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**LEARNING  
FROM NATURE :  
ARCHITECTURE  
AND DESIGN  
IN THE FIRST  
BIODIGITAL AGE**

Alberto T. Estévez

\*preserved author's typography

## LEARNING FROM NATURE:

### Architecture and design in the first biodigital age

(At the website, [www.albertostevez.com](http://www.albertostevez.com), you can follow the **state of affairs**, including projects, research and writings displayed in the different sections of the page).

#### Learning from nature

It is obvious that saying "learning from nature" symbolically refers to "learning from all things" (title of the Spanish edition Robert Venturi agreed on for "Learning from Las Vegas"). Although the preposition used provides nuances, learning "from" nature also means learning "with" and learning "in" nature, even "knowing nature" itself, without any preposition. Each expression has its significant nuances, which should not be discriminatory, but enriching when considering them as an interactive interrelated whole. Along the same lines of what was once published about genetic architecture, about the fact that nowadays it is no longer about building "in" nature, but building "with" nature, and even building nature itself, equally without any preposition.

The title also refers to the fact that more than half a century ago, after reclaiming the values of popular culture (which the aforementioned book took part in), we are now – having assumed the previous one- in another phase, another age, with other urgent planetary needs, and other technological knowledge and possibilities. This is the reason why the (Viennese) secessionist slogan written in gold letters: "to every age its art" continues to be up-to-date, even though there are always those that are absent-minded and, due to their (still?) limited cultural level, believe they are part of the avant-garde. They use clichés or *revivals* –in reality- of other times, which will always exist and which we appreciate, something that cannot be denied.

It is indeed true that trends, tastes and tendencies come and go with time. Some are more ephemeral than others, but surely sooner or later they will give way to others. Paradoxically enough, they appear condemning those established, even if only because human beings constantly need to be attracted to something. Likewise, humans need to feel they are the attractors, in order to feel more alive. When something new interests a human being, he/ she uses it, consumes it and keeps on searching, while, at the same time, when humans have something new to show others, it satisfies them to see they are the subject of attraction to others in their own search. It constitutes a marvellous subliminal human business, which turns us into the most extraordinary community in pursuit of personal and collective happiness. Despite all our misery –which we recognise, as eventually we connect in a more and more subtle way- being a human person in this world is the most valuable in this universe.

This is the reason why the words that circulate on the Internet attributed to Nelson Mandela –although he apparently did not say them- in a speech of the President of South Africa pronounced in 1994, citing the book *A Return to Love* (1992) by Marianne Williamson are still up-to-date:

"Our deepest fear is not that we are inadequate.

Our deepest fear is that we are powerful beyond measure.

It is our light, not our darkness that most frightens us.

We ask ourselves, who am I to be brilliant, gorgeous, talented, fabulous?

Actually, who are you not to be?

You are a child of the universe ['a child of God', it is written in the original book].

Your playing small does not serve the world.

There is nothing enlightened about shrinking so that other people won't feel insecure around you. [‘We are all meant to shine, as children do’]. We were born to make manifest the glory of the universe [‘of God’, appears in the book] that is within us. It's not just in some of us; it's in everyone. And as we let our own light shine, we unconsciously give other people permission to do the same. As we are liberated from our own fear, our presence automatically liberates others.”

With the healthy pride these words reveal to us, getting to know ourselves, recognising what we really are is the first step of this “learning from nature”, as we are nature. Undoubtedly, we have the duty requested in the aforementioned sentences, as well as the commitment, to move the sensitive hearts of people by means of our work, dedication and intelligence. It is a task that also resounds in this other sentence by Le Corbusier: “Gaudí was a great artist; only those who move the sensitive hearts of gentle people remain.” And, as Le Corbusier also said- “Architecture is the starting point of those who want to lead humanity towards a better future”, and now, more than ever before, architects are needed...

Obviously, here in Barcelona, we have an advantage over others, because –as Antoni Gaudí said- “the inhabitants of the countries touched by the Mediterranean feel beauty with more intensity”. Let it be said -smilingly- that there are few places better than this one to study architecture.

