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ARCHITECTURE & ENTROPY. TIME AND DESTRUCTION AS A CREATIVE SUBJECT

Blázquez Jesús, Pablo⁽¹⁾

(1) Universidad de Sevilla, pablo.blazquez.jesus@gmail.com

Abstract: Based on the Second Principle of Thermodynamics, any architectural manifestation has inexorably to do with time and destruction from the very moment it is situated in reality. All creation is temporary and ephemeral, even if it aspires to an eternal permanence. Architecture is the support that gives shape to time, so that any object, building or city is nothing more than a system in continuous transformation.

Entropy opens a new territory from which to understand reality through destructive processes in time, however, architectural discipline has associated this concept with negative connotations, rejecting its anabolic and constructive capacity.

This article presents the state of a thesis that studies in depth the intense, vibrant and productive relationship between architecture and entropy, through its two fundamental variables: time and destruction. The main objective of the research will be to analyze various works, projects and actions that have used time and destruction as project material, thus justifying how entropy can be integrated into the architectural project.

Keywords: Architecture, Entropy, Time, Destruction, Architectonical Project.

1. Introduction

Energy has always been an object of research in architecture, from the search for shelter and comfort of primitive man, to the current struggle to achieve maximum energy efficiency of buildings. If we understand architecture as a process by which matter is transported through space to form a new structure, being the energy ability of bodies to perform a action and produce changes in themselves or others, it is undeniable to read that in any architectural process an invisible energy component is present at first sight.

In the 19th Century the concept of entropy, a magnitude whose value is relative and which measures the degree of organization of a system in a specific time interval, shifted the debate around the concept of energy towards thermodynamics, torpedoing the foundations established until that moment by mechanical physics. The definition of this concept, established by Nicolas Léonard Sadi Carnot through the Second Law of Thermodynamics, described how in an irreversible cycle the entropy variation is always positive, that is, any open system tends towards disorder (Magie 2011).

Whereas the First Principle of Thermodynamics postulates the quantitative conservation of energy, entropy introduces two variables: time and destruction. Few architects have assumed entropy as an indissoluble part of architecture, and by extension of life itself, since this would be equivalent to understanding that all creation is temporary and ephemeral, although from the outset it aspires to last forever.

The world can be observed through an entropic gaze that halve mainly in two variants: hand there are those who interpret that our planet is a closed and compensated system where everything tends to the equilibrium. However there is another reading that assumes these processes of change and transformation as irreversible over time and which incline towards the increase of entropy, ie towards disorder and destruction.

Perhaps one of the earliest approaches to entropy was the collection of drawings and engravings by Piranesi in the 18th century (Ficacci 2011). Visits to the Roman remains activated his interest in the past through the more than two thousand engravings of statues, buildings, reliefs and tombs. The decrepitude, abandonment and continued looting of these ruins serve as a catalyst for Piranesi to undertake an operation of contemporary archeology, a study of the archaeological remains made from a personal view that establishes a first action of knowledge and heritage which was unthinkable until that moment, and which give entropy an unavoidable aesthetic component.

Two centuries later, Robert Smithson follows in the footsteps of Piranesi, this time in the form of drifts and approaches to the contemporary ruins arisen by the process of deindustrialization and understood as entropic landscapes. On this occasion the American artist opposes the idea of romantic ruin, since

for him any building is a ruin from the very moment of its construction (Smithson 1996). Although for Smithson-entropy, was a constant process of disorder and degradation, he was able to establish an operative and productive relationship through his artistic actions that managed to make visible the inevitable arrow of time becoming one of the main figures of land-art. This became a movement that will serve as a basis for future interventions that will be establish direct connections between entropy, architecture, city, territory and landscape.

Entropy offers a new perspective from which to observe material reality over time, and is that this constant not only concerns degenerative processes as we have hitherto been stated, but are also related to systems that tend to order. That is where the entropy decreases, a variable also known as neguentropia or negative entropy, being able to affirm then that there is a creative part within the Second Principle of the Thermodynamics, a fact that was demonstrated by the work of the Russian physicist Ilya Prigogine on the dissipative structures (Prigogine and Kondepudi 1998).

