Thinking with your eye, thinking with your hand.

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The mistery of man

After the Francisco Cabrero’s lecture in the School of Architecture in Seville in 1975, and due to the impression of his exhibited work, someone in the public asked Mr. Cabrero what was “really important in architecture. And Cabrero, a man of few words, got up as if he were leaving and said, “What is important is mystery” [1]. Francisco Cabrero was referring to the mistery of the advent of man.

Two years before, in an interview by Carmen Castro for the magazine “Arquitectura”, in which she asked what was architecture for him, Francisco Cabrero responded: “I use an Art in architecture, a Visual arts, but an art which has a peculiarity, its objective is to momentarily make the beauty of useful. A Fine art with utilitarian sense.” [2]

In his texts there are not explanation which clarifies the connection between the tool, the beauty and the arise of man being, however what we can reconstruct it will be this relationship starting from his words, writings and lectures.

Architecture utilitarian visual art

If there is a term which Francisco Cabrero likes to speak about architecture, as a “tool”. He uses it above all as a noun, but he also derives it and links it to other words.

In this way, speaking of tool, of utensil, of usage, of practical art, of utilitarian visual art, of the aesthetics of the serviceable, etc. Cabrero does not employ the term utilitarian as an adjective, which comes from the Latin “utilis”, and which means “that produces profit, comfort, results or interest”. It does not deal to pragmatism, which the considers narrow in scope and lacking committed action [3]. Cabrero refers to utilitarian as the word coming from the French term “outil”, synonym of utensil and, according to the RAE (Real Academia Española), is “tool or instrument of a craft or art.”

It is the tool, the artifact, the “supporting object” of man, as he appoints it, when he refers to the term utilitarian. The tool is the thing, as Gabriel Ruiz Cabrero says in his article published in number one of “Cuadernos de Proyectos Arquitectónicos”. [4]

Francisco Cabrero, in different texts, affirms that architecture is an art by being the cause of optical feel, but having its characteristic necessary and different, in relation to other visual arts, on the fact that it is appreciated as a tool, because of which he classifies architecture as an utilitarian-visual art. [5]

In 1990, the professor Antón Capitel wrote that the work of Francisco Cabrero has the condition of an autonomous visual object which is independent from the universal principles that the discipline used to appear as goals for man in an explanatory table in the competition’s memory to the chair of “Análisis de Proyectos Arquitectónicos”. This relationship between “visual object and management of universal principles” we can identify with the “utilitarian-visual” duality of the architecture described by our author.

With the desire to deeply into this utilitarian-visual duality, we will ponder on the understanding about tool and beauty, and their relationship to the advent of man in his own terms.

The origin of man

Francisco Cabrero, in his personal search for the Francisco Cabrero, in his personal search for the essence, explains in the introduction to his “Cuatro Libros de la Arquitectura” that tools, and the visual capacity of man, are the cause of the apperception of the species.

In the introduction to “Cuatro Libros”, which begins with the chapter called “Primary Medium”, he explains the evolution of the tool and the origin of man. Cabrero divides this evolutionary step into three sub-chapters called: Useful, Tool and Industry. In this chapter, he outlines the evolution of the first implements made by man and the hominids cranium. Man of Tuscany of Sterkfontein and Homo Namaathalensis. These abstract drawings, done with lines and patterns, show the parallelism between the development and sophistication of the first tools and the increase in volume of the cranium casing of these early men. Consequently, of their brain and level of consciousness.

After explaining the evolution on Man in relation to the tool, Cabrero demonstrates the conscious development of this tool to take advantage of it. Cabrero divides the process of the conscious monetization through art into three sub-chapters called: Profile-line-detail, Colour-expression-composition and Convention-scheme-sign. Cabrero explains how these first “faceless” men, in the search for food, discover the art of distinguishing the footprint in their traces, and begin to represent their own inside their shalters, with these acquire a certain symbolic value. The Homo sapiens began visual art representing their hand’s profiles, discovering then the similarity laws need to reproduce any encompasses animals. This is when man discovers drawing as tool of abstraction. The line is in itself a tool which allows to erase “that which is not important” and creates a voluntary thought in those first men.

