

**SAPERE
AUDE!**

Dare to Know!

REWRITING

2

Alberto Campo Baeza

SAPERE AUDE! REWRITING 2

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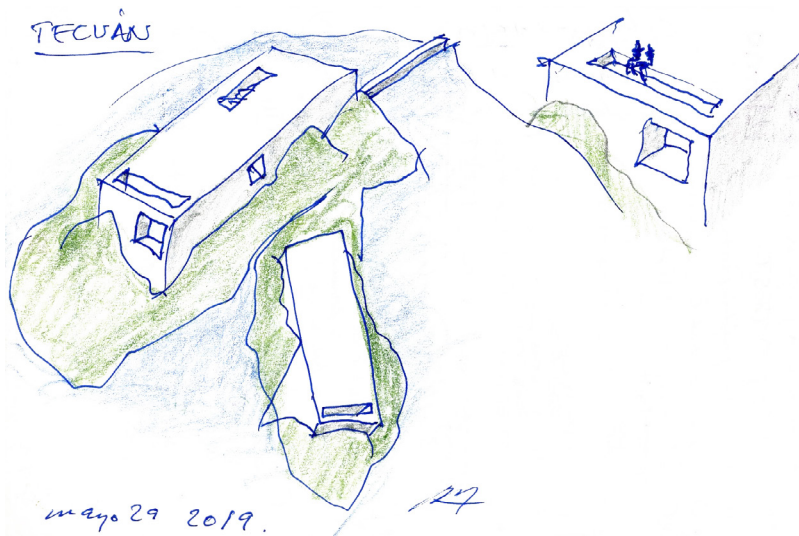
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PREFACE





SAPERE AUDE!

Dare to know! Horace

A marvel at your fingertips.

If writing is sometimes like starting over, rewriting is always like starting over again.

Not long ago “Rewriting about Architecture”, was published first in English and then in Spanish. I chose seven, quite a comprehensive number, out of the countless texts I have written over the course of my long life. They are the ones I consider to be fundamental. And now they are begging me to write, to rewrite, more texts along the same lines. This would be a selection of already published texts deserving of revision and amendment – once again! – with that marvelous tool which is the computer.

I have written many times about rereading and remembering: how rereading leads to much greater enjoyment, like squeezing a lemon to the core, and how remembering is like putting one’s heart once again into what is being recalled.

In the past, it wasn’t that easy to muster up the courage to rewrite anything. Mostly, it seemed like too much hard work to have to pick up your pen once again and, faced with the original script, to dare to make changes to it, removing or adding something to what you had already written. Now, however, all that is a thing of the past and with the computer at our fingertips we feel encouraged to embark on the adventure of rewriting.

It is said that Aristotle never managed to finalize the text of his marvelous *Protrepticus*. Can you imagine if Aristotle had had a computer at his disposal? Although now, thanks to Ingemar Düring and Carlos Megino, we are lucky enough to have Aristotle’s text to hand. As Cicero had it in his day to write his *Hortensius*, and later St. Augustine too. A real gift.

Sapere aude! Horace, Epistola II, *Epistolarium liber primus*.

Immanuel Kant, Was ist Aufklärung?

Although Horace's dictum "*Dimidium facti, qui coepit, habet: sapere aude, incipe*" (He who has begun is half done; dare to know; begin!), which Immanuel Kant used in his essay, is very beautiful, it would be presumptuous of me to say that it is easy to put it into practice, even if I have been trying to do so for many years. We are always beginning to begin, as the poet would say. I always consider myself, even now, at 74, to be just beginning to begin.

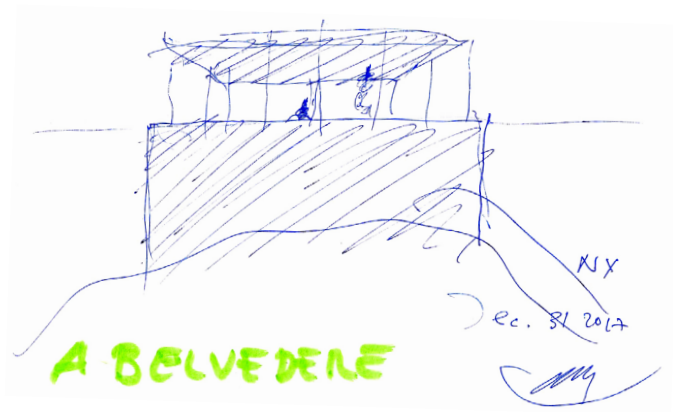
Because knowledge, wisdom, is something very serious. The saying that "All I know is that I know nothing" is clearer to me every day. And that's why I keep on studying. And I can assure you that I enjoy studying a lot. Just as I always saw my father do, who at the age of 104 never stopped reading, never stopped studying for a single day. And studying is a gift.

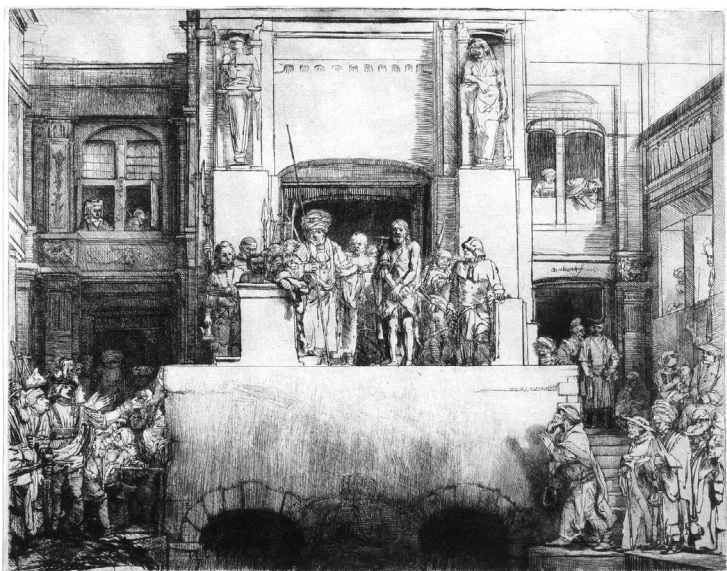
And now, once again, the publication of a book, bringing to light a collection of texts where, once again, one's soul is laid bare and which will be titled *Sapere Aude!*

Alberto Campo Baeza

July 2021

THEORY





Ecce homo. Rembrandt

FLAT HORIZONTAL PLANE

On Horizon

The flat horizontal Plane, the platform, is more than just one of the most basic mechanisms of Architecture. In this essay, I would like to further our understanding of this Flat Horizontal Plane not only as the primary mechanism of Architecture, but also, *in situ*, as the spatial limit between the stereotomic and the tectonic.

Standing before Rembrandt's beautiful 1655 drypoint engraving, *Christ Presented to the People*, I once pondered how the strokes produced by the hand of the great maestro bring to the fore the central horizontal line which functions as the base of the composition's construction. The upper plane of the stone platform, upon which the action of the scene transpires, is placed at such a height vis-à-vis the viewer's visual perspective that it becomes a line. That horizontal line is so perfect that one could say that Rembrandt used a ruler to draw it. Or indeed that he had a perfectly steady pulse.

Rembrandt clearly takes inspiration from an earlier engraving by Lucas van Leyden. However, Leyden's perspective is set higher, more at a bird's eye view, so that the main plane is seen as a trapezium. Once again Rembrandt, the *maestro*, shows his clear wisdom and skill in the precise handling of spatial mechanisms.

On the other hand, the double terminology that Holy Scripture employs for this place, *Lithostrōtos* or *Gabbatha*, is very expressive. *Lithostrōtos*, as its Greek root *litos* indicates, means "stone floor"; in Spanish it is called "*enlosado*," or tiled with stone. Moreover, in Hebrew *Gabbatha* means "a raised place," so that between the Greek and Hebrew terms, the rostrum or platform had this double meaning: raised on high and made of stone. Here

one can observe the same operation, with other dimensions, that one sees in the Acropolis of Athens.

Indeed if Rembrandt borrowed from Leyden's form, correcting it with the perfect horizontal line at eye-level, Picasso in his *Ecce Homo: Le Théâtre de Picasso* also borrows from Rembrandt's form and in his very free version conserves the horizontal line from the edge of the top of the pavement, of the *Gabbatha*, exactly at eye-level. And as with Rembrandt, the line is so horizontal that it seems, or is, traced with a ruler.

It is curious how both geniuses coincide, with astonishing premonition, in their perspicacity of understanding the transformation of plane to line at eye-level. This was something Mies van der Rohe was to later use in such a defining manner in his Farnsworth House.

A contemporary architect will immediately recall now what Mies van der Rohe attempted and achieved when he placed the ground floor of Farnsworth House at eye level: the plane became a line in front of the viewer, making the house appear even lighter.

So, this is what I wish to explore here: this flat horizontal plane, that of Rembrandt, Picasso and Mies, understood as the limit between the stereotomic and the tectonic world.

It is significant that Jorn Utzon in his well known text *Platforms and Plateaus* begins by saying that "the platform as an architectural element is a fascinating feature. I first fell in love with it in Mexico on a study trip in 1949, where I found many variations, both in size and idea, of the platform, and where many of the platforms are alone without anything but the surrounding nature". So it comes as no surprise that the platform, the raised flat horizontal plane, was the central theme of many of his buildings. The idea of the flat horizontal plane is so definitive in architecture: it is an idea of yesterday, today, and tomorrow. The horizontal plane puts man, standing on the ground, in juxtaposition to the physical sky thanks to the very gravity on which the human body depends for all of its functions; man

has a maximum sensation of balance on the absolutely flat horizontal plane. Furthermore, as this plane is the dividing line between these worlds, the plane is also where they, the tectonic and the stereotomic, come together.