This new territory has been followed by the Canadian architecture theorist Sanford Kwinter who advocates an architecture capable of reacting to the stimuli of the context in which it is situated giving rise to an up-to-date theory of the cybernetic (Kwinter 2001). However, given the breadth of the field that would be opened by the study of this new branch of knowledge, this thesis in development, and therefore this article presented here, try to focus on the relationship between architecture and entropy, understanding this last is a matter related with time and destruction.

2. State of the art

Entropy has been considered an annoying reality for architects, who are more concerned with continuing to cement their architectural thinking around the Vitruvian triad, understanding the architectural intervention from an attitude of control towards light and space through form and function and shifting the concept of *firmitas* towards issues more linked to solidity or resistance. Perhaps this is because the passage of time has not yet been accepted within our discipline as something natural and inevitable. However from an entropic point of view it is possible to displace the semantic meanings established so far for *firmitas*, *venustas* and *utilitas*.

The form in architecture can be observed as an intermediate state of matter that tends from an initial state, generated through an energy process necessary for its construction, to a final form fruit of the passage of time and degradation. Like the chrono-photographer Etienne-Jules Marey, any architectural manifestation can be observed as a instant photograph of an object exposed to entropy, which depletes the conception of any stable and perpetual form (Braun 1994). This matter makes any architectural intervention be envisaged as an open and flexible structure sustained by a structured and orderly temporal strategy that modifies the conception of function and durability current.

Acceptance of entropy makes us move from observing cities, territories and landscapes as closed and static systems to a new dimension in which the context where we intervene is framed in an open entropic system in which the time variable links to the architectural project.

Two images may be sufficient to understand the generalized attitude of architects in the face of the passage of time and therefore in the face of entropy during much of the 20th century: Gordon Matta-Clark, on the one hand, over Broadway during his performance known as *Clock Shower* (Moure 2006) seems to be the perfect metaphor for the positioning of our discipline, while René Burri's photographs of the decayed Ville Savoie (Quetglas 2004) are able to condense the absolute negation towards the entropic question by the Modern Movement. José Joaquín Parra quotes the following words from Le Corbusier: "Hemos nacido en el seno de la naturaleza. Antagonista, hostil a nuestras iniciativas, indiferente incluso, totalmente concentrada en sus propios acontecimientos, que no son sino borrascas, tempestades, desierto ardiente, noche y día, verano e invierno: destruye implacablemente nuestro trabajo, a cada hora, a cada día, a cada minuto: lo absorbe. No hay descanso ni tregua para su voracidad (...) Nos ponemos en pie contra ella, para escapar a su acoso, tratando de refrenarla, intentando dominarla. Si ella es el universo, desde siempre nosotros también hemos querido crear nuestro universo. Y lo defendemos" (Parra 2009).



Fig. 1 Gordon Matta-Clark, *Clock shower*, 1973

These examples cited above illustrate the attitude of resistance and the approach of attempted domination from the hostility of architects to entropy, a perpetual conflict that only leads to a systematic victory of entropy versus architecture. Perhaps it is time to analyze possible strategies that, from the architectural project, modify this relationship of confrontation and direct it towards mutual understanding by positively taking advantage of the entropy in favor of intervention on the city, territory and landscape. It would be interesting then to know the logics of these places from entropic positions that allow us to understand their peculiar functioning, and thus to observe the degradation and the passage of time to understand the laws that allow us to integrate and dialogue with them.