Cabrero shows the initial abstract prehistoric paintings and how later these huminids, in search of beauty, developed a greater expertise representation of detailed animals, flowers, and drawings. From then, colour, composition, and expression appear.

After the Neolithic, Cabrero explains how man has discovered some simplified methods, begins to represent primitive schemes through the production of sketches that evoke ideas, and not objects or animals. In this way, ideography comes connecting reading, writing, and consequently and according to Cabrero, the human culture.

For Francisco Cabrero, man arises through the ability of his hand to make and manipulate tools, and the abstract capacity of his visual world. For that reason, architecture is founded between image and practice, between the seeing-eye and hand that holds the tool, between beauty and practicality. Not in vain Francisco Cabrero writes that “Man has the natural desire for the possession of the practical and the pleasure of beauty”.

The structure of human beings

We discover that terms beauty and usefulness are natural for man in an explanatory table in the competition’s memory to the chair of “Análisis de Formas Arquitectónicas” presented in 1973. This table-board represents the relationship between architecture and the different vital states, components of reason and, deeds and goals of man.

Francisco Cabrero, to explain what architecture is, took from the Treatise of Man, by Saint Thomas Aquinas, the structure of the human being in which one can distinguish vegetable life, whose aim is health, simple life, whose aim is beauty, and intellectual life, which aims is the truth. Francisco Cabrero adds to Thomas Aquinas by adding to the structure of the human being the understandable life motive, whose aim is usefulness. This vital state is added as a consequence of the essay reading of Oswald Spengler “Man and Technique” [6], a book from his own library, underlined and with notes in margins. In relation to different vital states and their aims, we can find the different deeds of man. This way, usefulness can be attained through work, beauty through art and truth through philosophy.

Cabrero defines this picture of architecture as a work of man belonging to the visual arts, but intimately related

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8. Francisco Cabrero uses the verb “know intuitively” to explain how Man understands, without the needing to reason, how to work materials and how they should be treated. The apprenticeship is served through working directly with the masters, through practice. The relahtionship that Cabrero had with the ida is significant, classifying itself as a skilled carpenter.
9. When referring to the “distinctions of the materials”. Cabrero means its capacities of resistance to its capacity for being manipulated. These are the qualities of the transformation of material due to certain tools.
10. Cabrero uses the term “tool” which has a different meaning than the one that is commonly used. So, he speaks of “constructural” architecture as referring itself with a physical condition which is due to its appearance.
11. Following Antonio Franchini, in his verse structure, “There exits a unity between the practical equations, static and aesthetic, with different materials and not biologic shape.”
12. “A condition which has already been explained by Antón Capitel in 1985. "Under all the art of the wright, the condition is visual objects."
with the mobile-aprehensible vital state. Saint Thomas Aquinas as well as Spengler and Cabrero, work on the structure of the human being already formulated by Aristotle in his work, "On the Soul".

The vision and understanding of man

For Spengler, the history of man is the history of his technique and this is, at the same time, the element which distinguishes the species from other forms of life. Technique is not a distinctive feature of the human being, it is "the tactic of life" and a fact linked to the mobility of animals, unlike the vegetative life of plants, whose strategies for survival are not conditioned by the tactic.

Technique is an act by which shifting animals survive, conquering nature. Spengler explains that the technique of the lion exists, that it stalks the gazelle, the technique of the brushesroke, the technique of the spearman, the technique of the balloon and the technique of invention, to fabricate and use weapons.