Curiously, Spain's Royal Academy of Language and Letters defines a flat surface as "that which is situated in a position parallel to the horizon, in the lower part of a painting." Moreover, it defines the horizontal plane as something "defined by the surface of a liquid in a state of rest." I say 'curiously' because it uses an unstable physical situation, that of "liquid in a state of rest," to define what is really a stable physical situation, in fact the most stable of all: the built horizontal plane.

In his book *Studies in Tectonic Culture*, Kenneth Frampton aptly analyzes, on the basis of profound and extensive commentaries on Utzon and his work, the validity of the platform as a universal architectural mechanism.

Likewise, in *The Establishment of Architecture* I too presented a heated defense of the horizontal plane, giving all kinds of arguments that in one way or another stemmed from the analyses of Utzon and Frampton. In that text, which is, in some way, a continuation of an earlier essay, I insist upon those arguments and explain how I have radically materialized them in some of my latest projects.

I should like, once again, to emphasize how theory must accompany practice in architecture. It's not a matter of drawing designs, building them and then, like a ventriloquist, lending them a voice. On the contrary, I would like to demonstrate something that is fundamental to artistic creation, and even more so to architectural creation: that constructed works are the synthesis of an extended and anterior process of deliberate thought which, in connecting with past history, constructs future history. This rational-artistic process could be considered "true research".

Kenneth Frampton reconsiders and gives life to some of the forgotten theories of Gottfried Semper; his distinction between the Stereotomic and the Tectonic in architecture is especially brilliant: the Stereotomic, on the

one hand, refers to what is heavy – gravity-bound, immobile, unitary, and continuous – while the Tectonic refers to what is light – mobile, fragmented, and discontinuous. Frampton could not have imagined the extent to which new architecture could be generated from these ideas he brought to light. For my part, I owe their discovery to Jesus Aparicio, who after his stay as a Fulbright scholar at Columbia University, presented them in Madrid, and later included them in his marvelous book *El Muro*, “The Wall”.

THE HORIZONTAL PLANE: BOUNDARY BETWEEN THE STEREOTOMIC AND THE TECTONIC

It is my intention here to go one step further and consider the flat horizontal plane as the materialization of the boundary between the tectonic and the stereotomic.

When man establishes the horizontal plane, he is doing something more important than just satisfying a physical need for stability demanded by the universal laws of gravity. When primitive man settles and takes possession of a place, the first thing he does is construct the flat horizontal plane. Or he looks for places that are already flat, and afterwards they are shaped, fenced in, and delimited. The plane is the earth itself, clearly a stereotomic plane.

Furthermore, when he builds the horizontal plane with elements that are light, and makes it mobile, he is doing something even more profound: he is raising himself over the earth in order to dominate it. With the construction of the mobile, floating, already tectonic horizontal plane, he achieves mobility and, what is more important, he gains freedom. The hut becomes a sign of freedom as opposed to the cave.

When Mies van der Rohe builds his Farnsworth House, he is performing an act that goes far beyond merely making a truly beautiful, light, and transparent house. As an architect, for the first time in the history of architecture, he is consciously setting the flat horizontal plane floating in the air. This feat is absolutely key to the operation.

Given the self-evident perspicacity of the operation, it is not easy to explain why this has not been more generally repeated by later generations of architects. Not even Mies himself did it again.

There are echoes of all this in Adalberto Libera's Casa Malaparte where he proposes to establish the upper horizontal plane as the central plane of the life of the house, as the beginning or end of a stereotomic podium. As if it were a small acropolis. Nothing that radical was ever repeated, either by Libera or any other architect. The flat horizontal plane, naked, radical, pure, as the primary plane of Architecture.

ADDENDA

De Blas in Madrid, Olnick Spanu in New York and Rufo in Toledo are all houses of mine with a stereotomic podium aimed at achieving the construction of the horizontal plane on which the tectonic piece is built.

The same exercise was employed in the Entre Catedrales project in Cadiz, in the Center for Landscape Interpretation in Lanzarote, and in the House in Tarifa but perhaps in an even more radical way.

None of these cases involve a flat rooftop exploited for other purposes, or used for landscaping. Nothing could be further from the truth. As Utzon so astutely observes in the final paragraph of his text: "To express the platform and avoid destroying it is a very important thing, when you start building on top of it. A flat roof does not express the flatness of the platform".

Speaking for myself, from the very outset I had no doubt that the flat horizontal plane must take the lead role, as the most central guiding idea. If in my more recent projects any emerging element has been eliminated from their design, this was not done for reasons of either purity or so-called minimalism. On the contrary, the spatial force of this horizontal platform facing nature is such that any emerging element could distort it. It is a flat horizontal plane between the stereotomic and the tectonic, between heaven and earth.

It is clear that this is only possible in places that, on the one hand, have a landscape with a distant horizon that renders this operation meaningful, and moreover, that enjoy a climate that permits the intended activity in a space that is open to the sky. In all of these cases, in these three projects, the distant horizon is the line of the Atlantic Ocean and all three locations enjoy a privileged climate.

THE THREE PROJECTS

The first of these three projects, in Cadiz, the so-called oldest city in the West, is called Between Cathedrals. We were asked to “cover an archeological excavation”, and give the city a public space. To do so, we made something more than just a flat roof. We made a raised flat horizontal plane, paved in Macael white marble, to which we built a ramp for easy access, also placing a white canopy on it to give it some shade. Embraced by the two cathedrals, the raised platform blocks the view of the cars passing in front of it and we are left to contemplate the sea alone, in an effective operation of abstraction. The immense Atlantic Ocean lies before us, nothing more and nothing less. This is a plane that clearly belongs to the tectonic world.

The building in Lanzarote is situated at the center of the hills that surround the Janubio salt flats that open to the sea. Right in the center, at the highest point, stands a large, square, flat horizontal plane, measuring 90x90 meters. This plane is black, just like the lava found throughout the island, and capable of underlining the fascinating landscape, endowing it with spatial value. An entrance is dug out in the plane as a “trench” and courtyards that serve as an extension to the interior within. The shade produced by these excavated spaces gives the operation still greater force. This plane clearly belongs to the stereotomic world.

And the same is true of Tarifa House in Cadiz, also in a raised location, in fact on a coastal dune facing the ocean, which rises up as a square flat horizontal plane, measuring 20x20 meters, and made of travertine stone.

Here once again we are looking out to sea, highlighting and accentuating the seascape before us.

In each of these three cases, the geometry adopted, open to all four directions, further clarifies the proposed spatial emphasis. This is especially true when they are open to the west, to the sunset and the Atlantic Ocean: our line and the horizon of the sea in parallel.

And as I mentioned before, the climate in these places is perfect for these arrangements. The *azoteas*, or roof terraces, have traditionally been common living spaces in these island and coastal areas. A few well-known Le Corbusier photos come to mind.

I still remember when, as a child in Cadiz, we used to run across the *azoteas* at home while the women chatted calmly in that privileged, open-sky living room from which we saw the sea and the sunsets. Time there was always suspended.

A radical, flat horizontal plane of this sort will, without any intermediate element, exaggerate the spatial qualities of these places I've described with their far-off horizons. The distant landscape in front of us, in this case the sea, seems to be coming towards us since it is accentuated by the line of our flat horizontal plane; or it seems that we, as if riding on Aladdin's magic carpet, are moving towards it. It provides the perfect setting for activities such as sunbathing or relaxing next to the pool, or seeking out the *trenches* to shelter from the wind.

And in order to understand how it is perfectly possible to carry out the activities described above on a flat, radical and bare horizontal plane, it helps to imagine it like the deck of a ship. Standing on a flat horizontal plane is like standing on deck under the open sky, or on a raft, as Mies van der Rohe claimed when speaking of his Farnsworth House.

Unlike previous projects, in which the horizontal plane appeared with an element built on top of it to house practical functions, I believe its further

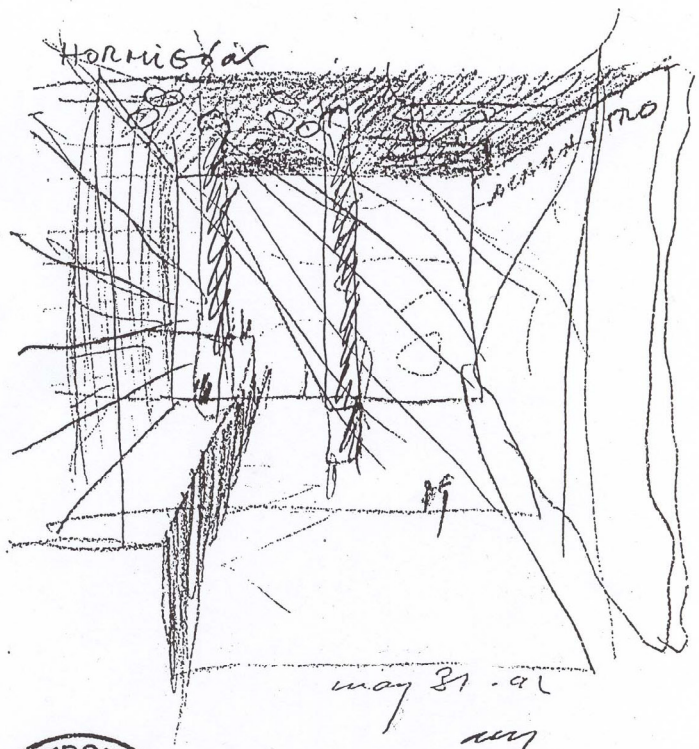
development ensuring that it becomes the main plane truly constitutes a contribution to Architecture: the construction of the radical flat horizontal plane.

