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SCIENTIFIC RESEARCH

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PLEADING FOR AN IDEA

Prof. Phd. Arch. Emil CREANGĂ*

A contemporary Romanian classic (obviously an architect) stated some time ago, and I am trying to quote him..., *the architectural phenomenon can fully manifest itself* (see the quality of life, of the built environment, etc.) *only under favourably financial and economic development conditions....*

The Chilean architect Alejandro Aravena, the Director of the 15th edition of the Venice Architecture Biennale, winner of the Pritzker Prize in 2016, called up to winning some *battles, some frontiers* which need to be enlarged so that to improve the quality of the built environment and, as a consequence, the quality of people's, *remark that has to be related to* the socio-economic context of the moment.

The effort of some students and young architects in Romania, to promote sustainable architecture in the architecture international competitions, implementing the present-day technologies (see *PRISPA* project and *EfdeN* project) comes out as an experiment that has to be continued, leaving room for interpretation.

Promoting an architecture marked out by the care for environment, the architecture that also provides the expected comfort level has to go beyond the stage of an experiment as far as all that effort has to answer to the requirements of the moment, with also obvious social connotations.

We propose that students at the Faculty of Architecture of *Spiru Haret* University and at the Faculty of Civil Engineering, to design together a volumetric spatial *module* that may be used in an *open design model* of certain SOCIAL DWELLINGS.

This module shall make possible the development of residential units with 1-3 rooms, which may be a part of certain buildings having a height between the ground floor and ground floor and 3 floors, buildings whose volumetry may take different forms depending on the parameters related to the characteristics of the site, on the beneficiary’s requests or on the economic aspects.

The building system elected (by using either wood or metal) shall enable an intelligent modular building, providing a prefabrication that shall allow flexibility of the planimetry

* Prof. PhD. Arch. Emil Creangă, Spiru Haret University, Faculty of Architecture, Bucharest.

(measurement of areas), reducing the time for the operations of structure assembling and possible disassembling in case that, for various reasons, the relocation of the residential units is required (e.g. emergency situations coming from natural phenomena, etc.).

The planimetry flexibility at the level of apartments shall be possible under the conditions where having a ceiling covered with ceiling tiles (to conceal the structural elements and installation), the inner division between the rooms of the apartments will be made by modular-type furniture which can provide various customised compositions of the users' apartments. The exterior enclosures of different spatial - volumetric compositions will be made from materials that will provide the energy efficiency and interior comfort.

The relation between *natural and built environment* shall be brought forward either by properly dimensioned balconies/ loggias, where the presence of vegetation will be adequate, by extensive glass surfaces or by the presence of greenhouses, variants that could be considered depending on the different requests.

The planimetric flexibility will allow the customization of each housing unit and the interior design may vary upon request.

In partnership with entrepreneurs in the industry, we intend to produce a *prototype* that will capture the interest of the potential users under maximum economic efficiency conditions.

We rely on the advantages of the project provided that its use will make possible the transition from *prototype* to the use in the *current production*.

BAMBOO IN ARCHITECTURE AND CONSTRUCTION: PROPERTIES, PROTECTION AND PROCESSING

Lecturer PhD. Arch. Andra JACOB LARIONESCU[*]

Abstract

The paper is structured in five sections. After the introduction, I present the main properties of the bamboo, its physical and mechanical properties. Next, I explain the principal methods used to protect the bamboo elements: protection by design and protection by treatment. In the third section, I illustrate different manners of processing the bamboo canes, such as splitting, flattening, straightening or curving. In the fourth section, I exemplify the concrete utility of bamboo in bamboo products that can be standardized, like bamboo boards and composite materials. Finally, I briefly present the main methods used to connect the bamboo elements.

Key words: *bamboo properties, bamboo treatment, processing the bamboo, bamboo connections*

INTRODUCTION

Bamboo, a primarily vernacular building material, is used in most cases by poor people, mainly in those countries where the material is available. In China, the bamboo is regarded as "the friend of the poor", while in India it is called "the poor man's timber", being one of the basic components of the vernacular, low-cost houses, used in low-tech methods.

1. BAMBOO PROPERTIES

The bamboo is a woody grass that belongs to the sub-family of bambusoideae in the family of poaceae. Worldwide, there are more than 1250 species. These species grow in areas with humid-tropical, subtropical and temperate climate in Asia, Africa, Latin America, Australia, New Zeeland and the Pacific Ocean, with temperatures varying from -28°C to 50°C, at altitudes between the sea level and 4000 m (Himalayas), in the jungle, on the mountain slopes, but also at farms and on plantations. The main producers of bamboo are China, India, Thailand, the Philippines, Indonesia, Costa Rica and Kenya.
Bamboo is the fastest growing plant, some species rise steadily with almost 1m per day till they reach the full height. In India, the sprouts grow faster in the monsoon season. Bamboo does not need to be cultivated. Moreover, it can be harvested every 3-5 years. By contrast, the wood used in construction needs to be at least 10 years old and, for some wood species, even longer. In the case of bamboo, after the mature culms are harvested, no deforestation occurs because of the many shoots left behind, this fact being a gain both for the economy and the microclimatic protection. Bamboo conserves the soil humidity and, thanks to its rhizomes and the foliage, it prevents the soil erosion and retains the rainwater. Compared to a tree, bamboo generates 30% more oxygen. Bamboo is also a consumer of

[*] Lecturer PhD. Arch. Andra Jacob Larionescu: Faculty of Architecture, *Spiru Haret* University, Bucharest.
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nitrogen, phosphorus and heavy metals. Thus, it reduces the pollution caused by the sewerage from factories, livestock farms and sewage farms. It is one of the first plants that grew after the explosion of the atomic bomb in Nagasaki and Hiroshima.

Image 1. Bamboo forest

Bamboo height varies between 30 cm and 30 m and its diameter between 1 cm and 30 cm. The highest is Dendrocalamusgiganteus, reaching up to 42 m in height and 30 cm in diameter.

Image 2: Clumping bamboo

Bamboo falls into one of the following categories, according to its root structure: clumpers (sympodial) or runners (monopodial). Usually, clumping bamboo is located in the tropical climates, while running bamboo belongs to the temperate zones or grows in the tropical mountains, at high altitude.

Image 3: Running bamboo

Image 4: Different types of bamboo culms

The culm (Image 4) has a tubular section except at the nodes, where the branches and leaves sprout (Image 5).The distance between two consecutive nodes differs from species to species and even on the same culm. Unlike the wood, bamboo culms contain only longitudinal fibers which bend into the diaphragm at the nodes.