Cabrero differentiates levels of animated life. On the inferior level are herbivores, in which dominate their auditory and olfactory senses, and the situating of their eyes on either side of the head, reveal that their technique is fine. Above herbivores are rapine animals, whose sense of smell dominates over on smell, and whose technique is attack. Animals whose eyes are forward looking and are directed towards a target, this is the origin of perspective, the control of movement in space, origin in turn, the control of the placing of objects and of distance: "A gaze which dominates the battlefield is the origin of perspective, the control of movement in space, origin in turn, the control of the placing of objects and of distance".

For Spengler, man arises adding the eye of the rapine animal which "theoretically" dominates the world, conscious, voluntary, variably, personal and inventive. For Cabrero, man arises adding the eye of the rapine animal which "theoretically" dominates the world, conscious, voluntary, variably, personal and inventive. For Spengler, man adds the eye of the rapine animal which "theoretically" dominates the world, conscious, voluntary, variably, personal and inventive. For Cabrero, man adds the eye of the rapine animal which "theoretically" dominates the world, conscious, voluntary, variably, personal and inventive.

The hand and the tool

In the introduction to his "Cuatro Libros de la Arquitectura", Francisco Cabrero defends the position that it is impossible that the human hand, in the upright position, and the tool had been developed forth one after the other. Not only the hand and its upright position are at the same time even the hand and the tool, one without the other does not make sense. "Not only has the tool been formed around the figure of the hand, but also the hand has been formed around the figure of the tool" (7). This way we can differentiate between man and the other rapine animals because man chooses his tools and prepares them according to a personal reflection. This fact Spengler called "the liberation against the coercion of the species", which he explained how it came to be that man became independent from the specialisations of his body.

The ability to construct many different tools as an extension of the hand becomes to man a species of animal with interchangeable organs. Specialisation is a characteristic that man is able to selectively specialise his hand with each tool that he fabricates, equating to all specialised animal. Man can mine as a mole, cut down trees as a beaver or grow things as an ant. However, an animal is limited to its habitat by the specialisation of its body, while man is capable of adapting to a diverse and changing environment.

The construction of tools allows with an estimate of the results of its use, indicating a complex mental development. Between man’s needs and the achievement of the result there is a series of intermediate thoughts, i.e. a plan of action exists, that leads to the supposition of the imagination of something that does not exist, inventiveness and experimentation. Francisco Cabrero refers to this practical thought when he talks about mobile-aprehensible life. Man, to confront nature, to survive, to adapt to different environments, is capable of making an axe or a hoe, weave a skin, do a trap or a shelter. As Benjamin Franklin said, the man is a maker of tools. (8)

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For Spengler: "There is thinking eye, by which will arise the theoretical thought, meditation and the wisdom of the thinker, scientist or philosopher. And, there is a thinking hand that comes from practical thought, audacity, strictly-speaking intelligence, which can be commonly found in the salesman or a general. While the eye enquires about cause and effect of the facts, the hand works in mediums and ends that provoke them. Cabrero picks up this thought that Spengler used as an example for the action of the creation of fire: "One can see--cause and effect--of how fire is made. Also many animals can see this, but only man thinks--mediums and ends--a reason for producing it." Cabrero splits the Spengler’s thinking eye, in two: intellectual thought and sensorial thought. Then he establishes three types of consciousness: mobile-understandable thought, which acts over the medium searching a useful end, sensitive thought which searches beauty in the effect or appearance, and cognitive thought which enquires into the search for the truth.

For Cabrero, every work of man involves goals of different vital states: health, usefulness, beauty and truth. In architecture he seeks a practical sense and beauty, but not the truth. According to Cabrero, architecture is reached through work and art, and not through philosophy. Architecture is reached through work and art, and not through understanding. Architecture is reached through practice and image not through ideas. Architecture is reached through intuition and perception, not through concepts. So the thoughts of Francisco Cabrero associate the visual condition and usefulness, both suitable and necessary for architecture.