In each of the cases mentioned, the raw materials used in their construction – the super-white marble in Cadiz, the black concrete in Lanzarote, and the sand or travertine in Tarifa – contributed effectively to the spatial dominance of the horizontal plane.

CONCLUSION

In short, we must defend the flat horizontal plane as the limit between the stereotomic and the tectonic worlds. Well-defined in proportions, dimensions, and materials, it remains one of the most basic mechanisms of Architecture since time immemorial.

According to Utzon, the operation that the Indians sought by raising their platforms to overlook the jungle in the Stone Age so that “they could commune with their gods” continues to the present day: the search for happiness, in our case, through Architecture.



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my



EPPUR SI MUOVE

On the movement of light, because light is never still

Galileo claimed that the earth moves around the sun, and history summarizes this in *eppur si muove*. And, with or without Galileo, we all see the movement of light in our lives.

Guided by Galileo, I have decided to entitle this reflection on the movement of light, *eppur si muove*. For our topic here is the movement of light and when we architects work with light, we are dealing with a material in constant and predictable movement, like the sun from which it emanates, crossing the spaces that we create, if we provide the appropriate devices.

Time and again I have drawn the comparison between light in its relationship with architecture and air in its relationship with music. But I have never written that, while the air passing through a musical instrument is docile and music is air tempered by the performer of that music via the musical instrument, the light that crosses the architectural space is not so docile; it is in continuous, constant and unstoppable but foreseeable movement. As a result, the fixed images that we have of that architecture are false, or better still, incomplete. Only a film or a video, now within the reach of all, has the ability to adequately translate that movement. In a sense this is what I am trying to explain here.

Light is material, as material as stone, whether we opt for Newton and his corpuscular theory or Huygens and his wave theory. I have said many times that light is the most luxurious, the most wonderful material with which we architects work and as it is given to us for free we do not value it sufficiently. Here, however, I would like to reflect on that other special quality of light and its inescapable movement in and about architecture.

An architect from Granada, Elisa Valero, wrote a book about light that she aptly entitled *The Intangible Material*. And in my unpublished prologue, I

wrote that even the title of this book was a stroke of genius. Writing about light, the most luxurious material that we architects work with, is not easy but necessary. Writing about light and declaring from the outset that it is matter, that it is material, is more than thought-provoking. And to qualify it as intangible is most appropriate because we are not the ones who touch light: it is light that touches us and our architecture, allowing the miracle to happen.

A SIMPLE EXPERIMENT

In some of my projects I have tried to make this movement of light visible. When I designed and built the Pavilion for Pibamarmi at the Verona fair in 2009, I called it: *Catching light in motion*.

The exterior was a black 6x6x6m cube on which were placed reproductions of classic sculptures, in the manner of a Roman Antiquarium. The inside of the cube, all in white, was done in Pibamarmi Carrara marble. And on one of the inner corners, a trihedron, we made equidistant circular perforations to allow the light pass through. To simulate the natural light of the moving sun, we invented a contraption, like a little choo-choo train carrying the source of artificial light. Obviously, its speed was slow, but greater than that of natural light. In this way, as can be seen in a video, the movement of the splashes of light on the Carrara marble walls was visible, they moved. The effect was amazing; the movement of the light became visible and credible.

A MAGICAL SPACE

And also in 2009, in a joint project with Paulo Duraó for Milan Airport, which we called Porta Milano, we proposed an exercise of light in motion. The large box that would lodge the lobby of the Malpensa Airport had a double skin of translucent glass, with many equidistant circular holes, the geometry of which was identical in both skins. Thus, when the rays of sunlight passed through and coincided, the sun would enter as if through a sieve, and immediately stop, and after the briefest pause pass through

again and so on, making visible this natural movement of light emanating from the sun.

The central focus, once again, was to catch, to make visible, the movement of sunlight. The projected space was wonderful, as some would say: a magical space.

LIGHT IN AN ISOTROPE SPACE

In geometry, isotropy is the property of invariance in a differentiable variety. It occurs when certain measurable vector magnitudes give identical results, regardless of the chosen direction of measurement.

I applied this isotropic quality with conviction to a cubic space project, constituting one of the many solutions for the MIA, a project for a museum in New York. And on my desk is yet another project, already under construction, for a small mausoleum in Venice, which we have named *heaven on earth*.

In this small piece of Venice, measuring 3x3x3m, at each corner of each of the six faces of the concrete cube, in a simple isotropic operation, I opened a small square gap of 0.60m, without touching any of those small squares, including the floor. In this way sunlight will successively penetrate into the interior. With this tomb project I made slight variations to control the quantity and quality of the incoming light with greater precision. I will include a mirror on the square floor.

Making the movement of light visible is the central focus in both of these projects, museum and tomb. In both, the intended isotropic space is nuanced by gravity. I'd like to imagine myself – vain whim! – as a bird flying within those isotropic spaces, or better still, as an astronaut who, having overcome the law of gravity, moves with equal ability in all three directions.

THE ROSY-FINGERED DAWN

The window of my little apartment in Madrid is large and illegal. And it has stunning views of all the roofs and rooftops and stainless steel chimneys that reach the tallest buildings in the Plaza de España. As the window faces west, every day it receives the direct rays of the evening sun, providing welcome heat in winter, but rather less welcome in summer! In the mornings, however, all the chimneys adorning this landscape of Madrid rooftops, almost all made of shiny stainless steel, are stained by the pinkish light of the rising sun at dawn. And because of the movement of light, this marvel only lasts a short time. My head and my heart are touched by the *rosy-fingered dawn* that Homer speaks of in his *Odyssey*. I can assure you that it is a spectacle of enormous beauty. And that is why I mention it here, because it makes the movement of light visible, it accounts for the passage of time and confirms my reiterated affirmation that light builds time. From dawn to sunset.

REFINING LIGHT IN GRANADA

I had already worked with light in movement in Caja Granada. Can you work with light and at the same time ignore that it is a material in constant movement? One cannot and should not.

The Caja Granada building in Granada is the consequence of giving due consideration to that movement of sunlight. Initially, the project proposed a grid of skylights, the same concrete structure in a 3x3m grid with 3m depth and all the recesses open. Then I discovered that, as the NS cube was oriented according to its diagonal, light would only enter through the southern quadrant and that with its 3x3x3 proportions, light would only enter at noon when the sun was very vertical. Two suitable corrections were then introduced to move the grid to 6x6x3 in the 64 existing boxes, and only open 12, in groups of 3 linked to each of the 4 large columns, and in the right direction.

The day that the skylights were revealed and the sun came streaming in is simply unforgettable.

A ROUND OF APPLAUSE FOR THE SUN IN CADIZ

It is difficult to explain what happens every day in Cádiz, because it scarcely seems credible.

Last summer, at dusk, after a walk through Cádiz with my sisters, I was told in hushed whispers that we were going to see something very special. And they took me to San Sebastian Castle, which is linked to the city by a narrow isthmus where the lighthouse stands.

The landscape before us was just as it used to be when we were children and living in Campo de las Balas. There, in the tower where the old lighthouse was located, it is said that the Oracle announced to Caesar Augustus that he would be emperor. And when he became emperor, he issued a decree whereby all those born in Cádiz became Roman citizens.

One of the most beautiful design projects I have ever made is for the castle of San Sebastian, which I wanted to make the flagship of the City of Cádiz. I still have the secret hope of one day bringing it to fruition.

There, at the castle, we encountered quite a number of people sitting on the wide parapets of the edges, waiting. They were waiting for the sun, the red evening sun, to descend into the sea and disappear over the horizon. When this happened, everyone burst into applause; we all did. Quite amazing! Here was light in motion, disappearing.

DAMNED APOLLODORUS OF DAMASCUS!

And what can we say about the light in the Pantheon? Although I have written extensively about it, here I will limit myself to merely proclaiming my admiration for the wisdom of its architect, Apollodorus of Damascus. Both the 43m diameter of the air sphere contained within and the 9m diameter of the lofty oculus are designed with implacable precision. The amount of light entering through the oculus is perfectly controlled, and the movement, the dance of the golden disc on the curved or flat surfaces inside, is extraordinary. The movement of light here attains untold heights.

Mind you, there are those who say that after all, the Pantheon, with its all its precision, is nothing more than a sundial.

FEDERICO'S SPHERE

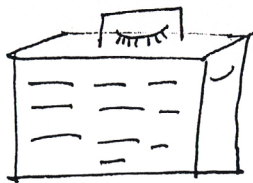
There is a well-known photograph of Federico García Lorca in New York in 1930, sitting on a marble podium, under a large black onyx sphere in the center of the campus of Columbia University. This was a curious sundial that marked the hour by means of the shadow thrown from the sphere onto the podium on which the hours were marked with bronze numbers. And an inscription also in bronze lettering that read: HORAM EXPECTA VENIET, await the hour, it will come.

With the passage of time the sphere broke and was taken away. The podium is still there today with the inscription that, without the sphere, leaves those reading it somewhat perplexed. And this is where I am in the habit of having my photograph taken with friends when we go to Columbia. And it is that very light in movement, with the precision of sunlight, that gives rise to the building of sundials. No wonder I repeat again and again that in architecture, light builds time.