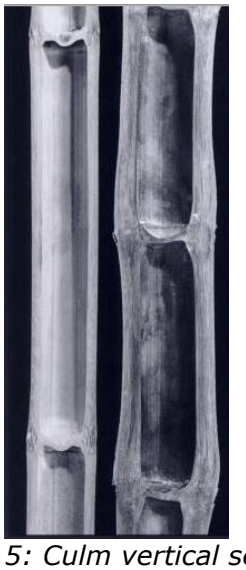


Image 5: Culm vertical section

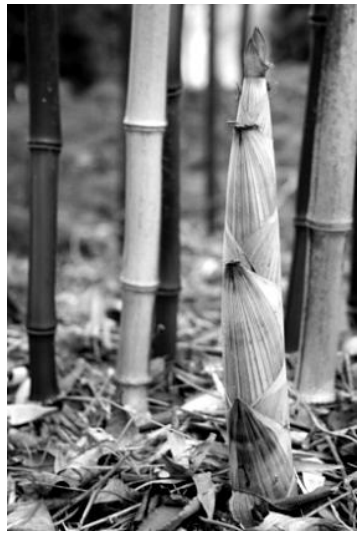


Image 6: Bamboo sprouts

Each sprout contains all the nodes and diaphragms of the mature plant, squeezed inside it (Figure 6), and its diameter matches that of the full size culm.

As the stem rises higher, its diameter and the wall width decrease, while its resistance increases. Bamboo culms have greater flexibility than wood. This may be seen in some areas where the culm is bending under the snow weight, until it touches the ground, but without breaking (Image 7).

Image 7: Bamboo forest after the snow

The uses of bamboo are many – Anna Lewington (1990), in her book "Plants for people", counts more than 1000 products made of bamboo – the examples include constructions (posts, studs, trusses, arches, rafters, purlins, roof coverings, exterior sidings, shutters, ladders, railings, walls, floors, scaffolds, as reinforcements for walls and foundations, water pipes, UV and waterproof roofing sheet, door and window frames), interior design and furniture (paneling, parquet, decorative ceilings, venetian blinds, floor lamps, mats, chairs armchairs, tables etc.), urban design (sculptures, kiosks, gates, fences, pergolas, trellises, shade structures for garden etc.), playground, sport equipment (fishing rods, skateboards, surfboards), in the paper industry (for paper pulp), for weapons (arrows, swords), for arts and crafts, toys, musical instruments, textiles (the bamboo fiber has antibacterial and hypoallergenic properties), in medicine, for hygiene products (from bamboo pulp), cosmetics and as food for people (beer, wine, vinegar, bamboo shoots) and animals. But its uses also depend on the plant age, the bamboo being used for food at 7-14 days, for baskets at 6-9 months, for boards and laminates at 2-3 years and in construction at 3-6 years.

1.1. Physical properties

The moisture content (MC) of the stem is influenced by the species and the age of the plant, the season and cutting-down time. Moreover, the MC is increasing at the base of the culm and in the nighttime. Green bamboo may have up to 100 – 150 % moisture. When the MC falls under 15%, its physical and mechanical properties increase and the risk of mould decreases.

The weight per volume or specific gravity (which varies from 500 kg/m^3 to 900 kg/m^3) influences the mechanical properties of bamboo. It increases toward the periphery and along the stem, from bottom to top and varies among species.

In a culm cross section (Image 8), two areas differentiate: one dark zone, placed at the periphery, with a high fiber density and another one, close to the center, with a low fiber density. The inner zone comprises 70% of the culm wall while the outer only 30%. The percent of the dark ring area in the culm cross section increases with the height of the stem.

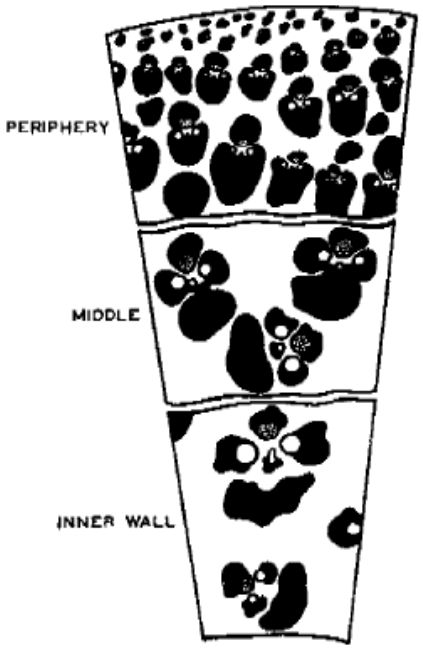


Image 8: Cross section of the wall of a culm

1.2. Mechanical properties

Its mechanical properties vary with the species, habitat, age, moisture content, the period of harvest, diameter and wall width. For a bamboo culm, the value of modulus of elasticity (MOE) increases from base to top. In the nodes area, MOE is reduced up to 40%. The compression strength goes up from the base to the top of the culm. It also increases with the age of the plant and decreases with a raise in the MC. The compression strength, parallel to the cane axis, of portions without nodes is smaller (with c 8%) than those with nodes and the compression strength perpendicular to the fiber is higher (c 45%) in portions with nodes, thus the forces perpendicular to the culm axis should be located in the nodes. The shear strength is the weakest aspect of the bamboo culm. The shear strength decreases as the thickness of the culm wall increases and it shows higher value (c 50%) in the nodes compared to the segments without nodes. The shear is related to the presence of holes in the cane and holes cannot be avoided as they are necessary in joining two or more elements. The bending strength decreases from base to top. If the span of the element is to be twice the length of an internode, the node should be positioned at mid span. The bending strength depends on the moisture content (MC). In dry bamboo, the MC is about 12%, while in green bamboo the MC is about 80%. Consequently, the ultimate bending stress for dry bamboo canes is 1.5 times the stress for green bamboo. The tensile strength is three times higher than compression strength and the tensile strength of the outer part almost triples that of the inner area, the strongest fibers being set on the edge. The nodes diminish the tensile strength of a cane. The value of a culm tensile strength decreases after 5-6 years. Tensile strength is important in designing trusses with lashed joints and when the bamboo is used as concrete reinforcement.

1.3. Technical properties

The behavior in earthquakes and hurricanes

Because of the joint type, used in bamboo structures, when earthquakes or hurricanes occur, about 85 percent of the energy is absorbed, causing a deformation of the joints, and the rest of 15 percent inflicts elastic bending on the elements. Another advantage of bamboo is the absorption of energy in the joints. Indeed, on April 1991, 20 bamboo houses built in Costa Rica for the National Bamboo Foundation survived a 7.5 magnitude earthquake, measured on Richter scale.

The burning behavior

According to DIN 4102 (Burning behavior of building materials), bamboo is categorized as being flammable but hardly combustible. A bamboo culm filled with water resist to a temperature up to 400°C.

