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 mystery 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 see an Art in architecture, a Visual arts, but an art which has a peculiarity, its objective is to eminently seek 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 human 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 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 he 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 basing its character, necessary and different, in relation to others 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 project [6]. 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 deepen 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 apparition 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 Sterkfountein and Homo Neanderthalensis. 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 cranial casing of these hominids and, 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 the species through its visual world in the chapter entitled Design. Cabrero divides the progress of the conscious hominid 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 shelters, with these acquiring a certain symbolic value. The Homo sapiens began visual art representing their hand´s profiles, discovering then the similarity laws need to reproduce any encompassed animals. This is when man discovered 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 these first men.

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

After the Neolithic, Cabrero explains how man having 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 out, preceding 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 appear as goals 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 its aim 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 status 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

1. Conversations with Gabriel Ruiz Cabrero. (Unedited text). Madrid 2002.

2. With Francisco de Asís Cabrero. Castro, Carmen. 172, Madrid: s.n., April 1973, Architecture pages 5-9.

3. CABRERO, Francisco: *Los Cuatro Libros de la Arquitectura* (The Four Books of Architecture). Madrid: Fundación Cultural COAM (Cultural Foundation), 1992. page 102. Volume IV.

4. CABRERO, Gabriel Ruiz: *The tool is the thing.* Project Department of Estam: Madrid, 2010.

5. CABRERO, Francisco. Architecture: *Los Cuatro Libros de la Arquitectura* (The Four Books of Architecture. Madrid): Fundación Cultural COAM (Cultural Foundation), 1992, page 24.

6. Abstract art and meaning in the architectural work of Francisco Cabrero. Capitel, Antón. 118, Madrid: s.n., 1990, Architects, pages 9-28.

7. SPENGLER, Oswald: *Man and technique and other essays*. Espasa-Calpe Argentina: Buenos Aires, 1947.

8. LEWIS, John: *Simplified Anthropology*. Selector, Mexico, 1985.

9. 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 bonded. This apprenticeship is served through working directly with the material, through practice. The relationship that Cabrero had with the trades is significant, classifying himself as a skilful carpenter.

10. When referring to the "idiosyncrasies of the material" Cabrero means its capacities of resistance linked to its capacity for being manipulated. These are the qualities of the transformation of material due to certain tools.

11. Francisco Cabrero habitually used terms which had a different meaning those commonly used. So, he speaks of "constructivist" architecture to refer to that with a physical condition which is obvious in its appearance.

12. According to Francisco Cabrero, in these vernacular structures, "There exists a unity between the practical equations, static and aesthetic, with different materials and its tipológica shape.

13. A condition which has already been explained by Antón Capitel in 1990: "above all the art of his works, their condition as 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 differentiates the human being 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, confronting nature. Spengler explains that the technique of the lion exists, that it stalks the gazelle, the technique of the brushstroke, the technique of the steerable balloon and the technique of invention, to fabricate and use weapons.

Spengler differentiates different 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 flee. Above herbivores are rapine animals, where the sense of sight 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 and is exclusive to the most noble rapine animals ". A gaze that allows man dominates the world and is the cause of his superiority.

While the technique of the animal is determined by the shape of its "active body", the technique of the human being, thanks to multiple possibilities of the hand and the tools which serve as an extension of himself conscious, voluntary, variably, personal and inventive. For Spengler, man arises adding the eye of the rapine animal which "theoretically" dominates the world, to the human hand, which dominates it "practically". Cabrero picks up on Spengler and writes in his "Cuatro Libros de la Arquitectura" that the understanding of the hand and the vision of the eye are the origin of human consciousness.

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 arose 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 reflexion. This fact Spengler called "the liberation against the coercion of the species", which he used to explain 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 in a species of animal with interchangeable organs. Specialisation is a limitation and man is able to selectively specialise his hand with each tool that he fabricates, equaling 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]

Thinking with your eye, Thinking with your hand

For Spengler There is a thinking eye, by which will arise the theoretical thought, meditation and the wisdom of monk, 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 searchs 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 desire and feeling, and not through understanding. Architecture is achieved through practice and image but 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 plateau. He studied the Kissi tribe, agricultural people from the Guinean jungle; the Matautu´s fishing village located on the island of Tikopía; 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 Tikopía, he even drew the technique for tying knots to fishing hooks and other tools with the intension 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 Le 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 their limitations 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 [9] tensions of phenomenon which are produced in the material and its corresponding rigging."