The specific study on the relationship between architectural project and entropy requires an analysis sustained in a wide catalog of looks and actions on time and destruction. This travel will take us along the thesis from the ancient engravings of Piranesi to the Iqualada Cemetery by Enric Miralles and Carme Pinós (Zabalbeascoa 1996). From the *Peintures de Feu* of Yves Klein (Ottmann 2010) to the utopian projects of the series "Premature architecture" by Isidoro Valcárcel Medina (Valcárcel 2011), from the Luis Longhi's intervention in the Teatro de Lima (Longhi 2008) to Robert Smithson's displacement of matter, since Albert Speer's "Theory of ruin" to Hamar Museum of Sverre Fehn (Norberg 2007) (...) It will then be possible to perceive a new look through these and other works that will allow us to conclude that it is possible to recognize new project strategies between architecture and entropy since an attitude of synergies hitherto unsuspected.

3. Objective

The main objective of this thesis is the analysis and definition of a thought around the architectural project that establish the existence of a direct relation between architecture and entropy, understood as a process of energy transfer over time. This approach will allow us to observe, through the extensive path of project action, invisible readings in a wide catalogue about art and architecture that order all these possible connections to establish a new way of observing the binomial: architecture and entropy, intuiting translatable guidelines to the architectural project.

4. Structure

The thesis is structured in five chapters, presented in this article in summary form. Five sections which focus on the relationship between architecture and, more specifically, to the architectural project and entropy. The first four chapters will serve to establish partial conclusions on the architecture and entropy's binomial that will allow to present methodological researches lines to develop, in the last of the chapters, a catalogue of architectural interventions made by the author which has been made possible by using time and destruction as generators of the architectural project.

The development of each of the chapters is structured from a careful selection of case studies and citations from very different authors that connect a continuous discourse which leads the reader towards conclusions, to end up in the fundamental objective of the thesis analysed in the last of the chapters.

Below is the content of each of the chapters:

4.1. Chapter 1: It will let us know the meaning of the variable "entropy" in different disciplines related to architecture in order to construct the hypothesis from which the research starts analyzing diverse projects in which it has tried to clear up the entropic variable of the architectural equation. The development of each of these cases will allow us to conclude that unless we exert a force of action contrary to constant and infinite entropy, all creation is inexorably ephemeral, and its form is nothing more than a variable state in continuous transformation.

4.2. Chapter 2: Presents a state of affairs which denotes how modernity has tried to create a static image of architecture cemented around the Vitruvian triad and in which the *firmitas* concept has been displaced by questions related to solidity or resistance and not both to assume the temporal as becoming natural and inevitable. However, it is possible to glimpse how some architects and urbanists have assumed the entropic condition of architecture and the hypothesis described in the previous chapter, being able to imagine the future of their works turned into ruins by time and destruction.

4.3. Chapter 3: It studies the relation between architectural project and destruction, and asks: is that all architecture implies? Some idea of demolition transforming nature, excavating quarries, altering buildings, etc. While the work of the architect seems to be linked only to the creation of forms, there

are professionals who have already investigated the anabolic condition of destruction, will allow project strategies in which destruction is used as project material to be observed

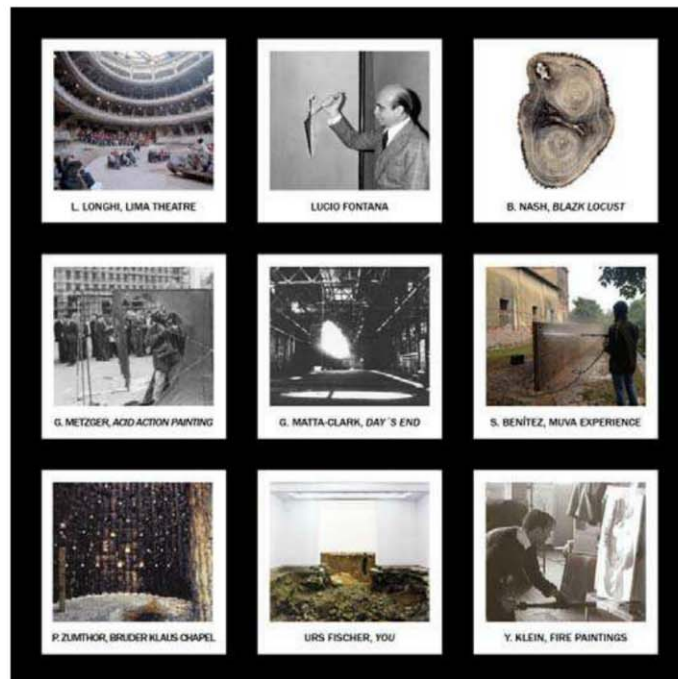


Fig. 2 Cases Studies: "Chapter 3"