2. METHODS FOR PROTECTION

The durability of the material is related to the age of the culm, the species to which it belongs, the time when it was harvested, the type of applied treatment, the position of the element and its maintenance. The bamboo preservation and a proper design increase the life span of bamboo elements. In Colombia, some bamboo constructions have attained a life span of 100 years.

2.1. Protection by design

Jayanetti and Follett (2008) underlines four basic principles of protection by design:

i. Keeping the bamboo dry

This involves designing large eaves with proper gutters that protect the bamboo elements from rain and direct sunlight.

ii. Keeping the bamboo out of the ground contact.

The second principle may be achieved by setting the bamboo poles and walls on a brick or concrete base / plinth wall.

iii. Ensuring good air circulation

iv. Ensuring good visibility

One way to meet these two recommendations is to let the bamboo element exposed so it can be checked and ventilated. Moreover, the ends of the culms have to be plugged to avoid insect penetration.

2.2. Protection by treatment: methods of preservation

The lifespan of an untreated culm is 1-2 years - when positioned in open air and on the soil – and 5 years when the element is covered and elevated above the ground level.
Untreated, bamboo is prone to insects (borer, termite, beetle), fungi and other natural or chemical damaging factors. The degree of insect attack is related to the moisture and starch content of the plant. Also, the risk of mould decreases as the humidity of the culm is reduced. With a MC of 15%, the risk of mould is kept to a minimum. The process of preservation should be planned before the harvest begins. For the species Guadua Angustifolia, the harvest is to take place one week before the full-moon because, at that time, the moisture content is limited. The branches and leaves should be left in place in order to allow the evaporation of the capillary water. Also, the culms have to be cut down before the rising of the sun, to avoid the absorption of nutrients which feed the insects. Nevertheless, some Indians from Latin

America have chosen the afternoon period for harvesting - this is the time when the humidity is low and the nutrients have already reached the leaves.

The chemical treatment of bamboo is difficult as the plant is more resistant to chemical penetration than wood, due to its anatomy. Choosing one technique of preservation or another depends upon where and how the bamboo element will be used.

2.3. Drying the bamboo

One traditional practice of drying the culm is to cut it and fix it vertically within the clump until it dries. Attention should be given to horizontally stacked culms which have to be placed on a rack in order to prevent bending. Also, they need to be placed inside a shaded and ventilated space.

When the elements are dried in a kiln, up to a temperature of 150 degree Celsius, the structure of the material is modified, gaining some resistance to insect attack. But this method is only for split bamboo as whole culms may crack. Air drying is thus a better option for round culms, which need about 6-12 weeks – the period varies with the MC amount and the wall thickness.

2.4. Soaking in water

In Asia (Indonesia, Vietnam, Bangladesh etc.), water immersion is an old way used by the locals to treat bamboo. The newly harvested whole culms or split bamboo elements are immersed in water (streams and ponds are also accepted) for a period of 4-12 weeks while the water soluble substances (starch and sugar) are lost. This method protects bamboo from borers, but not from fungi and termite.

2.5. Sap displacement method

The sap displacement takes place slowly, when the green bamboo element (whole or split culm) is placed vertically in a preservative solution to a depth of 30-60 cm.

2.6. Boiling

Another way to eliminate unwanted substances is by introducing the culms into a large container and boiling them for 15-60 minutes.

2.7. Borax treatment

Holes are drilled in the culm diaphragms, and then the culm is immersed into a basin or positioned vertically and filled with borax. Another way is to drill holes in the internodes (the holes should not be positioned on the same line) and fill it with borax.

2.8. Hot and cold treatment

This technique is applied to dried bamboo elements. The method consists in immersing the bamboo into a solution of fuel oil and coal-tar or creosote oil (to a 1:1 ratio) and heating the container until the boiling process starts (about 4 hours). A percent of 1% dieldrin may be added to the solution for protecting bamboo against termites. After boiling, the elements are allowed to cool down for 24 hours.

3. PROCESSING THE CULMS

3.1. Splitting the bamboo

By hand, using different tools

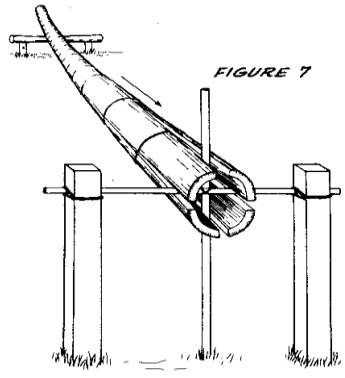


Image 9: Criss-cross bar of wood

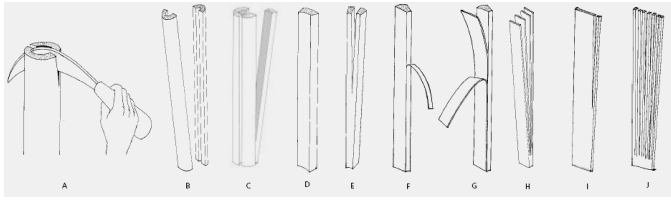


Image 10: The process of splitting the bamboo manually

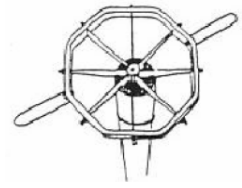


Image 11: The use of the knife frame

- With criss-cross bars of wood or iron (Image 9)

The bars are fastened to several posts fixed in the ground. One of the culm ends is slightly split with an axe, and then positioned on the criss-cross bars. Finally, the cane is pushed or dragged manually in order to split it into four pieces.

- Using the Dao (Image 10)

Dao has a rounded wooden handle and a curved thick metal blade that is sharp only on the concave side.

- Using the knife frame

Mechanical splitting

Image 12: Mechanical splitting of a bamboo culm

Flattening bamboo canes

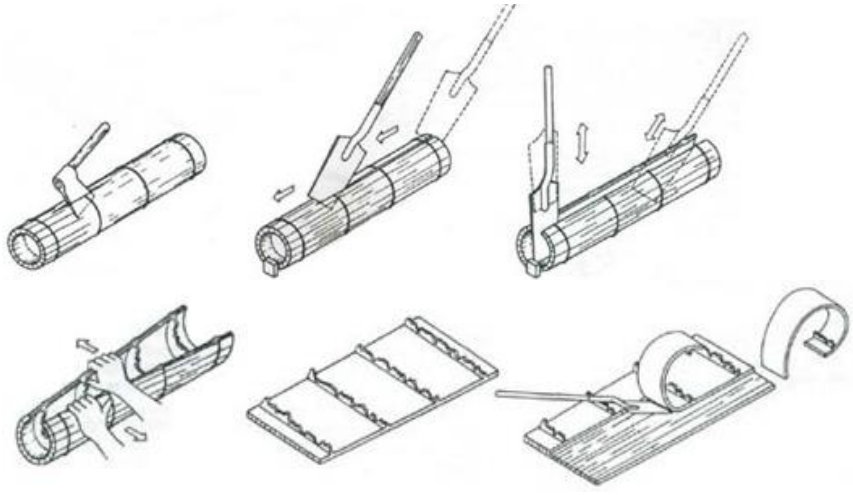


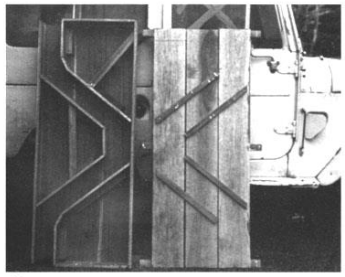
Image 13: Flattening bamboo canes

After taking off the nodes, the culm wall is cut longitudinally, splitting it several times, along its circumference, then the cane is opened and flattened, the inner layer, prone to insect attack, being also removed (Image 13).