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 way 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 than large blocks of stone, brick or steel? Stone rigging in the Cruz del Valle de los Caídos, brickworks in the houses of the Virgen del Pilar, concrete rigging in his project of Guniting houses, steel bonding in Arriba building, in his house of Puerta de Hierro and in the Glass Pavilion. In his books riggings are showed in foreshortening, 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 Architecture", refering 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 structures born out of the rational use of clay, stone, wood, foliage and leather, according to their corresponding idiosyncrasies [10]– malleable, robust, flexible and tensile-. Each material possesses an idiosyncrasy or law, which is the combination of 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 such when space is obtained and organised by existing elements.

Vernacular structures

Faced with a primitive hut, built with branches and tree trunks, suggested by the abbot Marc-Antonie Laugier in 1753 as the origin of architecture, Francisco Cabrero puts forward five vernacular constructions en relation to five materials. The lintel, the dome, the framework, the laminated and the removable structure are Cabrero´s cabins made of stone, mud, wood, foliage and skin, respectively.

For Cabrero, the dome possesses a determined formal character born from the malleable characteristics of clay, allowing its easy moulding and forging. Man intuitively knows the capacities of resistance of clay in the working of it and in the observation of the natural structures of eroded clayey hillsides. To prepare this fluid material, man fabricates tools like the formwork, 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 Massai and the dome shaped shelters made in the basin of River Esla from his trip through León and Zamora.

The lintel is the first triumph of building destined to do a great opening with the idea of permanence. This construction originates from the capacity to cut stone 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 commemorative significance that these civilisations had for the invention of the lintel.

The wood rigging emphasizes the "constructivist" [11] 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 this rigging. He explains the capacity of the material to be sawn and of the suitability of this for doing joints. For Cabrero, the man intuitively knows these ways of the fabrication of "wooden" frameworks of the observation of the structure of trees. While conifers develop around a vertical "post" from which horizontal cantilevers protrude, in fruit trees the trunk branches off in a "V" shape, reinforcing itself with the shape of an inverted triangle. He illustrated the structure according to the finishing and the level of sophistication of the tools, as exemplified the first fences made in European architecture in the 4th century, and the frameworks of Viking architecture of the 9th century in Trelenborg, Denmark.

Cabrero highlights of the laminated structures made from foliage of leafy plants, the strong spatial character, due to reduce thickness of layers in relation to the span of structure. He highlights the elasticity of fibres, its homogeneity and the adaptable character to be curved and personalised these flexed structures. To feather the foliage, techniques are used such as slitting and splitting off by allowing tie the wood. These membranes, made with sticks, function by avoiding bending and only working with traction and longitudinal compression. Cabrero illustrates the example of this type of laminated structure with the "Extremenian hut", nomadic shepherd shelter, the spheroidal dwellings of the Bechive Zulu, the Mudhif Iraki made from giant reeds and the Maipua constructions in Indonesia.

Finally, Cabrero underlines the flexibility and lightness of leather and weaving which allows the easy dismantling and moving of completed riggings. Operations shear, clean spin, rolled up thread and tautened make possible the transformation of raw materials into construction materials. Cabrero demonstrates in his "Cuatro Libros" that removable structures like the yurta in Mongolia and the jaima in the Sahar, which he describes as the best structure as far as its mechanics, 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 riggings where the visual reality of the condition of the material identifies it. [12]

The ages of Francisco´ architecture

If these vernacular structures are the basis of the classic structures, they are also the basis for the work of Francisco de Asís Cabrero. Architecture is no more than rigging or structures made of certain materials that the industry in that time uses, chosen a priori, and which are organised according to its internal laws. Cabrero looks for the possibilities of the material, the capacity to organise 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 reality, whose appearance manifests his fleshing physical condition. An architecture where appearance, structure and form is the same.

Francisco Cabrero, throughout his professional career, has elaborated structural riggings with materials that each era develops. Francisco Cabrero´s professional career stretched from the 1940s to the 1970s, using different materials during these three decades. In the Post -Civil war period, the country was impoverished and isolated from the exterior, opening up during the following decades and consequently widening the availability of materials and the technology associated with them. In this way we can classify Cabrero´s work according to materials available in each period but not with the argument of stylistic reasons, as has been the case on other occasions.

