figure 11. Boompjes Tower Slab, OMA, colour silkscreen print, 716 × 1216 mm. Silkscreener, (1975), triptych, 1982: Bernard Ruygrok. Drawing Matter©.

5. Conclusions

This last example works here as an illustration of this act of reconnecting existing objects, so that one cannot just look at this action of re-use in a functional rational way, but as a creative bodily experience. And this brings me here, now more conclusively, to Gilles Deleuze and Félix Guattari, their idea of *Corps Sans Organes* (CSO), and to a more sensitive understanding of space. The concept of CSO had its start with Antonin Artaud, a French writer, poet, essayist, visual artist, actor and theatre director, and we also know that Artaud used it in an artistic radio creation “*Pour en finir avec le jugement de dieu*” in 1947, that was prohibited and published later in November 1947 [72]. Here, Artaud says:

Il faut se décider à le mettre à nu pour lui gratter cet animalcule qui le démange mortellement, dieu, et avec dieu ses organes car liez-moi si vous le voulez mais il n’y a rien de plus inutile qu’un organe. Lorsque vous lui aurez fait un corps sans organes vous l’aurez délivré de tous ses automatismes et rendu à sa véritable liberté. [72]

In *Logique du Sens* [73], Deleuze evolves this idea to a more accurate comprehension of the *organs* as the functional part:

un organe, une fonction, une faculté d’identification, qui rapporte une diversité quelconque à la forme du Même. Le sens commun identifie, reconnaît, non moins que le bon sens prévoit. [73]

So, we see here also a possibility that this lack of function can exactly follow this idea of the CSO as an intensive body–space understanding, which is immanent in Deleuze’s and Deleuze and Guattari’s own ideas of the “body without organs”, an idea that Susana Ventura brought to the field of architecture [74]. The idea of the spatialization of a body–space without organs or function brings us to a very exciting field of new engagements with space that are more intensive and possibly deeper, regarding a bodily experience.

Throughout this paper, we saw the relevance of function and we also saw its end in the work of innumerable architects, theorists and practitioners. One thing does not stop the other, if we follow Eisenman's dialectic views. But we are here, remembering that, in facing the climate emergency, built environment and heritage studies appear to us as a requirement and, although there are some controversial research areas and sparring scenarios, discussions about the future are now on the table, and research and participation are mandatory. We stress that maybe this is a starting point to the creation of a new understanding and a new concept of heritage. Vacant buildings can be demolished, can be heritage and can also fall into ruin, but, if we are thinking through the filter of climate emergency, we can look at them through the frameworks of "hardness", "inheritance", "object trouvé", "affordance" and "empathy", as opportunities for intensive new mind and bodily experiences, and intensive new spaces for a better future on earth.

I would very much like, once this thought is inscribed as a possible idea, to be able to evolve this research into future studies that are more linked to a more corporeal reading of the engagement that was raised here, in the sense that, more than understanding the meaning of the idea of function-follows-form, we better understand the action that presents new approaches to this possibility.

It is also the time to remember that the bunker was presented here as a paradigmatic example and that the idea is to enlarge this possibility to other types, materials and functional examples, so that this could be effectively a possibility for future built environments. We can even, some day with more information on the table, legislate this idea, by deciding what type, materials or functions to use in each new building category.

Finally, I want to present another new concept for future discussion tables: the possibility of "up-cycling" buildings, by improving their spatiality, materiality or functionality, as a new approach when designing. The potential of re-using buildings to improve quality of life could also start to be aesthetically studied in architecture schools, together with future architects.

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