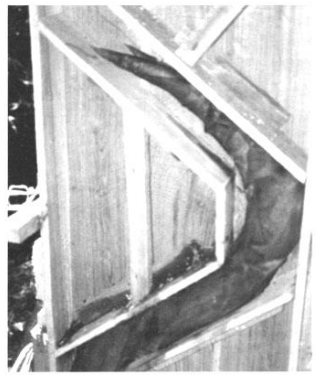
Straightening bamboo poles

In India, the base of a newly cut bamboo cane is fastened to a tree branch, high above the ground, then a heavy weight is hanged on the opposite end of the culm and left in place for several months.

3.2. Deforming the bamboo



B. *A short wooden form used in the experiment of deformation.*



C. *The bamboo shoot growing inside the short wooden form.*

Image 14: Deforming bamboo shoots

Due to its elasticity, the green bamboo can be curved using a propane torch. The cane segment to be deformed is heated slowly with the torch until the bamboo is able to change shape easily without breaking.

Oscar Hidalgo Lopez (2003), architect and professor at Facultad de Artes, Universidad Nacional de Colombia, found a way to produce curved bamboo culms with a predetermined radius. A mould, designed according to the required arc shape, is set over the bamboo shoot. While the plant develops, its culm inherits the curve of the form.

Moreover, using square section moulds, set over the shoots, the culm cross section assumes the shape of the mould (Image 15).

Image 15: Producing square section bamboo culms

Surface transformation

- Bleaching

The bamboo is immersed in a solution of hydrogen peroxide

- Dyeing

After removing the waxy surface, the bamboo element is bleached, and then the desired color is applied. Finally, a solution of vinegar is used for maintaining the element color.
In order to change the color of the cane to green, it may be treated with copper sulfate. Further, this method is used to increase the culm resistance to mould. To give the bamboo a brown color, the canes are peeled, treated with hydrochlorid acid and baked in a kiln.

4. BAMBOO PRODUCTS

Since the bamboo canes have a tubular shape and differ from each other in terms of wall diameter, thickness and position of the nodes along the culm, there is no possibility to process them like timber, so they cannot be standardized. The composite materials and bamboo boards are the only products which are to conform to standards, codes and regulations. Composite materials are made by cutting or splitting the culm into veneer, strips, fibers or particles and then reassembling them by various methods in combination with other materials or substances. The adhesives usually used for wood are not suited to bamboo composite boards. The latter is manufactured using UF (urea-formaldehyde) and PF (phenol-formaldehyde).

- Natural Fibre Thermoset Composite (NFTC) - DUROSAM®

This material was created in 1994 by company AB COMPOSITES –India as a substitute for conventional wood, ply-wood, asbestos and aluminum. It was used for doors, windows, panels, floorings and prefabricated units (shelters for high and low altitude, toilets). The composite is water and corrosion resistant, fire retardant, UV and termite resistant and has a low thermal and electrical conductivity.

- Bamboo Mat Board (BMB)

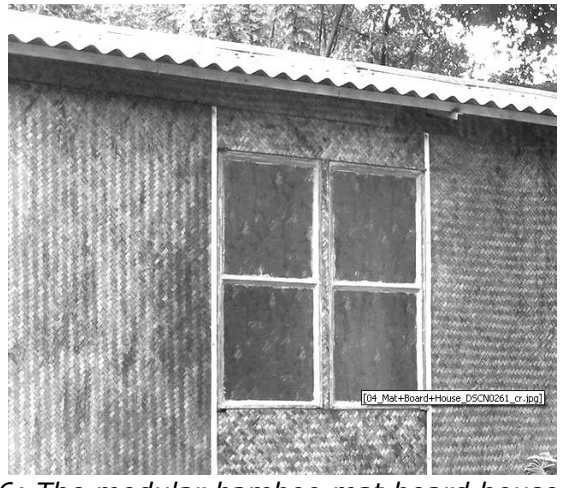


Image 16: The modular bamboo mat board house atIPIRTI

The product (Image 16), developed by IPIRTI – India, is made from bamboo mats which are weaved by hand or using mechanical devices – in a perpendicular or "herringbone" pattern – and then immersed into a PF resin solution to which they added an eco-friendly preservative. After drying to 8% humidity, the 2-7 layers (the number of layers depends on the desired thickness) are piled and hot-pressed. Finally the boards are cut to match the required size. This product is used for furniture, doors, partitions and ceilings.

- Bamboo mat plywood (BMP)

The material is a Chinese product which resembles to the Indian BMB. The outer face may be overlaid. Used for furniture, wall panels or shutters.

- Bamboo plywood panel(BPP)or bamboo curtain plywood or bamboo ply panels

The bamboo canes of desired length are cut into thin and long pieces, rubbing the nodes and taking off the external and internal layers, resulting in slivers of 0.5-0.8 mm thickness and 20-30 mm width. The slivers are used to weave mats which are dried till they reach 10-12% moisture content then immersed into a glue solution. The glued mats are dried again to 10-15% MC. A multi-layer structure (commonly three layers of mats), with alternating vertical and horizontal mats/curtains is created and hot-pressed. Finally another bamboo mat, veneer or PF resin impregnated Kraft paper is overlaid. It may be used for concrete form work.

- Bamboo veneer

In China, culms of Phyllostuchyspubescens are cut, processed and dried. Then, surface modifications (like bleaching, dyeing etc.) are applied in order to make them suitable for decoration.

- Flattened Bamboo board

Image 17: Flattened bamboo board

Image 18: Bamboo mat corrugated sheet

The boards (Image 17), obtained by flattened bamboo canes and finished with clear acrylic, can be used indoor or outdoor, for wall or ceiling paneling.

- Bamboo Mat Corrugated Sheets (BMCS)

The product was developed as an eco- friendly, energy efficient and cost effective roofing sheet, by Building Materials & Technology Promotion Council (BMTPC) and Indian Plywood Industries Research & Training Institute (IPIRTI). In order to obtain this composite, bamboo slivers are hand woven and transformed into mats by rural people, then the mats are soaked, coated, assembled and pressed under specified temperature and pressure. The product is resistant to water, fire, decay, termites and insects.