4.4. Chapter 4: It studies the relation between architectural project and time through the analysis from different interventions in which time transformation can be manipulated in favour of their own creation. At the end of the chapter it will be demonstrated how there are creations that use time and destruction as project materials, and both are intrinsic components of the entropy, so, to top it all off, will launch a question that will lay the foundation of the end of the thesis: Is it possible to generate a productive and operative relationship between architectural discipline and entropy?



Fig. 3 Cases Studies: "Chapter 4"

4.5. Chapter 5: It will consist of two parts, one theoretical and one practical. The first one will answer the question that concludes the previous chapter, and will refer to building a framework in which a catalog of works of art and architecture will be synthesized along with entropy, which has been inserted as a further layer of the creative process. The second section will be directed to the presentation of interventions developed by the author in which the practicality of the use of entropy as generator of the architectural project will be verified.

5. Methodology, Progress and y Results

The methodology of this thesis, which is still under construction, consists, from the outset, of an extensive bibliography linked to the above-mentioned themes. It includes as the collection of a wide catalog on art and architecture that allows to put on the table diverse perspectives on the subject to study from different disciplines implicit in the same, from the most scientific and technical, to the most theoretical.

Once this content is compiled, is being carried out, a detailed study of each of them is being carried out. This has allowed relations to be drawn between them

Far from conceiving a linear and chronological advance, the structure presented above has allowed the development of each of the five chapters in parallel through different actions that have given rise to articles, conferences and projects which are inserted in each of the sections and are allowed to reach to the objectives marked initially.

Below are attached the summaries of each of these advances and results that begin to construct the section of the conclusions that the thesis will contain:

5.1. Article “Germinal ruins”: This article analyzes different case studies through which we can observe how there are strategies in which time and destruction can be manipulated as project materials. (Published in a book of congress chapters after peer review)

5.2. Article “Imagined futures”: This article is one of the possible connections of architects who have assumed the entropic condition of architecture. Modernity has tried to create a static image of architecture in which the temporary, inexorable and relentless has become denied by a broad spectrum of architectural discipline. Through a collection of texts, drawings and works by James Stirling, John Soane and Albert Speer, it is possible to observe the acceptance by this three architects that all construction is temporary and ephemeral, which allowed them to imagine the future of their buildings turned into ruins. (Article in process of peer review in a scientific journal)

5.3. Artículo “The ethereal city”: The objective of the article is to build a theoretical base that allows the hypothesis that any city, as well as all architecture, is in constant transformation to be defended. Through the analysis of various case studies it will become evident that any architectural manifestation, from the very moment it is situated in reality, has to do with time. Assuming this position and by way of conclusion, two projects of Enric Miralles, one of them in collaboration with Carme Pinós and another with Benedetta Tagliabue, will be analyzed as examples that allow the discovery of flexible strategies, unfinished and open over time for the sake of real sustainability. (Article in process of peer review in a scientific journal)

5.4. Conference “Readings about the entropic city”: Through the analysis of cases studies in different times and places, and assuming the objective of the event to analyze the city through the impact of the transhumant masses on it, it was possible to recognize the traces that tourism leaves on our cities, landscapes and territories sometimes in an obvious way and others hidden under different layers. It is architecture that is the support that gives shape to time, so that any object, building or city is nothing more than a system in continuous transformation. (Conference dictated in the framework of the ETSA A Coruña Architecture Festival)