### Nature, an eternal mirror

Returning to the subject of trends, tastes and tendencies that come and go, as soon as their respective definitions have been pronounced their obsolescence begins. The moment one of them raises its voice declaring the others obsolete, it is signing its own death sentence. On the other hand, it has been confirmed that nature is an eternal mirror for human aesthetics, as well as for its aspirations. Year after year, generation after generation, nature never becomes obsolete and it never tires. It has always been, is and will be, as perennial as an open book, unique and indivisible. Nature is an inexhaustible source of inspiration, imitation and /or learning. Biodigital architecture and genetics, defined as directly involved in its incarnation “with” and “in” nature, is thus assured “durability”. It could even be said that it is a guarantee of “classicism”, and adapts to the times. Even more so when new techniques open up new fields that are still unexplored. We are living a great epic and heroic age. It is an age of opportunities where the brave and daring will launch themselves onto the unexplored and become the pioneers of the biodigital and genetics age.



**Present:** biodigital architecture.  
Alberto T. Estévez - Genetic Architectr. Office,  
*Automatic rental car building*, Barcelona, 2012.

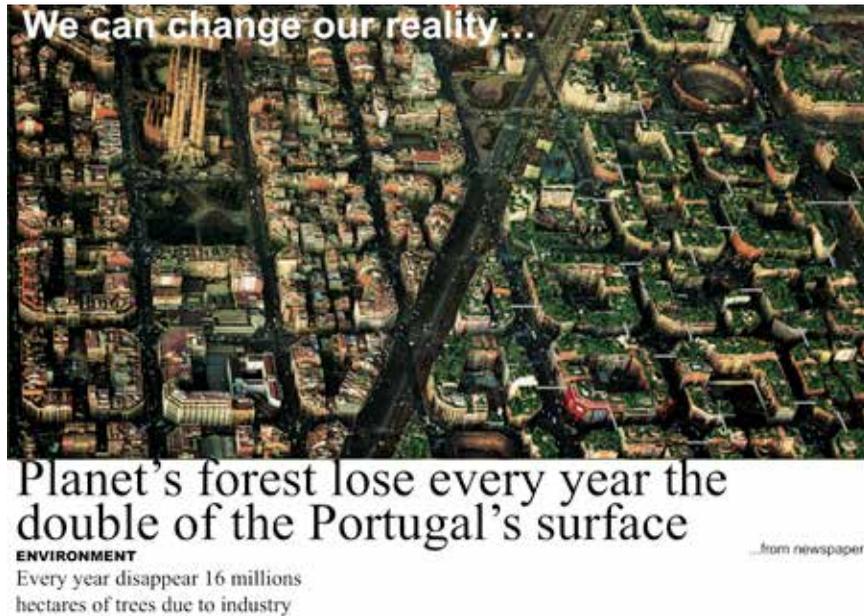
**Future:** genetic architecture.  
Alberto T. Estévez, *Built island*,  
Garraf, 2009-2010.

Thus, the closer the processes of architectural creation are to nature, the less obsolete and more “eternal” the result will be. It is necessary to listen to the language of nature and reply to it coherently if, in the end, nature and the entire universe are written in mathematical language, as Galileo Galilei suspected. We are talking about languages that are always valid and reduce the arbitrariness of our decisions when harmonising them. Science itself, “philosophy said, is written in this great book (I call the universe), which is permanently open to our eyes, but cannot be understood if we do not first learn how to understand the language and the characters it is written in. And it is written in mathematical language”. This provides us with control, efficiency and a harmonious accuracy that enables us to exclude arbitrariness as much as possible.

In spite of the discouraging news –not without reason- that time and time again has us on tenterhooks, this present time is the best, as –like never before, although this is not the way it seems- respect towards all creatures and towards our surroundings has increased. The need to understand that we are “protectors” of nature and guardians of the environment has grown, so as to avoid that the signs of destruction and death accompany us on our path in this world of ours. Every time a whole species is destroyed, something totally irreparable, a specific and unique molecular chain that expresses itself in a way we call life, is destroyed. On the contrary, the entire universe appears to us as a gift and -indeed- in it we discover a genuine grammar from which we do not only learn criteria for its use but also for its destiny, especially now that the development of genetics is opening up an incredible new cosmos of possibilities never seen within the known cosmos.

In this context, and in the words of the one who does not mind being copied, we cannot only understand ourselves as isolated beings, but it is not enough either to understand ourselves as a group, as a human group. This will still not be sufficient in order to be able to read the book of life completely. Human life is connected to the environment in which it develops and to the other beings present in this environment. Thinking human life is possible independently of the environment and other human beings could end up being an “idolisation” of the human being. The integrity of nature thus turns into an enormous challenge, and its consistent development to ensure our subsistence becomes an even greater one, if possible.