- Laminated bamboo beams

GluBam (Image 19) is a structural beam made from laminated bamboo veneers. It is the invention of Yan Xiao, professor of civil engineering at the University of Southern California. The beams can be cut like ordinary timber. Yan Xiao used it for schools and homes construction across China and to build a bridge in Hunan province.

Image 19: GluBam

image 20: Various sections of laminated bamboo beams

- Reconstructed bamboo timber

Image 21: Reconstructed bamboo timber

- Strand woven parquet

Strands from a specific type of bamboo are heated to eliminate all sugars and insects. Then, it is dried, glued, baled, pressed, and baked in furnaces until it hardens. Finally, the pieces are cut to make parquet flooring planks, which are stronger than ordinary bamboo parquet.

- Bamboo - Jute Composite

Manufactured by AB COMPOSITES, India, this material is used for corrugated roofing sheet, for doors, windows, furniture, panels, floorings and prefabricated units. The product, with a standard size of 2400x1200x 2.5mm, has a low thermal conductivity (0.020 mw/cm), withstands in 200 km/hrs wind pressure and has water absorption of max. 5.0%. Also, the material is light and it is corrosion and UV resistant, eco-friendly and bio-degradable, having a minimum 30 years life period without maintenance.

- Bamboo mat - wood veneer composites (BMVC)

The product is developed by IPIRTI (Indian Plywood Industries Research &Training Institute), a research institute in the field of composites. The board is environmentally sustainable and superior to Bamboo Mat Board (BMB). The composite consist of bamboo mats (woven in a herringbone pattern with 0.6 mm thickness slivers and coated with resin) and veneers. The board thickness varies between 4 mm to 25 mm.

- Bamboo particle boards

Bamboo particle board is obtained from bamboo wastes which are mixed with other cementing materials.

- MDF Bamboo veneer

The board has an MDF core and the outer surface is of bamboo.

- Bamboo wallpaper

Bamboo strips are glued to a fabric in order to be used as wallpaper.

5. BAMBOO CONNECTIONS

5.1. Traditional connections

When used in construction, a certain bamboo type is recommended, namely that with a big mass per volume, dried and harvested when of 5 years old. If the span is about 3.60 m, the bamboo elements have usually the following dimensions: 70 – 100 mm diameter and 6 – 12 mm wall width.
In order to obtain an optimum result, some design principles are suggested:

- The joints should be created in the node area
- Allow a distance between the joint and the end of the cane
- Reduce the number of holes. If not possible, position the hole near the node or fill the drilled cane segment with cement and use bolts for fastening the elements. Also, the holes must have a circular shape
- Avoid splitting: put galvanized wire round the culms, mostly at the ends of the canes

Because the bamboo culm has a tubular shape and splits easily, the mortise and tenon joints, specific to wood, are rare. Traditional wood connections use nails frequently but pre-drilling is required in order to avoid cracking, with bamboo canes.

Image 22: Connections using bamboo strips

5.1.1. Lashed joints

The canes are connected with lashes made of bamboo strips, coconut palm fiber, rattan, jute or hemp rope, zinc coated iron wire and plastic cords, which permit the relative movement of the elements, while still keeping them in place. If the lashes are green when used, the ties become stronger as they dry out. Common ropes wear down faster than the cords made of twisted bamboo fiber.

The ropes may also be inserted in holes while tied around the elements.

5.1.2. Connections in "fish mouth"

These are used only when elements fall perpendicular to one another.

Image 23: Connections in "fish mouth"

5.1.3. Connections with two wedges and rope

The wedges prevent the horizontal movement of the canes while the ropes stop their displacement.

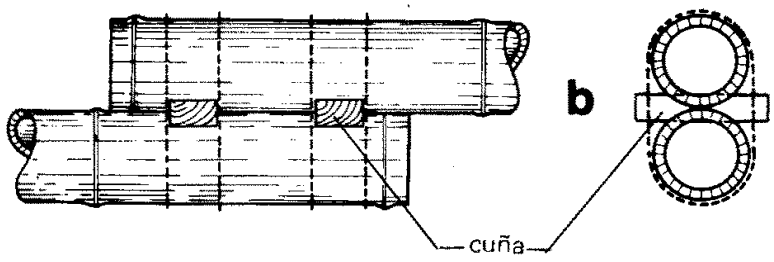


Image 24 : Connecting two horizontal elements

5.1.4. Double post

Image 25: Double post

One post is supporting the beam and a second one the roof (Image 25). No holes are needed and this is its advantage, as the drilling weakens the culm resistance. Moreover, it is easy to replace or fix the faulty post.

Another solution is to use a cleat instead of a second post. The cleat supports the beam and is fastened with rope to the pole. In this case, there is no drilling to weaken the cane.

5.2. Modern connections

5.2.1. Wood core connections

Wood core connections are helpful in joining the bamboo canes with wooden elements. A wood cylinder is partly inserted into the cane and glued to it. In order to avoid splitting, two channels are cut at the end of the cane, before the wooden core is inserted.

5.2.2. Wood core connections and steel plates

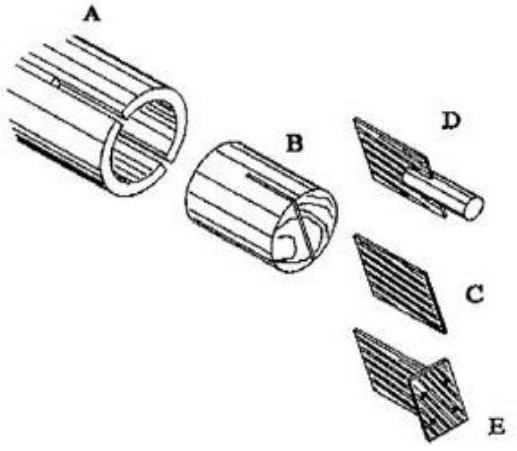


Image 26: Wood core insertion and steel plates

Further, a steel plate may be inserted into a slot of the wood cylinder and glued to it. The end of the steel element is then welded or connected to another metallic component. This type of wooden core and steel plate termination is useful in truss assembling.

5.2.3. Multi-culm beams

When the bamboo culms are to support big loads, the canes are bundled up with a steel band. Again here, wood cylinders with metallic insertions are fixed to the ends of the canes.

5.2.4. Connections with thread rods and mortar injections

After assembling the elements with thread rods, the canes are filled with mortar.