5.5. Workshop “Entropic gazes”: The objectives with which I prepared the teaching that I gave in this workshop were several: to reflect on the relation between destruction, time and architecture; to study degenerative processes as potential methods for their use in architecture; use time as a tool capable of being installed in the architectural project; to verify through the realized action the existence of a strategy open to the entropy, etc. The activity was divided into two parts, the first of which were lectures by teachers, researchers and professionals in art and architecture (José Joaquín Parra, Ricardo Alario, Ángel Martínez and Carlos Bunga) which showed a new way of observing the relationship between the triad: architecture, time and destruction. The second part of the workshop consisted of an inaugural class in which I prepared a conference containing and developing in

extension the structure of the thesis through various cases of studies case studies to proposed the implementation of specific actions with the students on the city of Seville that use entropy as project material. The following two actions are described (Workshop organized by the author in the frame of the XVII Cultural Week of the ETSA Sevilla):

5.5.1. Action “Mill wheels”: During the 16th Century the builders of the stately homes of the centre of Seville moved from the periphery the wheels of flour mills belonging to these families. Those stones were placed in the bases of the facades of the buildings, next to the corners. The reason was simple: The fragile wall that was used in the constructions of the time hardly endured, the rubbing of the wheels of the cars that collided with them when moving along the narrow streets, collided irreparably. The mill wheels were then used to cushion the impacts. It is easy to observe a history of time and destruction written on those stones, from the friction of the wheel in the mill, to the wear and tear caused by the impacts of the horse carriages that still continue today. The intervention consisted of trying to extract part of this footprint through the use of coal and paper; a simple action of friction allowed us to condense time and destruction giving rise to beautiful plates titled with the name of the street and its position.



Fig. 4 Don Remondo's Street Wheels N° 2, Seville, 2017

5.5.2. Action “What is hidden”: Salvador Square in Seville is one example of how one place is capable of absorbing different uses over time: Muslim souk, market, Christian cemetery, sacred space in the great baroque celebrations, plaza-saloon, public parking, and today it's one of the most popular leisure areas of the city of Seville. We propose a possible action in the square where during the night we would set a series of graves (measuring 2.10x0.80m wide, by 0.65m high) in the area of greatest pedestrian flow, with an amount of sand by each needed to cover the body of an adult: The unexpected action would make the pedestrian respect the routes between the tumuli to understand that someone or something is hidden under those small mountains, perhaps the people who walk there would speculate on the existence of a sacred place under his feet. As the day passed the sand would be dispersed around the square thanks to the passing of the passers-by, who would eventually forget the presence of the cemetery in the same way that the cities have managed to absorb these old constructions. The tiny grains of sand would be distributed through the city of Seville reaching other places that hide, to our surprise, the presence of other hidden fields. This action could not be realized in its entirety because of its size, although it was reproduced on a smaller scale reproducing the volume of a person's ashes, and being photographed every week until within a month, the sand disappeared completely from the Square.