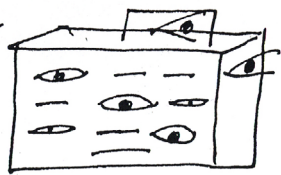
FINALE

Some time ago, I invented the existence of tables of light, mathematical tables to accurately calculate the quantity and quality of light, like tables for calculating structures. What was an invention then has become reality today. Now there are computer programs designed to quantitatively and qualitatively control light in movement with absolute precision.

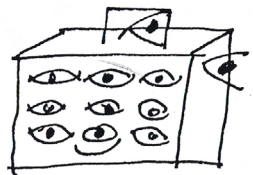
Light! The primary material of architecture, always in constant movement.



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3

PROJECT DESIGN IS RESEARCH

There are countless reasons that demonstrate why an architectural project is a work of research.

Architectural practice, which we architects call project design, from the initial idea to the basic project, followed by the construction or working project and from there to site management, is, or should be, a real work of research. And by the same token, its transmission, the teaching of project design, is also, and must be, a real work of research.

The purpose of this text is to demonstrate how design in architecture equates to research. Because, while this may be difficult for those who are not architects to understand, project design is research. Any architectural project is, or should be, a real work of research.

WHAT IS PROJECT DESIGN?

To design a project is to think, to reflect and to decide, to respond, to conceive; to thoroughly analyze all the existing data and then diagnose a problem in order to finally solve it. Project design in architecture is something more serious and more scientific than most people believe.

An architectural project is the development of an idea that is the result of a long process. An idea that is capable of being built and, as with every research process, one that always has a purpose and a concrete result.

An architectural project is not simply drawing sketches of the first thing that occurs to the architect. It is never a mere whim, the product of an ingenious mind.

To design is to give a unified response to a multitude of questions. To design is to give a simple answer to a complex question. It is to adopt a decision from diverse possibilities. To design is to generate an idea that when materialized, when formalized, is capable of solving all the questions raised.

In order to design one needs to know the problem well, to recognize it, and to know how it has been resolved throughout history, so as not to reinvent the wheel. It involves knowing the place well, being cognizant of the conditions and the requirements, the existing conditions and the wishes of the person commissioning the assignment, being familiar with the new technologies that make it possible to find new solutions.

Designing requires research. How could it be anything else? Searching, testing, exploring, finding. In short, studying the problems thoroughly to come up with the best solution. With all the time and dedication needed to reach the best possible result, at the slow, deliberate pace characteristic of all research projects.

And to carry out this project research, a microscope is not a necessary tool. However, there are those who think that to be a researcher you have to be looking through a microscope, just like Pasteur. These people, indeed much of present-day society, might accept the idea that architects are researchers, if they were to see us working on our project designs under a microscope. For to these wise men of Zion, as a Spanish painter once replied when asked what he was painting: "if it ends up with a beard it will be Saint Anthony, and if not, it will be the Immaculate Conception!" How wise proverbs can be sometimes! And how ignorant this contemporary society of ours!

PROJECT DESIGN, WHAT IS IT NOT?

Design projects are anything but the mere formalization of clever ideas, or the result of chance.

In the well-known fable by the Spanish writer Tomás de Iriarte, an ass plays the flute quite by chance.

Passing my abode, some fields adjoining me, a big ass on his road came accidentally.

And laid upon the spot, a flute he chanced to see, some shepherd had forgot there accidentally. The animal in front to scan it nigh came he, and snuffing loud as wont, blew accidentally. The air it chanced around, the pipe went passing free and thus the flute a sound gave accidentally. "O then," exclaimed the ass, "I know to play it fine; and who for bad shall class this music asinine?" Without the rules of art, even asses, we agree, may once succeed in part, thus accidentally.

I think this fable summarizes extremely well much of what I want to say here. For indeed, what turns the ass into a flautist is not the fact of playing music or designing. Many an architect is capable of playing the flute that makes a sound by chance. In the same way that composing or performing music is something wonderful but complex, designing and building architecture is perhaps still more complex and wonderful.

You have to listen carefully to your clients to know what they want. If their wishes are reasonable, as they usually are, you have to try to translate them into the best possible design. And if what they want goes against nature, you have to convince them that this doesn't make sense. Because the client is not always right, or at least when it comes to architecture! Take, for example, the patient who, after receiving his doctor's diagnosis, questions its merits or failings and puts forward his/her own ideas, "because, you know, doctor, I know myself better than anyone." Personally, I try to do everything that my doctor tells me. And, you know, I'm doing very well.

Some think that project design is a democratic act. And they are wrong. An architect should listen carefully, very carefully, to what the patient has to say, but after that it's the architect's job to diagnose. It's not the client's job to design.

Nor is design what some architects do, putting down on paper the very first thing that occurs to them. Because they think they know what they know, they put down the first solution that comes to mind. And that's how it turns out. This is not project design, much less research.

Other architects think that to design well you have to follow the latest trends. And after soaking up all the most fashionable magazines, they try to do something similar. And that's how things turn out the way they do. All of them would do well to read E.H. Gombrich's beautiful book, *The Preference for the Primitive*; it might clarify many of their ideas.

WHAT DOES RESEARCH INVOLVE?

To carry out research is synonymous with analyzing, investigating or examining. Research is carried out because something is unknown and a solution needs to be found. The concept of research is widely applicable, especially to the scientific and historical fields.

It would seem however that research is something reserved for the bearded '*eminences grises*' standing behind their microscopes, probing into matters that our society considers scientific. As if architecture did not quite make it into that elevated sphere!

Maria Moliner's dictionary provides us with a long list of synonyms in Spanish for the verb 'to research', which translate as: to analyze, to investigate, to examine, to seek, to inquire, to trace, to search, to browse, to interfere, to scrutinize, to rummage, to dig out, to probe, to sound out, to explore, to stir up, to study. And the synonyms for the word 'research' as a noun are: analysis, inquiry, examination, search, exploration, inquisition, inquest, study.

Poets do their research when they painstakingly search for the precise word to translate the idea they want to express in a poem and then, for the sake of the metrics, they place a word with the greatest precision in the exact right place. And they are well aware that a word that says little

or nothing in one line is capable in another line, in another position, of producing the sound of a thousand Handelian trumpets and stirring our hearts. They spend as much time researching, seeking out and finding the word, as in placing it in the precise place.

Musicians do their research when, knowing the ethereal nature of music, they forage between the lines of sheet music to devise a way of placing the notes to achieve the intended result. Their research involves both seeking and finding the notes, and putting them in the right place.

Painters do their research when, knowing what they want to paint, they trace a drawing on the canvas that is later covered over with the painting, resulting in a successful outcome astonishing their very authors and capable of transcending them.

Creators, all creators, do their research when they work tirelessly on their creations every day, every single day, with the conviction that their creation will one day transcend them, as indicated so well by my friend Stefan Zweig.

But neither the poet nor the musician nor the painter, nor almost any other creators have to fight against the laws of gravity as architects do. Neither the works of poets, musicians or painters can fall down. Nor, like architects, do they create for reasons of necessity.

Architects carry out research when, after analyzing the conditions and the requirements of a new project, they gradually unveil an idea capable of responding to all of these. Their research into seeking out and finding the idea is just as painstaking as the development and the construction of that idea. It involves investigating and exploring the place, the *locus*, in its physical and its historical aspects. It examines and analyses the function to be developed and the construction itself, as well as the aspects related to aesthetics and beauty.

And in this vast and complex research that is architectural practice, architects must attend to many different questions: what they want to

achieve in relation to the function; how they want to do it in relation to the construction; when they want to do it in relation to the technology of their time; for whom it is being done in relation to the finances and the idiosyncrasy of the client; where it is going to be done in terms of the place, the *locus*; and why it is being done, that is open to many and very diverse answers. It would seem that we have closely followed the seven questions of the Quintilian Hexameter: *quis, quid, ubi, quibus auxiliis, cur, quomodo, quando*. (*quis* = who; *quid* = what; *ubi* = where; *quibus auxiliis* = by what means; *cur* = why; *quomodo* = how; *quando* = when.).

Quintilian's questions are similar to the famous Ws often quoted in journalism: What? How? When? Who? Where? Why? The six Ws, also known as the five Ws and one H, is a concept used in writing and news stories, but also constitutes a basic formula in information gathering, problem solving and scientific research.

Perhaps the simple achievement of *Utilitas, Firmitas* and *Venustas* proposed by Vitruvius, may constitute a more appropriate response to these questions, not forgetting that Gravity builds Space and Light builds Time.

The Idea as a result of the first stage of research

An architect should carefully study the symptoms of the project, as if it were a medical analysis, in order to be aware of all the circumstances involved and produce the most accurate diagnosis, or the project idea. We have already explained this sufficiently.

The idea is like a distillation that needs time, like a good wine. Time for research. As the classics would say, if the idea is clear and distinct, everything will go smoothly.

RESEARCHING THE *LOCUS*

When studying the site on which to build, whether in a natural or historic city setting, the architect carries out a great deal of research on the *locus*. The *locus* includes everything from topography to landscape, from climate to history.

On my desk is the project of a house perched high on a rocky ridge facing the Atlantic Ocean. I can assure you that, in addition to the obligatory on-site visits to this beautiful spot, we have not only drawn but already produced several topography models at different scales, in order to better understand the site; in-vestigating, looking for vestiges of the layout that the site indicates to us.

Analyzing the surrounding landscape, to know where and how the house will be facing, focusing it, underlining it and framing it.