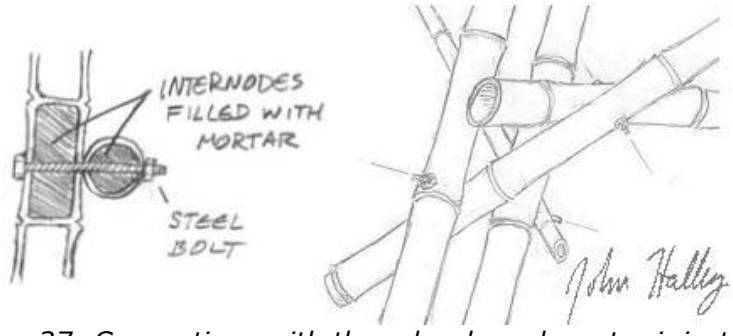


Image 27 :Connections with thread rods and mortar injections

5.2.5. Connections with steel plate or thread rods, bolts and mortar injection

- Connection with thread rod and mortar injection

For fastening a pole and a beam, a metallic rod is inserted into the vertical pole – after drilling two or three diaphragms – and mortar is injected afterwards. Then, the horizontal culm is drilled and fixed to the rod. The adjacent beam internode is filled with mortar, too.

- Connection with steel plate, bolts and mortar injection

Two or three holes are pre-drilled into the vertical cane and bolts are inserted perpendicular to its axis. Then mortar is injected inside and the beam is positioned at the top end of the pole, fastened with a steel plate. The steel strap is screwed to the bolts. Finally, the beam internode is filled with mortar.

5.3. Fixing the bamboo poles to a concrete base or foundation

- The connection between the elements and the concrete foundation is carried out through a metallic profile (Image 28).

Image 28: Fixing the canes to the foundation with a metalic profile

Illustration source

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BAMBOO IN ARCHITECTURE AND CONSTRUCTION: BUILDING WITH BAMBOO

Lecturer PhD. Arch. Andra JACOB LARIONESCU*

Abstract

The paper presents different methods to build structures, roof or floor systems, building envelopes and partitions, using the bamboo plant. It also provides good examples on the use of bamboo in vernacular and modern buildings.

Key words: *bamboo structures, vernacular buildings, contemporary architecture*

1. BAMBOO IN VERNACULAR BUILDINGS

Irrespective of the geographical location, the bamboo is most frequently used in wall construction. Usually, the houses have a structural frame made from bamboo or wood. Since the wall does not bear the roof weight, no fundation is needed underneath. But in order to protect it against the rodents, insects and water, the wall is either lifted up above the ground (in stilt type constructions) or it has a base.

1.1. Wall systems

Dry type construction

a) Walls built with vertical culms.

Image 1: Building a wall with horizontal culms

In Thailand and Indonesia, the bamboo culms are arranged vertically, side by side, being pinned to the house framework. For a better weather protection, closely interlaced matting may be applied on the outer face.

b) Walls made from half round canes, positioned vertically or at 45 degree, nailed to the frame.

c) Walls built with horizontal culms (China)

d) Walls made of horizontal bamboo strips (2 mm thickness and 20-50 mm width) nailed on both sides of a wooden or bamboo frame.

* Lecturer PhD. Arch. Andra Jacob Larionescu: Faculty of Architecture, *Spiru Haret* University, Bucharest.
Excerpt from: Andra Jacob Larionescu, " Bambusul: Utilizari in arhitectura si constructii", ed Limes, 2016.

e) Walls built with mats of various thickness and weaved in different patterns are attached to the frame

f) Walls made of mats waved with split bamboo to become rigid

g) Walls built with interwoven mats (India)

Wet type construction

a) Plastered bamboo mat
Thin bamboo mats are pinned to the bamboo or wooden post, then coated with a stabilised mud plaster, creating an in-between air space.

b) Plastered „esterilla”
In Colombia and Ecuador, the split „esterilla” are fixed to the bamboo poles, then plastered. '*Esterilla*' derives from splitting the bamboo along its culm, opening and pressing it, then taking off the inner part of the cane. After being treated and dried, the elements are fixed to the bamboo or wooden frame and plastered with mud (Image 2).

Image 2: Wall made from plastered „esterilla”

Image 3: Bahareque walls

c) Bahareque wall
This type of wall, largely used in Latin America, is heavier and - when good handycraft is available – is able to withstand strong winds and earthquakes.Thin culms or bamboo strips, 4-5 cm in width and positioned at 5-7 cm intervals, are attached on both sides of the wooden or bamboo studs. The interstices are filled with a mixture of mud and straw (Image 3). In Colombia, where the resistant bamboo species are used (e.g. bambusaguadula), the bahareque wall houses has an extended life span.

Image 4: Bamboo board

d) Bamboo board wall
This technique, perfected in Colombia, uses round bamboo poles which are set at c 45 cm intervals, then covered with bamboo board on both sides and cement plastered. The system offers a better insulation thanks to the air spaces in the wall.

1.2. Floor construction

The beams are made from bamboo culms on which small size bamboo canes, bamboo laths, bamboo mats or bamboo board are positioned (Image 5).

Image 5: „Esterilla" mats, placed above the secondary bamboo beams

1.3. Roof construction

Split or whole bamboo culms may be used also as purlins, rafters and battens. The battens are nailed or fastened with ropes to the purlins. The roof is covered either with thatch or with bamboo tiles or shingles.

1.3. Roof coverings

- **Bamboo shingles** (Image 6)

The minimum pitch is 30°. The elements are usually 3-4 cm in width, processed from mature bamboo canes. The shingles are fixed to the 4 cm wide bamboo battens.

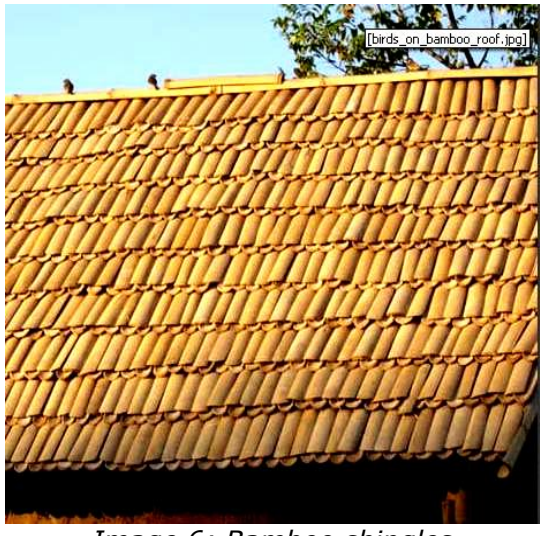


Image 6: Bamboo shingles

Image 7: Bamboo tiles

- **Bamboo tiles**

Flat tiles: the minimum slope of the roof is 30°. A 13 cm diameter culm is cut to a length of 30 cm. The diafragm is used to create a nib for the tile, in order to fix it to the batten.

Roman tiles (Image 7): the pitch should be at least 30°. Tiles with a curved section are obtained from round bamboo canes, split into two equal parts with the diaphragms being removed. The length of the tiles may be less or equal to the rafter length. One layer of tiles is fastened to the battens, side by side, with their concave side up and a second layer – having their concave side down - is set to interlock with the first.