Precisely because we possess consciousness and intelligence, we have to live our lives with an unavoidable responsibility towards the entire universe. It is a responsibility that does not only consist in defending the earth, water and air as gifts that belong to us all, but also in protecting human beings against self-destruction. The whole planet is crying. We can feel it, hear it almost, and it is waiting for us to protect it: in the same way the human being is waiting. The solution is to be found at its origin, in nature and its teaching.



### **Biolearning applied to architecture and design**

Everything can indeed be solved by learning (in depth) from nature. At all its levels, from the most “internal” and intra-molecular one, accessible today thanks to genetics, to the most “external” and superficial one, which has also been imitated by human beings from the moment they came into existence. It is not a coincidence, for instance, that human beings are attracted to the sight of **fire**, **earth** (rocks under the action of water and wind, geological crystals under the action of physical and chemical processes), **water** (the sea, waves) and the **air** (clouds, smoke). It furthermore coincides with the four roots of Empedocles, the four primitive elements, which confirm how their changing forms permanently remain configured by actions or laws that affect the whole as well as every part alike. Architecture and design, which also follow similar laws, equally evoke a similar attraction: something invisible to the human eye that “from the inside floods” each cell, its entire appearance and even its most remote corners (continuity). It resounds in all its parts, configures the whole (*Concinnitas*) and inevitably controls its constant evolution (emerging system).

Along the same lines as a primitive imitation of nature, the term biomimetics has undoubtedly received favourable criticism in recent times. It appears everywhere as a positive value in a wide range of fields. However, it does not seem entirely appropriate or accurate in its application, as it has acquired a sense that is too broad and diverse. In reality no biomimetics, a mimesis of life, can copy or imitate nature without further ado. Said term is being used when in fact it is merely a formalist inspiration –sometimes far away- from nature. It is an inspiration, not an imitation. The same word is also used when what we are talking about in reality is a previous observation of a living being, which leads to synthesising a characteristic that can be of interest for its application in different fields, eventually followed by its proper

application, which is not imitative either. There is thus no such thing as a mimesis, but rather a learning process, learning from nature, mother and master, as we would put it metaphorically. What is produced should thus more appropriately be called *biolearning*, which is different to *biomimetics* (mimesis, imitation, copy of nature), or what could be described as *bioinspiring*.

Paradoxically enough, in the strict sense, “nature” does not exist. It is only a human abstraction, a simplification used in order to understand one another. Misunderstandings arise when the parameters that define it are not well established. Simultaneously, different people refer to different terms and viewpoints. Hence, when Louis Sullivan said the sentence “*form follows function*”, he did not know that the rational functionalists of the 20<sup>th</sup> century would distort it until turning it into a false dogma. Marvelled, he was referring to how the visible forms in the so-called nature adapt and respond to the functions the respective living being needs to unfold.

To those with a more advanced understanding of the subject this subject could seem out-of-date. However, the truth is that it continues to appear in the day-to-day criticism and teaching of architecture, as we find ourselves in a kind of loop critic/teacher- student- critic/teacher-student-etc. that never seems to come to an end... So then, “does form follow function”? “Form follows function” but **in an endless amount of different ways**... From a protozoon to a tiger, all have the genetic function or need to (sur)vive, the secondary functions of eating, reproducing, etc., as well as the most specific and sophisticated functions and possibilities of each plant or animal. Nevertheless, one only needs to look at a small meadow in spring to realise that the same function/s may have been solved for millions of years with a thousand different forms, colours, aromas, flavours and textures.



Form follows function? Form follows function, but, in infinite ways!  
Images: Alberto T. Estévez, from “*Still alive*”, *landscapes and others fleshinesses* series, made with electron scanning microscope on natural structures at its most genetic, primitive and original level, Barcelona, 2009-10.

LEFT: Glass' old man.

RIGHT: Invocation's gesture.

Designers and architects need to act in the same way, in the delicate equilibrium in which form and function have to feed one another mutually to be solved and used, recognising the architectural “biodiversity” as a value, in the same way it is recognised in nature. However, when starting their task, they need to understand they have to define the “species” and the “breed” they will configure until getting to the final specimen to be created. What they are designing needs to have the characteristics

of a coherent and harmonious system from all its viewpoints. In this incipient task, the question “Am I making a gazelle, an elephant or a tiger?” needs to be of use to them.