The evolution of the tool and of architecture

Cabrero, ends the introduction of his "Cuatro Libros" with the chapter entitled Dwellings. After explaining the advent of man through his ability to fabricate tools, and capacity for the abstract as a consequence of his visual world, Cabrero describes three primitive civilisations in different geographical locations: valley, coastal and plains. He studied the Kist tribe, agricultural people from the Guisanne jungle; the Muriata’s fishing village located on the island of Titoica; and an shepherd village of the Sahara.

The environmental characteristics and surroundings of each of these primitive peoples were studied and, as a result, their work systems and social organisation. Cabrero explains that as the primitive dwelling arose based on tools that could be exploited with alimentary ends. So, in the chapter dedicated to the fishermen of the island of Titoica, he even drew the technique for tying knots to fishing hooks and other tools with the intention of identifying them with those used for the construction of their primitive dwellings.

For Francisco Cabrero, tools used by each civilisation are different, and these are what determine the character of each type of architecture. In this case he shares the same opinion as La Corbusier when he says that ancient civilisations do not exist, only ancient tools, as he affirms in his "Cuatro Libros de la Arquitectura": "Tools evolve through history and the environmental limits define: limitations of material, which always remains the same in nature, at the same time acquired knowledge by man, acting as a personal background of consciousness, sensing tensions of phenomenon which are produced in the material and its corresponding rigging." (9)

Matter, material and bonding

For Cabrero, matter is converted in material by the tool, to be rigged, to build. If we understand that a rigging is the tool in which materials are joined in a construction, a structure is another way of bonding, as well as brickworks, stone or any other type of material. Of what is made Cabrero’s works are large blocks of stone, brick or wood? Stone rigging in the Cruz del Valle is made of cobblestones, brickworks in the houses of the Virgin del Pillar, concrete rigging in his project of Gaming house in Jerusalem, and his house of Puerta de Hierro and in the Glass Pavilion. In his books riggings are showed in shortening, to understand the order of the material as happens in the educational axonometric drawings in construction books.

Francisco Cabrero concludes the first of his "Cuatro Libros de la Arquitectura", referring to the vernacular structure, which are built according to what can be identified as material reality and visual appearance. In this way the Dome, the Lintel, the Structural Framework, the Laminated and the Removable Structure are defined as structural born out of the rational use of clay, stone, wood, filagio and leather, according to their corresponding idioms. (10) -- malleable, robust, flexible and tenable. Each material possesses an intrinsic and inherent character which is the theoretical thought, the practical thought, the mechanical capacities linked to its capacity for manufacture. Stone, for example is a hard and robust material, but it can be cut using simple tools in order to obtain prismatic pieces for the construction of rigging.

Cabrero puts so much importance on the material condition of architecture that, although recognising that it is in space, "where there is nothing", Where usefulness is, architecture begins to exist as when space is obtained in space, is obtained in space.

Vernacular structures

Faced with a primitive hut, built with branches and tree trunks, suggested by the abbot Marc-Antoine Laugier in 1753 as the origin of architecture, Francisco Cabrero puts forward five vernacular constructions on relation to five materials. The lintel, the dome, the frame, the laminated and the removable structure are Cabrero’s cabinet of gold, stone, mud, wood, filagio and skin, respectively.

For Cabrero, the dome possesses a determined formal character born from the malleable characteristics of clay, allowing for moulding and forging. Cabrero not only knows the capacities of resistance of clay in the working ad and in the shortening, but also the natural structures of eroded clay hillsides. To prepare this fluid material, man fabricates tools like the fornomk, the pickaxe, the rammer; the trowel and the palette, and carry out the dome with forms which use only forces of compression that are capable of withstanding. Cabrero demonstrates the "formal character" of mud rigging constructed by the Maasai and the dome shaped shelders made in the basin of River Esla from his trip through Leon and Zamora.