Studying the climate of the place to decide on the type of architecture that best responds to the prevailing conditions.

Knowing the history of that place. Knowing what others have done before us to avoid replicating what others have done.

All of this is a research exercise to inform ourselves thoroughly and become fully acquainted with the site in order to produce a diagnosis based on the greatest wisdom that we are able to summon up. It has never been easy for non-architects to understand the huge importance of the placement of architecture on a site. It truly is so important.

RESEARCH ON THE FUNCTION, UTILITAS

Following an in-depth analysis of the program and when a first idea begins to emerge, the architect arranges the layout so that the requested functions are well organized and articulated. This arrangement of the functions and circulation flows is not at all as obvious as it might seem.

After all, this process of measuring, arranging, organizing and connecting of each of the requested functions is also research.

RESEARCH ON THE STRUCTURE AND THE CONSTRUCTION, FIRMITAS

When working on a structure, the skeleton of the building, we must always understand that the structure establishes the order of space; it builds the space.

The architectural translation of the space involves the absolute control of the structure through its precise calculation to guarantee the stability of the work, to guarantee the security of its resistance. For this the architect uses calculation tables which are put to good use. And knowing that there is not just one possible structure for each work, the architect pursues a real work of research here.

Norman Foster, when designing the Hearst Tower at Columbus Circle in New York, did his research and decided to build a facade structure of overwhelming logic. Piano and Rogers carried out their research when they constructed the Pompidou Center in Paris, where the structure is the main protagonist.

Here I'd like to allude to a personal example. In the context of the project for the Pavilion Sports Center for the Francisco de Vitoria University we studied a variety of structural alternatives, researching, seeking to find the simplest solution: the most logical and the most economical. After numerous work sessions with Andres Rubio, the architect with whom I calculate the structures of my works, and with Ignacio Aguirre, my main collaborator on that project, we finally came up with the solution of the simple trusses that were later built and placed there.

And when we work with materials we are also involved in research; investigating materials: stone, concrete, wood, steel and glass, but also graphene or EFTE and structural silicone.

RESEARCH ON BEAUTY, VENUSTAS

But, oh, Venustas! Oh Beauty, how to reach her?

I know it is not easy to understand how one can actually carry out research into something that seems so ethereal - but is not - as beauty. All the creators in the world have employed research in the pursuit of seeking and finding beauty.

We pointed out earlier how everything in architecture is form, that inescapable form. And it is that form that shapes the load-bearing suspension in the air and establishes the order of space that one way or another leads us towards beauty.

Mies Van der Rohe did his research into form when he introduced the solution of acute angles in his Friedrichstrasse building, on account of the visible perspective transparency and for similar reasons in his beautiful unbuilt Glass Tower.

In this context it is appropriate to speak of how in my Cala house, which we call *Raumplan house*, because of its spatial conformation, the reason for this arrangement of spaces, is a pure exercise of project research. The simple concatenation of double-height spaces in a simple ascending helical movement produces spatial effects that are enormously effective. To achieve this we did substantial research work involving countless drawings, plans and models.

RESEARCH ON LIGHT AND TIME

If there is one central material in architecture it is light: light that builds time. When people speak of me as the architect of light, I have always answered that neither I nor anyone else can take ownership of that prerogative. Light is a theme of architecture itself. As a friend of mine said: *architectura sine luce nulla architectura est*.

In an attempt to explain how that control of light, far from being something intuitive, is a question that requires great precision, I invented the existence of light tables, tables for calculating light just like the structural calculation tables that we all use. Because working with light is a true work of research, perhaps the most specific research work in architecture.

Light that builds physical time, but also builds that other time, the *distentio animis*, which leads us to the capacity of light to make time stand still, to suspend it in an architectural space.

TEACHING AS A RESEARCH PROJECT

And so we finally come to the transmission of project design, to the teaching of architectural design in Schools of Architecture, which is also, and should be, a work of research. Those of us who teach know that we learn more than we teach.

Teaching project design in Architecture, on account of its primary purpose, also becomes a real work of research.

A professor in charge of project design who carries out research on a daily basis in his own work, in his architectural practice, can only operate in the same spirit when he teaches. Teaching is not a mere transmission of the results of the designing activity, but is in itself an activity of research.

Many of the questions raised by educators in their daily lives as teachers in a school are resolved in their studios when they are designing. And *vice versa*: some of the questions that architects pose in their studios are resolved in their everyday teaching work.

That is why I always advise my best students to stay on in teaching when they graduate. Being a teacher provides a privileged position for producing the best possible architecture, for developing the role of researcher. Designing and teaching, teaching and designing become inseparable

actions that mutually benefit one another. They are two sides of the same coin in the context of project research.

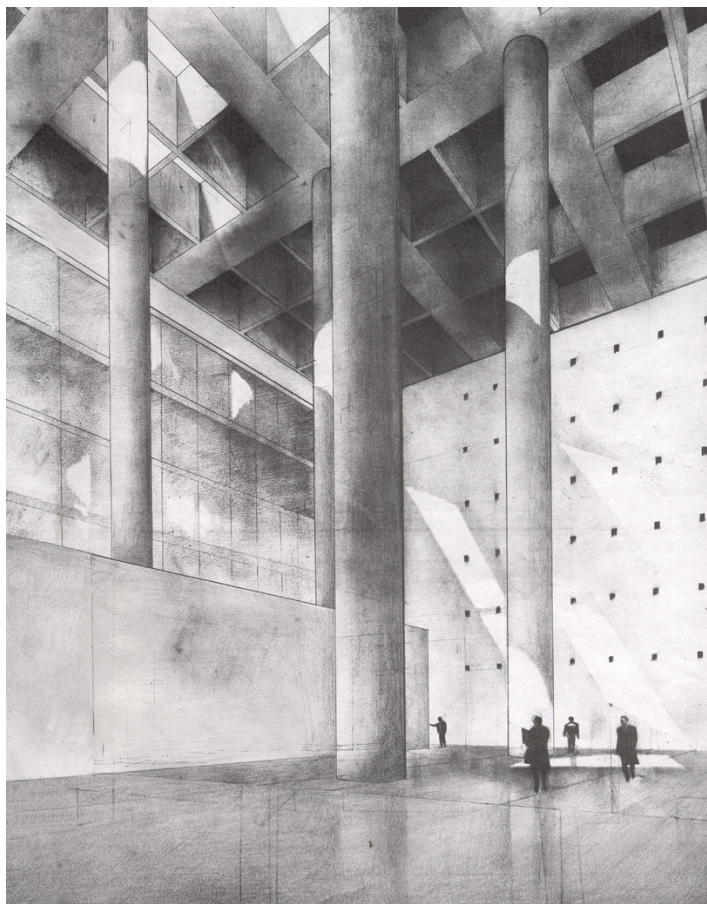
It is acknowledged that good architects – the best – if they take up teaching, cannot fail to be involved in research in their projects and their teaching. I have always stoutly defended that desirable balance for an architect between teaching and constructing.

Back in 1986, when called upon to submit a Research Project for my candidature for the Chair of Design at the School of Architecture in Madrid, I presented a real project, that of the Orihuela Library, which was under construction at the time. And in that thick document, I already put forward quite an outspoken defense of the architectural project as a project of research.

CONCLUSION

I have endeavored to demonstrate through the countless reasons outlined here, that project design in architecture, what we call architectural practice, and its transmission through teaching, constitute a real work of research requiring an investigative spirit so well described in the words of St. Augustine: “Let us seek as those seek who have not yet found, and find as those find who are yet to seek.”

And so it is, truly, that an architectural project is a labor of research.



THE AIR IS CALM AND CLOTHED IN BEAUTY AND UNACCUSTOMED LIGHT

About precision in the use of light in architecture

In this essay we try to establish a connection between the musical instrument and architectural space. The musical instrument, pierced by air, produces the gift of music. Architectural space, pierced by light, produces that unspeakable thing called architecture. In both cases, air and light should be measured with absolute precision.

“The air is calm and clothed in beauty and unaccustomed light, Salinas, when that consummate music sounds, guided by your wise hands” (*El aire se serena y viste de hermosura y luz no usada, Salinas, cuando suena la música estremada, por vuestra sabia mano gobernada*). So begins the Ode III to Francisco Salinas, where Fray Luis de León speaks about light and music in such beautiful words.

And the truth is that architectural space is similar to a musical instrument. Both in wind and string instruments the secret is in the AIR. Air passes through the wind instrument and vibrates inside the string instrument. Air breathed into a flute as well as air vibrating over the tensed strings of a cello generates something as sublime as music. Without air there would be no music.

And in a similar manner, light, natural light, sunlight, by crossing a well-tensed space as conceived by the architect, through carefully arranged fenestration, generates that incomparable emotion that only architecture can arouse. Without light, architecture would not be possible.

In the same way that a musical instrument must be well conceived, well built and well-tuned for music to sound correctly, so too should architectural space be well conceived, well developed and well built for architecture to resonate.

IDEA, CONCEPTION.

The musical instrument and architectural space should be correctly conceived. It is necessary to have a clear idea of what one wants to achieve. And then to know how to do it, to control with precision the shapes, dimensions and proportions that will bring about the desired result.

If one wants to listen to violin music, one should build the instrument with the shape, size and proportion of a violin. A violin is not the same as a viola.

Today I was listening to a radio broadcast about a Museum exhibiting musical instruments. And it seemed strange, unnatural even, that musical instruments, whose *raison d'être* is music, were exhibited like corpses, dead bodies. Musical instruments are meant to resonate, to make music, when air passes through them and the miracle takes place.