### **Breeds of buildings (“between quotation marks and in brackets”)**

“A good idea is much better than skill”, said one, while “a bad idea will never result in a good completion”, exclaimed another, as, “no good project can result from a bad idea”, concluded a third one... And so on and so forth, all on the lips of wise, reputable, admired people... Those words must have some credit at a later stage.

The first question then arises: **which idea of a building or an object do you have?** Do you want to build a lemon tree? Do you prefer a silverfish? A giraffe? This serves to explain, by way of a Herculean task, when –as said yet another person– “architecture cannot be taught, it can only be learned”; or a variation of the same, “architecture is vision, impossible to teach, difficult to learn”.

In order to get closer to how to apply it to architecture and design, the most tangible part of the “idea” of a living creature would be its respective DNA (to understand one another in layman’s terms): something invisible to the human eye, that “from the inside floods” each cell, its entire appearance and even its most remote corners (continuity). It resounds in all its parts, configures the whole (*Concininitas*) and inevitably controls its constant evolution (emerging system). These are the same conditions of seduction as what we said about fire, earth, water and air: the same conditions of seduction architecture and design must show.

Whatever we call it, the DNA of the building –we could almost say its soul, or the “deepest” part of its being- needs to be clear in the mind of its creator, “breathing life” in the project by means of a system, which will make it grow on its own. It obviously needs to be a strong idea with potential, or else it will only produce a pathetic being that does not rouse any empathy or reactions of pleasant recognition in people.

Such an architectural design will only need to be given an appropriate, balanced “diet”, seen to down to the last detail; the necessary “hours of sleep”, reflection and rest; in a favourable environment to ensure its “survival”, and that is saying something! It is always in pursuit of coherence between the architectural genotype and phenotype, between the internal and conceptual “engine” and its harmonious final and constructive implementation (all this written in a broad sense by way of explanation).

It also needs to be ensured that in its transition, teachers –because of their own limitations, obsessions and frustrations- and the social context, do not torture it and turn it into a “mentally” twisted, odd, mutilated architectural being. In other words, because of ignorance –or carelessness- a good idea (difficult to come up with and/ or identify, and easy to ruin) cannot be belittled. As not everybody is capable (it is rather unusual), no matter how talented one considers oneself to be (which is rather common), lesser intelligence and coarse sensibility can improve by making an effort, but they can never change, although the mediocre youth (because of his youthful conceit and the lack of knowledge of his own grey existence) “boasts” more than the old man (who knows himself 10 times better than the youngster). What does not help

either is the current lack of intensity in acquiring culture, or the exposure to less efficient references that result in getting in contact with subcultures, pseudo-cultures or even “un-cultures”.

Developed from a powerful seed, provided with a long and fertile life, conducted with the right amount of freedom, but with the right dose of discipline is how a project should be carried out, just like in the case of salt: one either uses too much of it or too little. The exact point of balance is very delicate, as it could turn into a “point of no return”: Antoni Gaudí was right when he said that for wanting to be pretentiously too original, one loses the necessary quality of seduction a building needs to show.

### **Towards an objective beauty (*sachliche Schönheit*)**

Along the lines of what was said earlier, why do we like looking at bonfires (fire), cliffs (earth), waves (water), clouds (air)? We never tire of them, as they calm us, attract us and we all agree we perceive beauty, “objective beauty” in them. Furthermore, as they move, our interest becomes addictive. Their shapes do not bore us and because of their complexity, because they change (without us moving), they even surprise us. When each and every part responds to the whole, because of objective laws, physical and chemical determinants, genetic ones in the case of living beings that need to carry out specific functions; when each part is reflected in the whole and the whole is reflected in the parts, an organic, organised continuous, coherent, united connection exists; when each and every one of these words turns into a value for architecture and design, always moved, created by common external physical-chemical forces and/ or internal ones driven by DNA.

When the determinants are almost purely and exclusively genetic, or at least still mostly genetic, when the consequences of a specific diet, habits, climatology, a specific and distinguishing genetic inheritance, or whichever other random external determinant, are still not completely reflected, it is then when the emerging character of life driven by DNA “clearly shows” its own force more: it is then when unanimous, spontaneous and popular qualifying adjectives such as “cute”, “lovely”, “sweet” are on everyone’s lips, something common when ones sees a puppy or a baby.