1.5. Bamboo cables

The cables are made by twisting bamboo ropes around each other. The ropes are weaved from fine bamboo strings. Even Marco Polo, while exploring China, noticed that such ropes, more resistant than hemp ropes, were used for pulling the boats. Moreover, bamboo cables held up the Chinese bridge over Min-Chiang river. The bridge, constructed about 1000 years ago, was ca 2.7 m in width and 255 m long.

When wet, the resistance of a bamboo cable goes up, while that of the hemp rope decreases.

1.6. Examples of vernacular building

Ethiopia

An ethiopian hut, as pictured below (Image 8), is built on a bambooo skeleton and covered with a bamboo woven skin.

Image 8: Ethiopian hut

Image 9: A Tong house

India – Tripura (North-East India) – Tong House

The Tong house (Image 9) is a hill dwelling. In order to protect themselves from wild animals, the tribals have lifted the floor area with ca 1.5-1.8 m from the ground level.

Curilam village – India, west Tripura

The posts and the walls of the house are all made of bamboo. The wall consist of mats from woven bamboo strips, reinforced with bamboo laths. The facade may be covered with mud.

Image 10: House in Curilam village

Image 11: Dai houses

China - South of Yunnan Province - Dai houses

The Dai ethnic minority live mostly near the river in a climate characterized by heavy rainfall. Consequently, the house is raised on stilts (fig. 11), this technique being also a way to protect the inhabitants from insects, snakes and other dangerous animals. The skeleton of the house is made of timber, while bamboo is being used for floor and wall construction, as for purlins, rafters, ladders, handrails etc.

2. THE USE OF BAMBOO IN MODERN BUILDING PROJECTS

2.1. Trusses

Image 12: Assembling a Bamboo School Building

Image 13: Bamboo trusses are used to build a roof structure(Guyaquil, Ecuador, arch J. Morán)

2.2. Concrete reinforcements

Image 14: Bamboo reinforced concrete beam

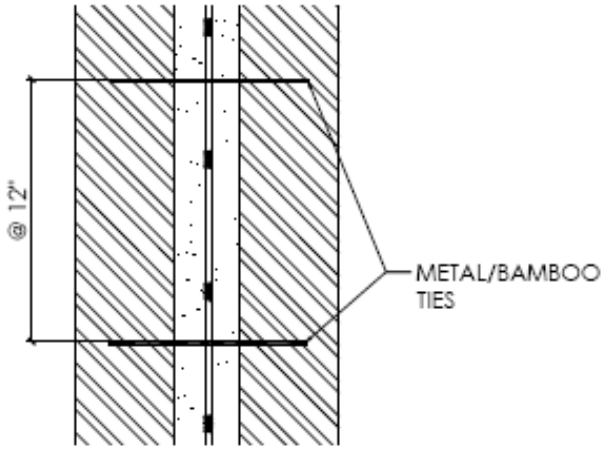
In the midst of the Second World War, in Japan, because of the steel shortage, steel reinforcements for concrete elements were replaced with bamboo.
When bamboo is to serve as concrete reinforcement, three or more twisted bamboo strips, taken from the peripherical zone of the culm, should be used, in order to increase its adherence to the concrete. The strips have to be made from nine months old bamboo culms, as the younger culms are more flexible than the older ones.Also, they need to be treated with asphalt or coal tar solution in order to gain water-resistance. But too much asphalt affects the adherence of the strip and the concrete.

Bamboo reinforced concrete slabs

In Ecuador, bamboo strips were used to reinforce slab foundations of prefabricated houses. Even after 10 years, no crack was visible in the slab.

2.3. Cavity wall construction with bamboo reinforcement

In order to get the best results, bamboo reinforcement for cavity wall construction requires a width of the cavity of minimum 7.5 cm and a distance between the splints axis of 15 cm. Also, horizontal rods, made of metal or bamboo, need to be used to secure the two layers of the cavity wall.



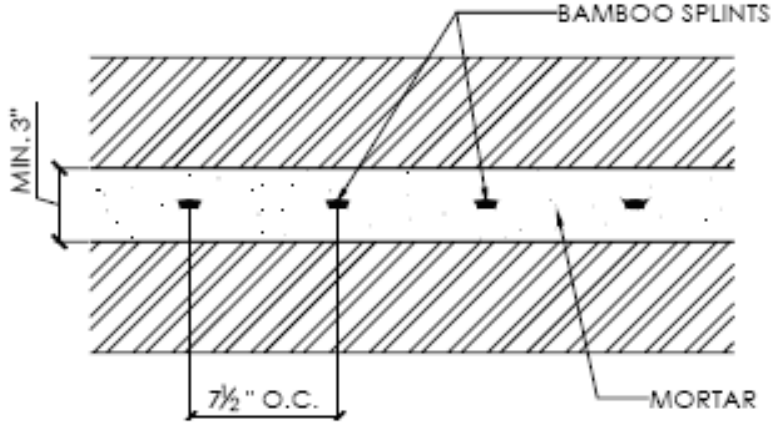


Image 15: Bamboo reinforcement for cavity wall construction

2.4. Examples of modern buildings

- Bridge, Pereira,Colombia, arch.Jorg Stamm

The bridge has a span of 52 m. The arches consist of 12 curved bamboo canes, tied together.

Image 16: Bridge, Pereira, Columbia, arch. Jorg Stamm

Image 17: Bridge built using GluBam

- Yan Xiao, Bridge, Hunan, China

A bamboo bridge, with a capacity of 90 tones, was erected in October 2007 in the village of Shangxun, Hunan Province, China. The superstructure was built with bamboo components, treated to gain weather resistance. Yan Xiao, the chief architect, professor at the University of Southern California, estimated that the life span of the construction at 20 years and approximated the cost of bamboo bridges as being half of those built with steel.

- Great bamboo wall house, China, arch.Kengo Kuma

Built nearby China's Great Wall, the main house materials are glass and bamboo.

Image 18: Great bamboo wall house, China, arch. Kengo Kuma, 2002

Image 19: Great bamboo wall house, China, arh. Kengo Kuma, 2002

The bamboo elements are used for the facade as well as for the interior bamboo wall. The latter, made from bamboo slats is a permeable wall which divides and unites the space at the same time, enriching it with fluidity and dynamism.

- Bamboo furniture house, Great Wall, Shui Guan, China, arch. Shigeru Ban

The house design follows the directions set by the previous "furniture house" projects: it is a single - storey construction, with an open- plan, having load bearing, modular and prefabricated furniture elements. Panels made from laminated bamboo strips are used to build the house structure, the facade and for the interior design, while laminated bamboo beams support the roof.