If an architect wants to create a space tensed by light (can there be a space with no light?), he must conceive it with the precise form and proportions so that the building wakes up every morning, and, according to the rhythm of light and time, lives throughout the day, throughout time. The idea of a new project must contain from its conception that inescapable relationship with light. I will never tire of insisting that a clear idea of a project is the essential foundation for architecture to appear. And light should be at the centre of that idea.

This is the first phase, when the outlines of the architectural project are decided. It is the time of knowing what and how the architecture will be built.

DEVELOPMENT. FINE-TUNING.

If even the most perfectly built musical instrument needs tuning, the same thing is true for architecture. And this architectural fine-tuning is not only the very thorough attention some architects dedicate to detailing. Fine-tuning in this case refers to the precision in the relationship between space and light.

María Zambrano defined poetry as “the word in harmony with the number”. And along similar lines, Osip Mandelstam suggested that “in poetry all is measurement”. This precision, which is a *sine qua non* for poetry, plays the same role in music and architecture.

Precision is essential in all artistic creation. Art, artistic creation, is commonly confused with whimsy, fanciful, or capricious form. On the contrary, artistic creation demands an enormous precision and refinement, which in turn require wisdom and time from the creative artist.

If a musical instrument is to produce that consummate music described by Fray Luis de León, it must be finely tuned. In string instruments, the strings must be tensed with absolute precision so that they can vibrate in the desired range. And in wind instruments, the diameters of the tubes and the holes must be exactly defined.

If architecture is to resonate like divine music when touched by light, it must be perfectly tuned. It needs the placement, shape and dimension of the openings relating to the exterior, to the light, to be perfectly defined by the architect. Doors, windows and skylights should be understood as openings in an architectural space, connecting it to the light, the views and the air. Everything must be precisely defined in this second stage, the final project design. This stage is not a simple mechanical development of the preliminary design. It corresponds to a real fine-tuning of the instrument.

CONSTRUCTION.

Once the musical instrument is built and tuned, it must be very well played, so that the resulting music sounds very good. An accomplished musician with a good, finely tuned instrument will be able to create the precise notes, to make the air vibrate in a way that that will touch our deepest emotions.

In architecture, following on from the idea, which is a mental construction, and its subsequent detailed development into what architects call the project design, the interpretation of the piece is precisely its material

construction, its implementation. The construction is a true interpretation of the initial ideas and not merely the mechanical application of the construction drawings. Through close and attentive supervision of the construction works the architect continues to fine tune the architectural structure even further.

I have often quoted Saramago as saying that we that architects have little brains in our finger-tips, which is another way of saying that we think with our hands. And I recently read that a great composer from Seville in the 17th century, Francisco Guerrero, used to praise Pedraza, the wonderful organ player from the Cathedral, by stating: “in each of his fingers I see an angel”. And so it is. The architect is someone who builds ideas and thinks with his hands.

In the case of music, it is easy to distinguish between building, tuning and playing an instrument.

In the case of architecture, the physical, material construction is what we consider to be the interpretation of the initial idea.

And then light, like the air in music, will pierce the space created by the architect so that it sounds well. And, as if by a miracle, when light arrives, it produces that power of touching time, something that appears elusive but is nevertheless within our reach, and deeply moves us. Time suspended, say the poets. That light is the builder of time is hardly an appropriate sentence for an educational text. This spatial miracle is a tangible reality within our reach.

In my Caja Granada building, where I clearly and emphatically create a dialogue between the large central space and the light of the sun. I have never seen two performances alike – each day and each hour it sounds differently, and always well. And it always manages to deeply move us, including me.

The directors of my Nursery for Benetton in Venice have published a little book I found very exciting, since it was full of images showing that they had clearly understood my intentions for that building. In one of the images, a little girl is touching the imprint of the sunlight on the wall, while exclaiming "*Il sole! Ho toccato il sole!*"

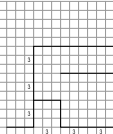
And now, on my table, I mean on my computer, still vibrating, the breathtaking design that a young Portuguese architect, Paulo H. Durão, and I are developing for Gallarate Airport in Milan, where we are planning a box filled with radiant light, as if it were a cloud pierced by sunlight. I hope to show you the built work.

FINALE

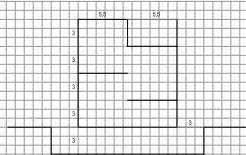
Ultimately, when proposing this comparison between musical instruments and architectural spaces, I want to insist once more that the works of architecture that really matter are not born from fashionable fads or whims or from facile formalism to impress the ignorant. On the contrary, architecture demands clarity in the ideas it generates, precision in its development and adequacy in its construction. And always an understanding of light as its main component.

We are all familiar with how Paul Valéry, in his *Eupalinos*, classifies works of architecture as mute buildings, buildings that speak and buildings that even sing. Well, to make them *sing*, we must conceive them well, tune them well, and build them well. And thus architecture will sing the finest music and will be able to bring light and happiness to mankind.

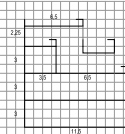
Music is air. And Architecture is also air tempered by light. Without air there is no music. Without light that makes the air vibrate there is no architecture.



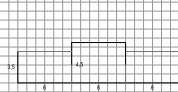
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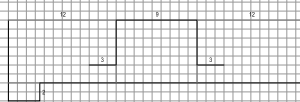
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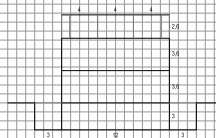
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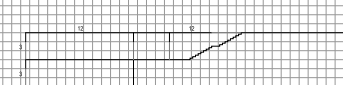
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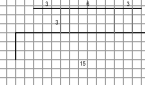
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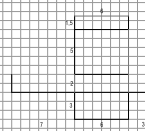
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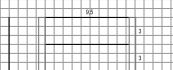
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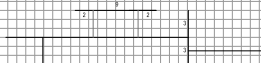
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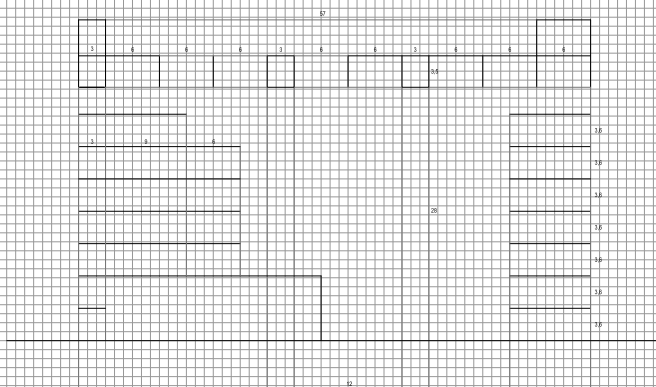
NGUNER



ZAMORA



MALLORCA



CALA GRANADA

GRID PAPER

Isosceles square vs scalene square

As an architect, I have always used grid paper, and I have always used it a lot. So much so that now, at my age, I have decided to write a text about this squared paper that has helped me so much in designing. I think it can help students of architecture to manage their projects. Some people see me as an architect who does everything in straight lines, orthogonally. Square-headed, some say. I blame it on the squared paper.

I was somewhat taken aback to see how graph paper is defined by Google in Spanish as “a tessellation of the plane with congruent squares” – what a thing to say! And if you read on, you would be even more astonished.

Some time ago I wrote a text titled The Brain is Square. At the time a prestigious scientific journal had published a report with images of how the connections of the human brain were straight and orthogonal, like a printed circuit board.

A tool used by some architects is called a square. Because of the square, the squared brain and the squared head. The Spanish Royal Academy defines a square as “a template of wood, plastic or other material, in the shape of an isosceles right triangle, which is used in delineation”. And the set square is defined as “a template of wood, plastic or other material, in the form of a scalene right triangle, used in drawing”. The isosceles square and the scalene set square. And while they are fundamental tools for any architect – of yesteryear? – it makes no reference whatsoever to architecture.

Of course, if you ask a high school student or a student of architecture today what an isosceles right triangle or a scalene right triangle is, they will look at you with infinite astonishment. Square? Set square? Isosceles? Scalene?

THE GRID AS AN INVENTION

I have searched for, but cannot find, a date when grid paper first appeared in history. Logically, it must have been with the printing press. I can imagine the architect Juan de Herrera making his own squared paper to draw the outlines of El Escorial. Imagine what he would have given to have been able to have our grid paper?

It seems that the inventor of grid paper was a certain Dr. Buxton in England in 1795. And one of the first to adopt commercial graph paper was Thomas Jefferson, who as well as being president of the United States was an architect, who drew up the plans for the Capitol of Virginia on specially engraved “graph paper”, originally intended for silk weavers, ordered from Paris. Cartesian, of course.

MY GRIDS

Yesterday I was drawing the floor plan of my latest project on grid paper: a small house in La Rioja, which is an 8 x 8m square divided into four 4 x 4m squares. And next to it, on the same squared paper, I drew the floor plan of the only work of mine currently under construction, a house on the outskirts of Madrid, Rotonda house. The floor plan is square, 12 x 12m, divided into nine 4 x 4m squares. How original, some might say! Indeed, in many of my projects I still have the square brain I mentioned in the first lines of this text.

And the Square of the Cathedral of Almería, Palmería, a project dating back to 1978 and later built in 2000, was simply an interpretation of the structural layout of the buttresses of the Cathedral wall that presides over the square following the 7.5 x 7.5m grid of those buttresses, where I placed the 24 palm trees, all identical and all taller than the Cathedral. The result was not only square, but also logical, almost obvious, and very beautiful.