All this supports the “objective beauty” Antoni Gaudí talked about, when something has certain characteristics that make the definitions of beauty comply and that, in addition, coincide in qualifying it as such. However, in the time of Antoni Gaudí genetics did not exist and he therefore did not know about the consequences of the “natural computer”, which is DNA. And, of course, he did not have any digital computers that could organise a complex and united whole, and at the same time measure it with absolute accuracy and control it. This is why he had to invent his own non-digital computers: catenary ropes hanging freely in space, which, thanks to the strategic position of little sachets filled with lead, could simulate to scale the real loads the building would have to support, ordering its lines “automatically”, “parametrically”; lines the author did not directly and with pinpoint accuracy decide upon, but rather the “computer” supervised by him to configure an objective, harmonious, mathematical beauty.

“Objective beauty” thus turns into “necessary beauty” when it becomes a human need and a duty of architects and designers towards humanity. Willing to create

architecture and design in an equally complex way, that cannot be used up in the blink of an eye, nor be understood in a second, where every point of view is different (as we are the ones that move) and therefore awakens interest and responds to a coherent whole at the same time. It is nature that shows us the way to create and develop it...

Yet another character, when faced with such dazzling beauty, expressed it nicely when he said: “It is like a high, like a madness that comes over us. The joy threatens to annihilate us, the exuberance of beauty to smother us. Whoever has not experienced this will never understand plastic art. Whoever has never been enraptured by the capricious rustling of grass, the wonderful hardness of thistle leaves, the rough youth of buds when they emerge, whoever has never felt captivated and impressed as far as the innermost depths of their soul by the burgeoning line of the roots of a tree, la fearless strength of cracking bark, the slender softness of the trunk of a birch tree, the boundless stillness of extensive foliage, [whoever has never experienced this] does not know anything about the beauty of forms.”

Antoni Gaudí expressed this same passion too when he said, “I seized the purest and most pleasant images of nature. Nature, which is always my master (...) The great book, always open and which we need to make an effort to read, is the book of nature; Other books are taken from this one and include the errors and interpretations of human beings. Everything comes from the great book of nature (...). This tree near my workshop: This is my master!”

### Learning from Tree

Wandering along such paths, the “learning from nature” in the title of this article could be further specified in what is here called “learning from tree”, words Toyo Ito borrowed from Antoni Gaudí when he pronounced them at one of his conferences in Barcelona:

- “1. Trees generate order in the process of growing over time.
2. Trees generate order by repeating simple rules.
3. Trees generate order through relationships with their surrounding environment.
4. Trees are open to the environment.
5. Trees are fractal systems.”

The organic aspects of his work have made him stand out: the continuous organic, formalist and conceptual understanding, as if generated by a coherent system that resounds in all the parts of the whole in a harmonious symphony, filling a building with a specific character, determining it as a species, as special. A certain geometric and morphogenetic complexity, perceived as harmonious, represents the DNA of the building. This is what Toyo Ito has learned from trees, the same thing Antoni Gaudí intuitively knew about trees. It is this learning we share here, learning from the advantages of nature to design architecture using the advantages of digital tools. This obviously leads us to understand one another with regard to digital organicism, which I declared to be the first vanguard movement of the 21<sup>st</sup> century at the beginning of this century.



Fractality conditions: Alberto T. Estévez, *Fractality images*

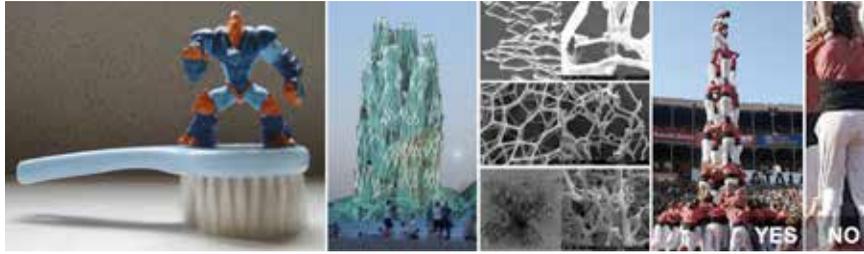
Beyond Toyo Ito’s intuitions with respect to fractal trees, the research I have been carrying out since 2008 using a scanning electron microscope, concerning the first level in which amorphous masses of cells organise themselves in efficient structures in order to resist strain—something relevant in architecture- led to corroborate, for instance in the case of bamboo and sea sponges, the fractal conditions living beings grow with: how bamboo and sponge structures in their turn consist of microscopic bamboo and sponge structures. Said conditions are also convenient for buildings. Fractals can nowadays be performed with the help of 3D printing technology on a millimetre scale, constituting the -so far- solid structures with microscopic structures, in which lightness and saving of material is maximum for the same resistance, in addition to increasing its capacity of thermal insulation.