The lintel is the first triumph of building destined to do a great opening with the idea of permanence. This construction is between the natural materials of earth and wood and the durability of compact stones, which can be fractured with simple tools into prismatic pieces capable of forming lintel. Cabrero gives examples from nature; bridges and natural ceilings which generated in the first men the desire to permanently cover a space. With examples like Stonehenge and Menga, he explains the importance of significance that these civilisations had for the invention of the lintel.
The wood rigging emphasizes the “constructive” \[12\] character of structure. Cabrero explains the different use of material according to the types of trees that they come from, focusing on those of slow growth to explain the condition of the material identifies it. The Stone Age of Francisco Cabrero, we can speak of the reference when he designed La Cruz del Valle de Los Caidos. Cabrero. He drew his first project as an architect with gigantic granite ashlar in 1941. He raised the cross over a pyramidal cymatium of stone and raised monumental rigging of granite ashlar where the cross was constructed with lintels, and where arms rest on a suspension of granite ashlar. The arch, which is continuously separates each of the units of the binding, is converted into the mechanism which isolates each of elements that conforms the monument. Cabrero achieves, of his funeral monument, a character of permanence and construction in his writings.

An architecture where appearance, practices a naked architecture, without skins to hide the condition of the material identifies it. Cabrero illustrates the example of this type of laminated structure with the “Extremenian hut”, nomadic shepherd house, the spherical dwellings of the Bechive Zulu, the Mudhif Iraki made from giant reeds and the Maipua constructions in Indonesia.

Finally, Cabrero outlines the flexibility and lightness of leather and weaving which allows the easy dismantling and moving of completed rigging. Open to the appearance, supporting structures, is designed to make possible the transformation of raw material into construction materials. Cabrero demonstrates in his “Cuatro Libros” that removable structures like the porta in Mongolia and the jai in the Samburu. He describes the bale as a reactor of his materials, where the forces of bending are eliminated thanks to its shape of catenary.

For Cabrero these structures are the basis of the classic styles, which arise from the rational use of the different materials and form rigging where the visual reality of the condition of the material identifies it.

The ages of Francisco’s architecture

If these vernacular structures are the basis of the classic styles, they are also the basis for the work of Francisco de Asís Cabrero. Architecture is more than rigging or structures made of certain materials that the industry in that time, chosen a priori, and which are organised according to its internal laws. Cabrero looks for the possibilities of the material, the variability to organize and the capacity to combine with others. In this way, he creates a hierarchical order in the project, exploiting to the maximum its visual capacity. \[13\] He practices a naked architecture, without skins to hide his structure. His appearance material and resistant iron hidden inside permitted the creation of apparently unstable construction. In this way he designed the monument to Calvo Sotelo on the Paseo de la Castellana in Madrid in 1955. Two triangular wings of victory on a monumental scale which are mysteriously supported on one if its apexes. Years prior to this, Asís Cabrero had already experimented with the possibilities of the construction with reinforced concrete, designing la Basílica de Madrid in 1953 with reinforced iron heating pipes. In 1956 he designed a neighbourhood of dwellings using dome frameworks for a posterior housing of concrete. Finally, in the 1970s, with the development of national industry, Cabrero was able to get sheet steel contours for the construction of his buildings, arriving at his “Steel Age”. He reviewed his repertoire with the newly available material, and constructed steel steel contours designed years before in La Casita Fina. Cabrero could recreate in La Casa de Campo the gigantic diaphanous space designed in the Basílica de Madrid and construct the Glass Pavilion. A great space without pillars where one can see the structure of the Basílica is, this time with a lintel structure.

Cabrero did cut the laminated steel bars coming from the Altos Hornos of Bilbao, they stuck out of the roof of his Casa en Puerta de Hierro. As the clever builder who joins bricks without cutting them, Cabrero used the double “C” bars of the roof as the expression of his rigging iron.

To answer the question that everyone asked about this, Cabrero said to his son, Sagastegui, “Before cutting one of these bars, I prefer to be cut me a finger.”

**FRANCISCO CABRERO MICROSCOPE INSTRUMENTS MATERIAL STRUCTURE TOOLS**