And the Inca building, Mallorca, 1990, was no more than the application of a 6 x 6m square grid to a plot of land in the shape of an isosceles right-angled triangle. Where there was a building, there were pillars. Where

there were no pillars, orange trees. Very simple. The result is spectacular. Logical, simple and very beautiful. With the beauty that derives from order.

And, for the record, another of my latest projects – not yet started – is also gridded. A large concrete box tucked among the rocks by the sea, on the beach of El Tecuán, in Jalisco, Mexico, is arranged on a 7 x 7 m grid. I am working on it in collaboration with a wonderful young Mexican architect, René Pérez Gómez. The concrete walls and the thick square pillars and beams are also made of concrete. The interior is reminiscent of a Roman thermal bath. All square, all well-ordered. Very impressive and very beautiful.

FROM SQUARE TO ISOTROPIC CUBE

In physics, isotropy is the characteristic of some bodies whose physical properties do not depend on the direction in which they are examined.

The term isotropic can be applied to a three-dimensional space which has the same value when measured in different directions. In the case of a cube, in all three directions. If there were no gravity, a person inside a cubic space would float like an astronaut.

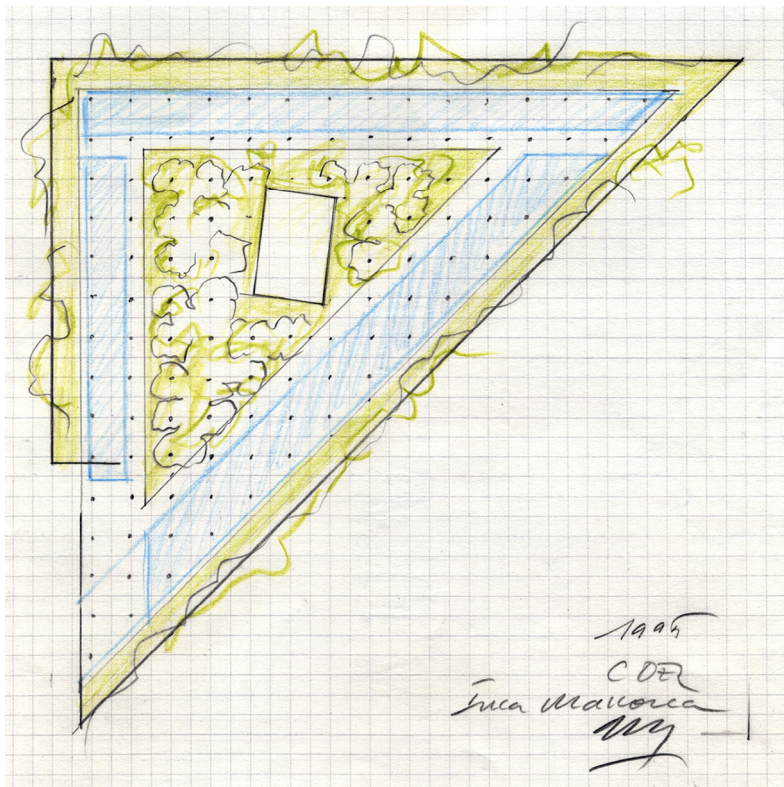
Never fear, I am not thinking of doing or proposing anything strange. But I am again considering that sunlight, in relation to the six faces of a cube, moves in such a way that it touches all of them alternately. Except, that is, for the one that lies on the ground. So if we cut out suitable holes in the faces of this cubic space, we will always be able to let the sunlight in. It will be a space that testifies to the movement of the sunlight, which is constantly on the move.

I have experimented with this isotropic cube mechanism in some of my works. Recently in a tomb in Venice, and on a project for a New York museum, in the Robert Olnick Pavilion of the Magazzino, with the young architect Miguel Quismondo. And in the initial sketches for both projects I

have used grid paper. Of course, for Turégano House, which was my first cubic rather than isotropic project, I also used grid paper.

FINALE

In short, the right angle has been, is and will continue to be a very efficient architectural tool producing marvelous results. By applying it, we can continue to pursue Beauty, which is what we are aiming to achieve, in order to make people happier. Underlying all this is the inescapable law of gravity that makes things continue to fall at right angles to the flat ground on which we humans stand and live, and where we try to be happy.



THE BRAIN IS SQUARE

There are still some set squares to be found in my studio. These are used not so much for drawing, which is done in Autocad, but for the many scale models that we do ourselves. When I was a child my mother used to bake the most magnificent home-made pies. And so it is in my studio today, that I make the pies, the scale-models, and, better still, so does my team. Our models are always home-made.

We use set squares to control the right angle, which is a basic ingredient of architecture: the angle at which the vertical of gravity and the horizontal of the earth plane always meet. It is not by chance that the right angle has been the most used geometrical mechanism in the history of architecture. In cross-section on account of gravity, and in the ground plan because of order.

But before I proceed to say anything further on the right angle, I feel I should at this stage confess that the reason I have decided to address this subject is not solely in honour of Heinrich Tessenow, whose Gold Medal I have received. Let me explain. I have read in the press that a team of American scientists based at Massachusetts General Hospital have discovered that the brain is made up of parallel and perpendicular neuronal fibers that cross paths at right angles. In other words, that the brain is square.

These latest findings from researchers using the most advanced MRI technology suggest that the physical connections of the human brain, rather than being a tangle of wires as previously believed, are arranged in an astonishingly simple criss-cross pattern. It would appear therefore that the wiring of the brain is geometrically arranged in a grid structure rather like the checkerboard streets of Manhattan, or the classic layout of a circuit board. It is also true to say that naturally enough the ancient tenet that the

shortest distance between two points is the straight line, still remains true, and was not something discovered by our American scientists.

I have always been accused of obstinately insisting on and using right angles, both horizontal and vertical, while other architects are leaning, twisting, bending, curving and folding, so you can imagine how this amazing *new* discovery was like music to my ears. With architects everywhere rolling out acute and obtuse angles, having read the news I quietly smiled to myself in my own straight-lined, rectangular, square corner. And, you know, a corner is usually just that, a straight-lined rectangular trihedron. Nevertheless, many of today's self-styled theorists prescribe angles of varying types, in fact anything but right angles, as indispensable elements allegedly lending originality and modernity to the architecture of today.

You will perhaps comprehend therefore my sheer delight on learning that the brain, which is the seat, the cradle of reason, is equipped with such an orderly, grid structure of connections, arranged orthogonally like Ikea's Expedit shelving units, if I dare make such a comparison.

I still remember how, having commenced my studies at Madrid's School of Architecture, as an undergraduate under Alejandro de la Sota, an architect who followed in the footsteps of Tessenow and Mies, the draft designs I presented of my first project the following year were totally orthogonal. They were so imbued with German orthogonality that my new tutors were not impressed: "you have to be more expressive, less bland", they told me. With remarkable docility I toiled diligently for the entire weekend and the following Monday I presented them with a new project full of curves and turns and expressive gestures, heavily stamped with influences of Gaudi and Wright. Delightful drawings that were warmly and publicly extolled by my teachers. Indeed so warm and enthusiastic was their praise that, whether out of loyalty to Sota and Tessenow, or simply following my own willful and contradictory nature, I decided on the spot to revert to my lost orthogonal designs and my set squares. As a result my work failed to receive the highest qualification from those formerly enthusiastic examiners. But, let me tell you something: that incident taught me a lot. I elected to swim

against the tide for my own beliefs, as I have always done in every aspect of my life. And I continue to do so to this day, despite what others may think.

While attending the Aachen Congress on Mies van der Rohe that I spoke of earlier, apart from visiting Rudolf Schwarz's uncompromising stark church and Charlemagne's rich Palatine chapel, Eduardo Souto de Moura and I devoted much time to speaking about architecture. And Souto, as he sipped away at his Riesling, told me with a smile that I was one of the few who had remained faithful to the straight line and the right angle. And I nodded happily in agreement on hearing such a comment from an architect of his stature.

In my latest project, a house by the sea in Zahara, in the south of Spain, which we have just begun to build, the right angles are so straight and upright and the box is such a straightforward box that in the end it will be a large box built in Roman travertine integrated into the sand of the beach, the roof of which, a radical flat horizontal plane, is the main protagonist of the space. Like a *Temenos* where the gods will mingle with mortals. Like something Tessenow himself would have designed. More Tessenow than Mies.

Because on that exquisitely beautiful beach gravity is the same gravity that it always has been, that of Newton's apples, which still fall vertically, straight down, always perpendicular to the ground. And there too in that little spot of paradise, the horizon is still horizontal. So horizontal and straight is the horizon defined by the Atlantic Ocean right in front of us.

That very same horizontal plane that Tessenow or Mies would build if they were to raise their heads not only in recognition of the work of the team of leading American scientists in discovering the physiological orthogonal arrangement of the brain, but also to corroborate something that is for them and for me so elementary as orthogonality in architecture. Because the shortest distance between two points is still the straight line. And because apples still fall vertically, orthogonally to the horizontal plane of the ground.



Aún aprendo. Fco de Goya

THE NEED FOR BEAUTY

I must admit that when I decided to define Beauty as necessary, I thought to myself that many other authors would have already spoken about this before me. And so, naively, I logged onto Google: nobody, not one, not a single one! Nobody speaks of the necessity of Beauty.