Fractality conditions: Alberto T. Estévez, *Fractality images*.  
LEFT: *Fractal people, broccoli people*, 2007. RIGHT: *My hand*, 2011-12

In this discussion (**towards the creation of fractal structures**) the so-called “paradox of the brush”, the paradox of “bipeds *versus* centipedes”, the one of the loose hair that does not support anything, but a million hairs together that can support

the weight of a biped with thick legs or columns, are also pertinent. It is the same paradox as the one of the ant that, increased to a big size, would collapse, while thousands of ants together, one on top of the other, could easily constitute this same big size.

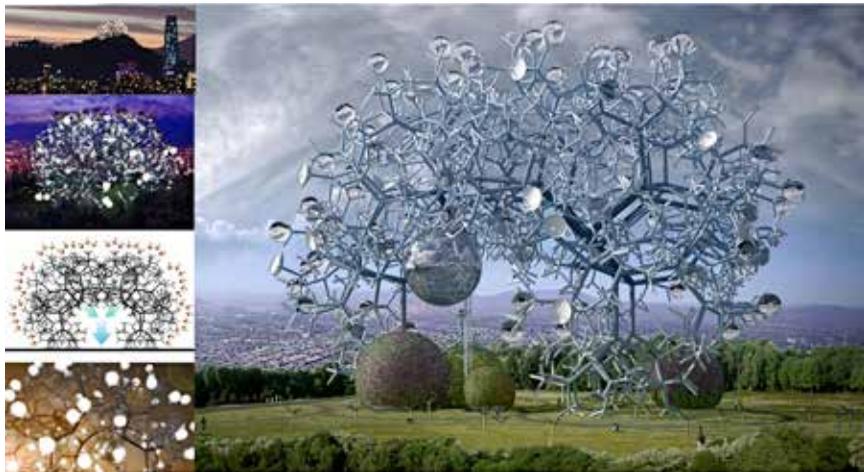


LEFT: The “paradox of the brush”, “bipeds versus centipedes” (creation of fractal structures).

CENTER: Alberto T. Estévez - Aref Maksoud, *Biodigital Skyscraper*, Barcelona seafront, 2008-2009 (right, details of Caribbean’s sea sponge, 100x, 400x and 3000x, made by Alberto T. Estévez with scanning electron microscope; left, renders of 3D scripting file show the results of implications of the genetic and structure rules of the sponge biomicroscopic research in parametric tools: fractal structure for 3D printing).

RIGHT: Typical catalan human tower.

This is something the natural constructive sense of Antoni Gaudí’s homeland knows well. Actually, if a giant existed in reality it would be deformed. The human towers that arise as a secular popular tradition show how a lot of people together, ones on top of others, can reach a “body” of considerable height.



From biolearning to digital tools: application of fractal strategies to architecture.

Alberto T. Estévez - Genetic Architectures Office, *Air purifying and energy self-sufficient fractal telecommunications antenna*, Santiago de Chile, 2013-14.

(8 generations, 3.276 bars, angles of 60°).

Biolearning... How far away we still are from it! The assessment of architecture and its teaching continues to be carried out by conventional critics, town planners and architects that have not yet left the vicious circle of rational-functionalism and contextualism. "Sacred word" this, context... But, eventually, f. ex., are the trees at the streets, parks and landscape around not "context"? Why they have problems if the understanding of my building is closer to a tree than to the boxes around (called buildings)?



LEFT: From Internet random anonymous door.

RIGHT: Alberto T. Estévez - Genetic Architectures Office, *Lichen Digital Door*, Castellón, 2012.

### Arbitrariness, still...

A tribute in favour of the most “persecuted” terms by the major monopolising *establishment* of architecture: emotion, expressivity, beauty, or –let us use the case of its supposed “arbitrariness”, is always appreciated. However, the question of the formalist arbitrariness that may be observed in today’s use of digital technologies is nothing new. We have heard the same old song for years from those who do not know and who disparage, because of hidden envy, like in the fable of the fox that says the inaccessible grapes are not ripe yet.