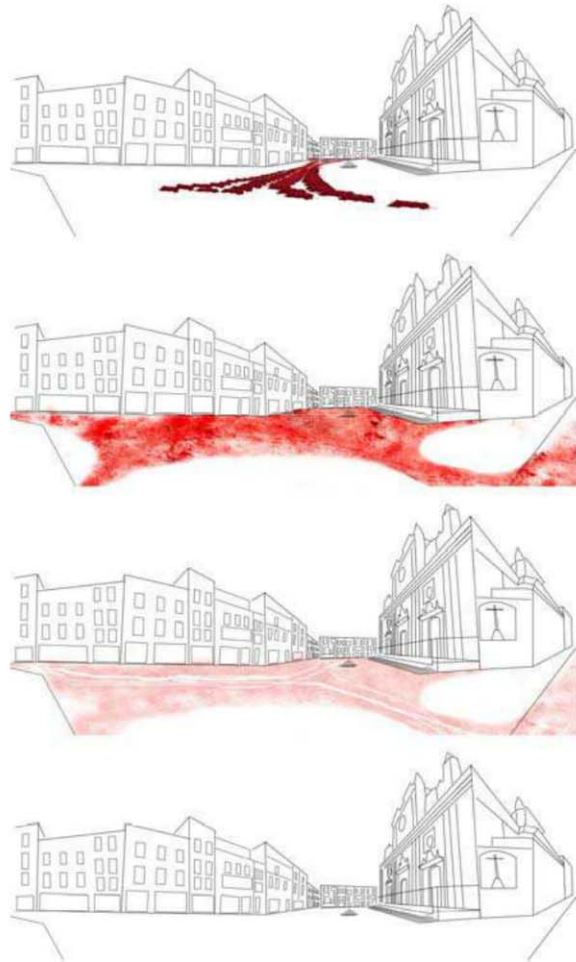


Fig. 5 VV. AA., *What is hidden*, Seville, 2017

5.6. Project “Displaced Typologies”: Spanish suburbs are a monotonous landscape of abandoned concrete structures. At a time when there is once again a demand for burial grounds far away from the city, interest in these premature ruins has been increasing: would it be possible to recycle these empty shells by transforming them into cemeteries? This intervention uses time and destruction as generators of the architectural project itself to present, by way of conclusion, an action that assumes the deterioration of the thousands of obsolete housing structures as an intrinsic element of the project strategy. (Project that obtained a Mention in the Competition “Unfinished” and was exhibited in the Pavilion of Spain of the Biennial of Architecture of Venice 2016)



Fig. 6 Author, "Displaced Typologies", 2016

5.7. Project "Time, great sculptor": It was proposed the design, construction and dismantling of an ephemeral intervention in the Revellín square of Logroño, an enclave marked by the presence of the medieval wall that makes evident the existence of the various temporal strata of the city. The mandatory materials to be used were 20 panels of wood, which together with the chosen ones for the realization of the project (Ice and Plastic Mesh) allowed an easy physical construction of the pavilion, which gave rise to a calculated object so that in the 5 days during which the festival takes place, it would be dismantled naturally, without needing any final action. If all architectural creation is ephemeral, perhaps this is the occasion to develop an intervention in which time and destruction arise as catalysts of the project itself. *Time, great sculptor* (Yourcenar 1989), serves as a title and leitmotiv of an intervention that denies the solidification of a specific moment, to end up settling in the time of the festival itself, creating a different urban action in every hour, minute and second. (Project selected as Finalist in the Festival of Art and Concentric Architecture 03 of Logroño and exhibited at the Headquarters of the College of Architects of La Rioja)

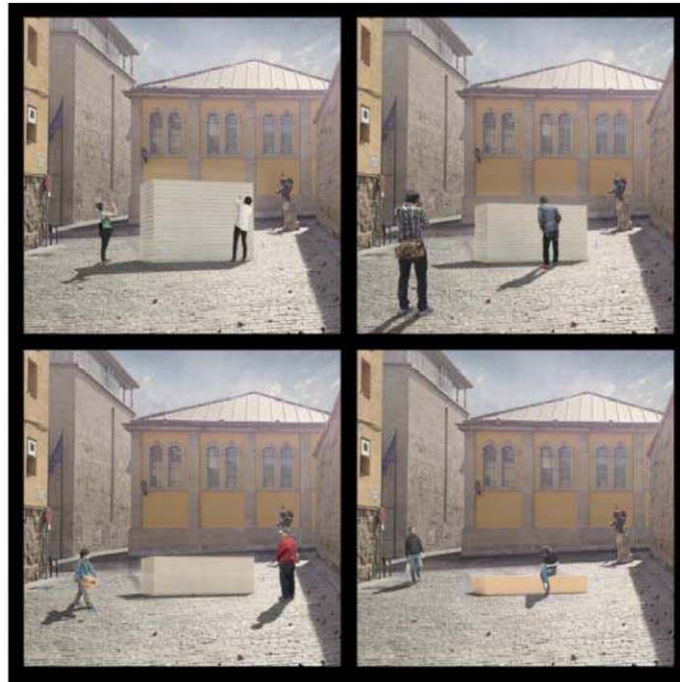


Fig. 7 Author, "Time, great sculptor", 2017

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