The Stone Age of Francisco Cabrero, we can speak of the reference when he designed La Cruz del Valle De los Caídos. Cabrero. He drew his first project as an architect with gigantic granite ashlars in 1941. He raised the cross over a pyramidal cymatium of stonework and raised monumental riggings of granite ashlar where the cross was constructed with lintels, and where arms rest on a suspension of groin vaults. The joint, which insistently separates each of the units of the bonding, 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 the overcoming of death for assigning to the stone construction in his writings.

The Age of Clay is the name we give to the work carried out during the 1940s. The scarcity of steel, due to the isolation suffered in post war Spain, did that Cabrero basically built with brick. In 1948 he constructed the Virgen del Pilar dwellings with a system of walls and "Catalan vaulting" with one on top of the other. The structure of the exterior was unadorned, with south facing two storey patios and which are apparently have the appearance of being left open and show supporting brickwork. Walls were built replete with buttresses, showing sides of the piling of the "Catalan vaulting". The inlays in blocks of concrete showed the tension´s system chains. Cabrero knows the material and how it should be joined, he draws the layers of the brick domes, the join to the walls and steel bars that embed in the concrete blocks. All of these elements are visible to the exterior.

Experimenting with the same material, in 1949 Cabrero developed La Feria del Campo, where he always worked in collaboration with the architect Jaime Ruiz, his brother in law. They practiced different solutions to bonding using the same material, developing domes with different lighting, dimensions and geometries. For the access plaza he managed to eliminate the lateral buttresses by creating a bonding with circular layout. In the cow pavilion the system opens out in a fan shape, and supports the domes on arches which rest on one of its side walls on an undulating wall. In this way Cabrero exploited the "formal" character that he gives to ceramic construction in his writings.

With the opening of the country outwards and the consequent arrival of iron, Cabrero began his personal concrete´s age. In the Feria del Campo, Cabrero had already announced the type of work he will develop in the 1950s with reinforced concrete used in his watch tower. From the two walls set in the ground arise a large balcony in cantilever. Cabrero was interested in reinforced concrete in its double condition: on the one hand, the formal continuous capacity of material that hardens in a mould, and, on the other hand, the hidden steel strength of its interior which allows him to make challenging structures of the gravity. In 1950, and after visiting Max Bill the year before, Cabrero designed his "Forma Conmemorativa". The use of strength of the reinforcing steel allows him the rotation of the reinterpreted grid. Cabrero visually made the most of a bonding constructed with a material of stony appearance and whose 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 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 Rafael Aburto. A system arranged in a series of parabolic reinforced concrete arches whose cross sections deviated directing the great diaphanous space towards the altar. The bell tower resembles its "commemorative shape", but the steel is without the concrete which covers the monument and makes it more slender and lighter, suggesting the use of laminated steel girders.

In 1956 Cabrero built the dwellings in Calle Reyes Magos in Madrid giving the exterior a concrete bonding tangent which, in the sculptures of Bill, the master, was converted into the exterior emblem of the structure. In the Mausoleum Alí Jinnah in Karachi, Asís Cabrero understands that the strength of the dual condition of the bio-component material allowed him to use different bonding in the same work. The possibility of potent reinforcing allows the construction of a massive empty cube in which the tomb of Qaide would be placed. In contrast with the transcendent lintelled cube, domes appear which are less reinforced and more in tune with this terrain.

With the desire to exploit the possibilities of building with reinforced concrete to the maximum, Cabrero built the concrete roof of his first house in Puerta de Hierro, reinforcing it with highly valued iron heating pipes. In 1956 he designed a neighbourhood of dwellings using dome frameworks for a posterior hosing 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". Here he investigated the bonding of this new material, which was painted red, emulating the raw material in its natural state. He finally managed to make his much desired grid into a more abstract and lighter reality! He reinterpreted his repertoire with the newly available material, and constructed sheet steel contours designed years before in La Castellana. El Diario Arriba, 1961, once again took up the frontal position of the Casa Sindical, making the grid lighter and eliminating the base and the cornice. With the availability of the new, light-weight material, he 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 site where the Basílica is but, this time with a lintel structure.

Cabrero did´nt cut the laminated steel bars coming from the Altos Hornos of Bilbao, they stuck out 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, Santiago, "Before cutting one of these bars, I prefer to be cut me a finger".

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FRANCISCO CABRERO
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