In this world of rational-functionalist, ignorant and pragmatic dominance, where the lack of culture activates dogmatism to justify oneself, a will that “intends to recognise and evaluate the subjective, “arbitrary” and not quantifiable aspects present in the decisions of design is praiseworthy.” However, those aspects are not that subjective, arbitrary and non- quantifiable. When analysing in depth each decision made, specific “quantifiable” pushing forces always appear. Even the most daring supposed arbitrariness is guided by the emotional intelligence of the subject at work. No matter how secret the decisions made with the heart, the psyche, the soul, or whatever one wants to call them, seem to us, they are not more arbitrary than those of the mind.

Everything would thus remain a mere terminological discussion, because of the rashness of human beings when they communicate –and know themselves- without any rigour. False digital objectivity is as arbitrary as false Cartesian objectivity of the one who chooses a sphere, a tetrahedron or a cube. It is therefore as arbitrary to be carried away by simple geometries, although they limit arbitrariness, as limiting them being carried away by mathematical equations integrated in whichever *software*. In

reality, both ways -digital and Cartesian- make sure we restrict our own apparent arbitrariness.

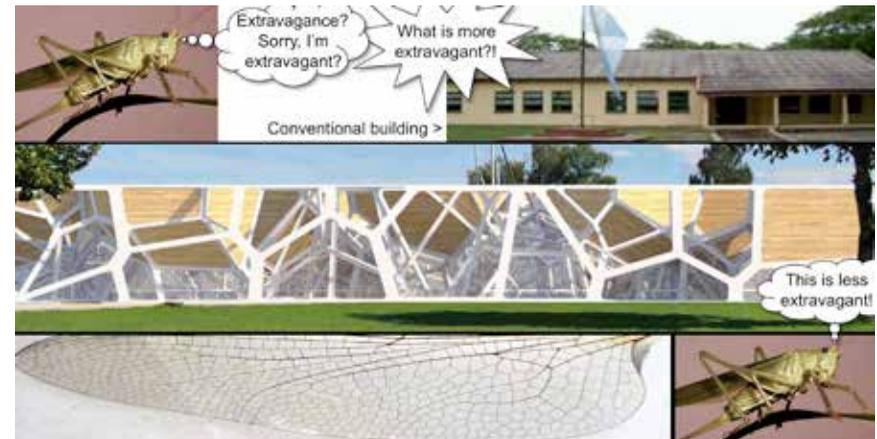
The circle and the sphere, followed by the equilateral triangle, the square, the tetrahedron, the cube, etc., are the most basic figures: they are called “pure”. The “arbitrariness” in their creation is minimum, as a simple measure configures them. One only has to choose a certain measure and repeat it the amount of times one wants to. Making fewer decisions in geometry is impossible, as they are necessary to represent architecture and design in order to later reproduce them at a scale that is convenient to attain usefulness. Obviously, this maximum simplicity, which quickly satisfies the non-physical needs of human beings, disappears as fast as it appears. As it is easy to understand and know, it bores human beings straight away, and they need to maintain their interest awake in order to feel more alive. In the same way one keeps the same note in a music composition pressed for a long time, we are talking about a unique circle or sphere in architecture and design. This is why it is correct to say that the simpler something is, the less “arbitrary” it is, but the shorter the natural human curiosity lasts, the greater the loss of interest in the piece.

With each decision added to the first one, each subsequent added “arbitrariness” chosen, the result gains in difficulty and potential interest, if –obviously – it were solved in an intelligent and coherent manner. Each decision has to involve its application to the whole. And once again it would be necessary to learn from nature: nature provides the **complexity**, we only need to add the **contradiction**, if that is how we want to gain even more depth and interest, until reaching the exact point of seduction mentioned earlier on. And adding a few “drops” of mystery, a “pinch” of the enigmatic and/ or symbolic, a bit of surreality, always being careful not to “overdo it”, which would mean a loss of the necessary “freshness” and grace architecture and design must evoke.



Alberto T. Estévez, *Crucified forest*, urban structure, 2009-2010.  
Genetic research about control of growth, make growing alive cells for being architectural material and inhabitable space.

In order to advance more and better one has to free oneself from the conventionalities of the scene, the ones that appear and label digital organicity as extravagant, challenging Cartesian geometry. Extravagance? Considering the organicity of nature, which is millions of years older and more efficient, what is more extravagant is a pile of square boxes: in order to recover what we lost with respect to the destruction of our planet, we need to go back to the origin, to nature.