How could we live without Beauty? Beauty is as necessary for human beings as the air we breathe. Without Beauty, this life would not be worth living.

But is Beauty within everyone's reach? Yes, indeed it is. In a thousand ways, of course, but it is. From our childhood onwards, at home and at school. Even the elderly, even as we approach the age of one hundred, we can join Goya in saying: "I am still learning".

This Manifesto is intended to underscore the importance of cultivating the Fine Arts in education, and their relationship with nurturing intelligence. Because Beauty is indissolubly linked to reason, to truth. The splendor of truth, was how Plato defined Beauty. And, for the moment, neither reason nor Truth nor Beauty are the exclusive preserve of the rich. They belong to everyone. Adam, who had nothing, was so taken by Eve's sublime Beauty that when she offered him the apple, he ate it without hesitation. Not for the apple, but for Eve, for her Beauty.

Is it so difficult to convince children and adolescents of the need for Beauty? I don't think so. And I think the best way is by putting compelling examples to them.

POETRY, MEMORY

Arouse the sleeping soul/ revive the brain and wake up/ contemplating how life passes/ how death approaches, so quietly/how quickly pleasure leaves/ it gives us pain/ how it seems to us/ any past time was better/ It astonishes me to think how I can still, recite with such accuracy this beautiful couplet by Jorge Manrique, that I learnt when I was so very young.

Doubtless you can recall, as I do, being so impressed when we heard words that sounded so good because of what they told us was poetry. Can you remember the first poem you wrote as a child after listening in awe to Manrique's couplet? And the happy faces of the teacher and the other pupils when you recited it aloud in class? And the faces of your parents and your siblings when you recited it later that evening at home?

MUSIC

Can you remember the family gathering where everyone applauded when you played that well-known melody on the flute?

I can still recall a piano recital by José Cubiles in Cádiz. In the summer, during the Spanish Festivals, the concerts were held in the Faculty of Medicine, which was next to my house. I still remember Falla's *Night in the Gardens of Spain*, played by Cubiles. I didn't have much time to improvise my Cubiles concert with puppets over the next few days. I built the piano from my father's old black X-rays. The concert was a resounding success with critics and spectators.

As children, following the good example of our parents, my siblings and I would turn on the 'His Master's Voice' gramophone and we would play classical music to our heart's delight. Our dear aunt would always say: "There they are, the little lords and ladies, playing the music of the dead".

I WANT TO BE ONE OF THEM

In front of me, on my computer-screen, is the orchestra of the Hofkapelle Munchen with the Tölzer Knabenchor children's choir, directed by Christian Fliegner, in a very beautiful version of Bach's St. Matthew Passion.

And, thanks to the computer, I can see the faces of all those German children who make up this wonderful choir. When children sing, their faces are a real poem. You can see, you can tell that they are completely immersed in the music, that they are enjoying themselves as only children can. How I would like to be one of them, how I would like to be one of those children singing Bach with such precision and enthusiasm!

And when it comes to writing about the Fine Arts in teaching and nurturing intelligence, my answer would be, that those who read these lines, together with their children, should watch and enjoy this incredible video capable of convincing any child to become involved, and want to be one of them.

And the fact is that Music transmits Beauty. And even more so when it's courtesy of Bach.

DRAWING PAINTING

I still remember the thrill I felt when I showed my mother the first drawing I made myself after seeing Picasso's drawings. On returning from our visit to that exhibition, at such a young age, we thought that we could do it too. And we drew and took our drawings to our mother, who else? And she showered us with kisses. And we never stopped drawing for the rest of our lives.

I still remember that school tour to the Prado Museum. And how as we stood before Velázquez's *Las Lanzas*, our teacher asked us to count the straight, parallel, upright and tilted lances. I put up my hand and said: 25 upright and 4 tilted ones! Exactly, said the teacher. And a few days later, in class, he showed us some slides which, apart from the Velázquez painting, included one of the Battle of San Romano by Paolo Ucello from the Louvre Museum, and he asked us again how many upright spears and how many

tilted ones. I quickly raised my hand again and said: 25 tilted and 4 upright! Exactly, said the teacher again. And he explained to us how Velázquez was doubtless familiar with Ucello's painting, painted 200 years earlier, trying, unlike Velázquez, to transfer the heat of battle to his painting. Because Velázquez, according to my teacher, was trying – and succeeded – in conveying quite the opposite, the peace and serenity of the surrender of Breda. I was never to forget it for the rest of my life. Ever since I have been a devotee of Velázquez. And it was then that I began to paint.

I have written many times that drawing is thinking with your hands. Not only for an architect, which is self-evident, but for everyone. In the Royal Academy of Fine Arts of San Fernando, there is only one Velázquez: a drawing of Cardinal Borja, one of the few drawings by Velázquez that have been preserved. It is a true marvel. Because Velázquez, before being an exceptional painter, was an exceptional draftsman.

And not long ago I donated all my drawings – all of them – to the library at my School of Architecture in Madrid, and the archives of all those scanned drawings, more than 12,000, to the School and to the Royal Academy of Fine Arts of San Fernando. And I am the first to be surprised by the result.

PHILOSOPHY

Surely you remember when, as children, you discovered philosophy and Socrates and said to yourselves “I only know that I know nothing”? Maybe it was when you heard that Beauty was the splendor of Truth, a concept suggested by Plato. And you thought, of course it is! It almost seems as if children are not capable of understanding philosophy, but, oh yes, they are!

RELENTLESSLY

When I wrote my acceptance speech as an Academician at the Royal Academy of Fine Arts of San Fernando, I looked for a central theme: Beauty, of course! And to convince those present, I looked for a forceful

term capable of awakening in them that desire for Beauty. And I gave it the title of *Relentlessly Seeking Beauty*.

Because I believe that this is what all we human beings do, with varying degrees of awareness. And I came up with a host of arguments that I believe convinced those present – as they already were – that our life has meaning within that search for happiness that is the relentless pursuit of Beauty. Children too.

EDUCATION, LIGHTING THE FIRE

Montaigne said: “Education is not the filling of a pail, but the lighting of a fire”. And he was right. A teacher has to know how to ignite the soul and thoughts of his pupils with knowledge. He must know how to transmit to them the sacred fire of culture. And to keep that fire burning, the search for Beauty, the fine arts are indispensable, they are the best kindling for that fire.

Julián Marías pointed out that the three qualities a teacher must have are: knowing, knowing how to teach and wanting to teach. Very clear, very Ortega-like. I remember my best teachers, both as a child and at university, as extraordinarily learned people, who not only talked about their own specific subjects, but also about all aspects of culture. And that is what I tried to do when it was my turn to be a teacher.

And likewise, the three qualities of a pupil should be: knowing that you don't know, knowing how to learn and wanting to learn. So I would tell my young pupils to be aware that they don't know anything, but that it can be easily resolved. That they should learn to learn, which means paying full attention to what they are doing. And that they should want to learn, which means devoting all the time they need. And if drawing and music and poetry and philosophy and dance and gymnastics are also included, so much the better.

Intelligence is cultivated, just like plants are. And the fine arts are fertile soil for the best growth. I remember a short story by Gloria Fuertes about a little boy who, in order to grow, had to read. He only grew when he read books. If this child not only read books but also enjoyed Music and Drawing and Poetry and Philosophy and Dance and Gymnastics, he would have grown up remarkably well. There is a story about a boy who didn't grow because he didn't read. One day, his aunt gave him a present of a story about witches, with lots of drawings. The boy sat down to read and began to grow. After all, children are very, very clever.

LIGHT AND BEAUTY. THE ROSY-FINGERED DAWN

How could an architect speak of Beauty without speaking of light? How could a child not understand that light, the continuously moving light of the sun, is an ingredient of Beauty?

The window of my room in Madrid is illegal and large. And with great views of all the roofs and rooftops and stainless steel chimneys that reach all the way to the tallest buildings in the Plaza de España. As it faces west, every day at sunset it receives direct sunlight that provides very welcome warmth during the winter, and rather less welcome heat in the summer. But in the mornings, at a certain time, the chimneys that adorn this landscape of Madrid rooftops, almost all of which are made of shiny stainless steel, are tinged with the pinkish light of the rising sun in Madrid. And because of the movement of the sunlight, this marvel only lasts for a short time. And my mind and my heart are touched by the appearance of the *rosy-fingered dawn* which Homer evokes so well, and so often, in his *Odyssey*. I can assure you that the spectacle is truly beautiful. And that is why I mention it here, because the movement of light makes Beauty visible, it accounts for the passage of time, and it confirms my oft repeated assertion that light constructs time. And Beauty. From dawn to dusk.

CONCLUSION. I AM STILL LEARNING

As I finish writing this text in defense of including the fine arts in education, with their rightful value, I feel that, once again, I am still learning. Something that Goya sums up so well in that small engraving that appeared in his last exhibition at the Prado Museum. "I am still learning" are the words he wrote on the engraving of the old man, with his white hair and white beard, leaning on two walking sticks. So, with these memory-filled personal musings, I have returned, at my age, to learning, and learning a lot.

Of course, Goya himself, who was highly intelligent, also recorded and wrote "The dream of reason produces monsters" and then added: 'Fantasy, abandoned by reason, produces impossible monsters; united with it, she is the mother of the arts and the origin of marvels'. This is something that children understand perfectly well.

If I were a father and had a child of that age, the first thing I would do would be to have him or her ask me to enroll them, wherever I could, in Music, Drawing and Poetry and Philosophy. My child would be happy and I would be even happier, if such a thing were possible. And both of us, together, would be freer.

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