Above RIGHT: From Internet random anonymous building.  
CENTER: Alberto T. Estévez - Genetic Architectures Office, *Multifunctional building*, Hard, 2014.

There have always been people, ideas and tendencies that attenuated the Cartesian, functionalist and objective architecture: from the humanisation of architecture, expressionism, surrealism, informalism, organicism, critical regionalism, contextualism, etc., to post-modernism and the architectural trends that followed, as well as all those who directly awoke anti-functionalism without any palliatives: Friedensreich Hundertwasser, Friedrich Kiesler, Hans Hollein... an entire hidden legion. One only has to follow the real thread of the story with finesse, without letting oneself be carried away by platitudes that explain it to us.

### Bio-architecture?

Before ending, as an epilogue to these pages, the following paragraphs need to be added, even if in “small print”: where there is distinction, there is no confusion. If we give the word biology the definition of the science that studies living beings, and if the term *bio-art* identifies the art that includes living beings, then why did people start calling bio-architecture the architecture that simply uses solar panels or that is built with earth, or that draws the well-known blue and red arrows of airflow, or that takes renewable materials into account, etc.?

Let us be rigorous...Inventing bio-architecture is not going to be less demanding, and it will therefore need to be defined as the architecture that includes living beings. As a matter of fact, this is a very broad definition. A simple garden on a rooftop already represents an architectural element that includes living beings for the benefit of the users.

Meanwhile, this is the latest great terminological misunderstanding that is in a sibylline way slipping into architecture, and consequently into the rest of the fields, possibly by innocent contagion, because of the trend to include the term “bio” in any product, as it seems to provide the product with prestige, although it could in fact be a mere business strategy. In that case the word architecture should be accompanied by a derivative of the terms environment, ecology, sustainability, etc., anything except the

prefix “bio”, which should exclusively be reserved for what really integrates real life amongst its architectural elements.

It is obviously not the first time that misunderstandings are introduced in the use of words on the part of architects. Even respected professors and critics use them. There are some examples that are still in use, and it seems it will be impossible to remove them. They have been reported and clarified on pages 112-114 and 193-196 in the book *Al margen: escritos de arquitectura* (Abada, Madrid, 2009). On the one hand, there is the confusion between Spanish-speaking architects of the terms modernist-modern/ modernism-modernity, greatly due to the erroneous translations of Anglo-Saxon publications. On the other hand, the babel between sculpture and architecture, that comes from the prejudices of rational-functionalism. There is also an abuse of the words minimal and minimalist, frivolously applied to architecture. (The word “metaphor” is also used too often in an application that is excessively lax, and not entirely correct either).

Those who aspire to seriousness must put an end to this by demanding that people speak accurately.

### **The end, the beginning**

Yes, finally, summarizing, what is first? What is relevant for the biodigital architecture & design? Biolearning! Which also involves live (nature), organic forms & digital tools (see the *Genetic Architectures II* book), bio & digital techniques (see the *Genetic Architectures III* book), genetics, computation...

And, how to call, how to name architecture with alive (bio)elements?: alive architecture, bioarchitecture, natural architecture. But alive (bio)elements that define and/or are at the architectural concept or idea, and this means at the structure, space, skin; and the same also on the other side of the mirror, on the digital realm. Elements that helps to obtain better conditions, physical conditions, metaphysical conditions, better use and/or comfort conditions, more efficiency (sustainability!), application of natural alive creatures and/or digital alive creatures for a better architectural use, as f. ex. green roofs & façades (live architecture), and/or robotized roofs & façades (responsive architecture), always digitally conceived, designed and manufactured.

Also in a new contemporary understanding of nature, of ecology, of landscape: a not conservationist understanding of nature, of ecology, of landscape (see the *Bioplasticity Manifesto*). Where are no more architectural objects in the landscape, where architecture is landscape, and even up to nature! (Getting for architecture the contemporary fusion, dissolution, melting of background and figure like art before).

In the end, the answers to the questions architecture and design will have to satisfactorily resolve for our planet to survive, would be for “in”, “with” and “from” nature to continuously to appear, until eventually genetic architecture would become one with nature. At first, artisanal techniques, or rather gardeners’ techniques, dating from the time of Babylon, were used. Now we use biological and digital techniques. In the future purely genetic techniques will be used, and a final, perfect and total fluency between nature and architecture will need to be attained.