Image 20:Bamboo furniture house, Great Wall, Shui Guan, China, arch. Shigeru Ban, 2002

Image 21: Bamboo furniture house, Great Wall, Shui Guan, China, arch. Shigeru Ban, 2002

- Nomadic Museum, Zocalo, Mexico City, arch. Simon Velez

Conceived as a temporary construction, the museum houses Canadian artist Gregory Colbert's Ashes and Snow project. The building accommodates two galleries and three distinct theatres and is built using bamboo, shipping containers and different recycled materials.

Image 22: Nomadic Museum, Zocalo, Mexico City, arch. Simon Velez, 2008

Image 23: Nomadic Museum, Zocalo, Mexico City, arch. Simon Velez, 2008

Image 24: Nomadic Museum, Zocalo, Mexico City, arch. Simon Velez, 2008

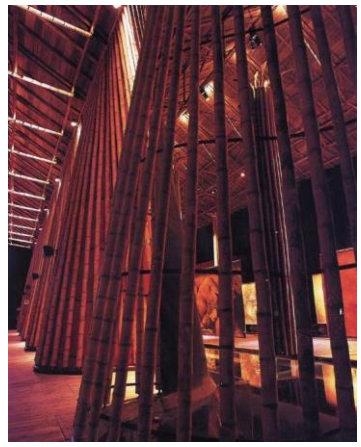
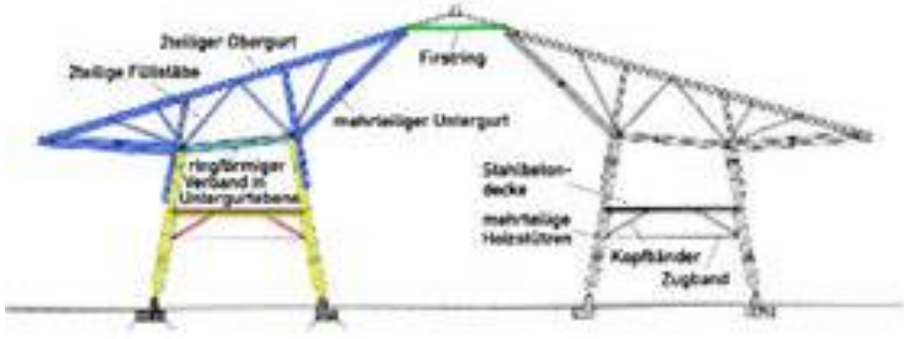


Image 25: Nomadic Museum, Zocalo, Mexico City, arch. Simon Velez, 2008

- ZERI Pavilion, Expo 2000, Hanover, arch. Simon Velez

The ZERI Pavilion, conceived for EXPO 2000, was set up in less than three months. The building materials were bamboo, wood, steel and concrete. The shape of the pavilion is decagonal, the circumscribed circle having 40 m in diameter. Its large roof with 7 m overhangs, is supported by 20 wooden pillars (each pillar is comprised of several bundled round timbers), arranged in two concentric circles. The studs and cantilevers are made from the bamboo specie guaduaangustifolia, with a diameter of 10-14 cm and a wall thickness of 1.1-2.2 cm. The beams, that supports the floor at the gallery level, consist of bamboo canes, as well as the base on which the concrete floor is poured – made of thin canes, 2-3 cm in diameter, laid down, side by side, to form a surface. Bamboo is also used as reinforcement for the roof 9 cm thick cement tiles.



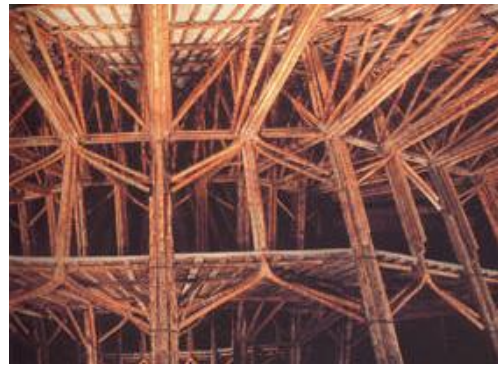


Image 26: ZERI Pavilion, Expo 2000, Hanover, arch. Simon Velez

Image 27: ZERI Pavilion, Expo 2000, Hanover, arch. Simon Velez

- Cultural Center Max Feffer, Pardinho, Sao Paolo, arch.Leiko Motomura

The building, with a footprint of 6000 m^2, houses a bamboo museum, a library and other spaces used for exhibition or as meeting places.

Image 28: Cultural Center Max Feffer, Pardinho, Sao Paolo, arch. Leiko Motomura, 2008

Image 29: Cultural Center Max Feffer, Pardinho, Sao Paolo, arch. Leiko Motomura, 2008

- METI School, Rudrapur, Bangladesh, arch. Anna Heringer, Eike Roswag

The school is built in Rudrapur, Bangladesh for a poor rural community, by the villagers and local craftsmen, together with the volunteer architects from Europe. The project received the 2007 Aga Kahn Award for Architecture.

The foundation is made with brick, the ground floor walls are built with loam and straw, bamboo being used only for the ceiling and first floor construction.

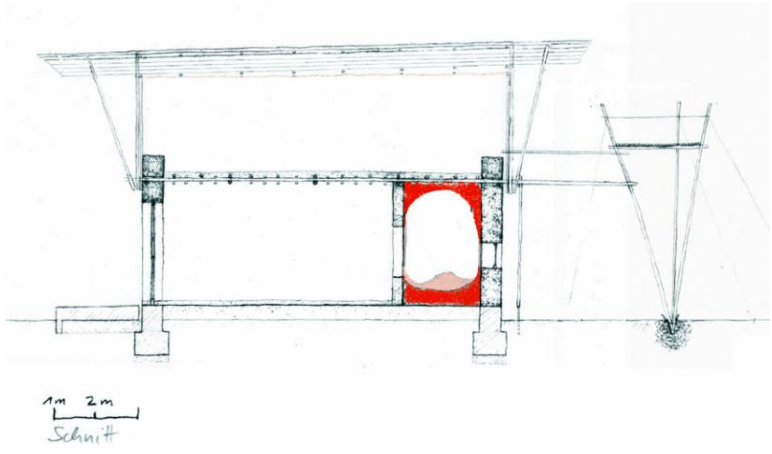


Image 30: Cross section (www.archsociety.com)

Image 31: METI School, Rudrapur, Bangladesh, arch. Anna Heringer, arch. Eike Roswag

Figure 32:METI School, Rudrapur, Bangladesh, arch. Anna Heringer, arch. Eike Roswag

Figure 33: METI School, Rudrapur, Bangladesh, arch. Anna Heringer, arch. Eike Roswag

Image 34: *METI School, Rudrapur, Bangladesh, arch. Anna Heringer, arch. Eike Roswag*

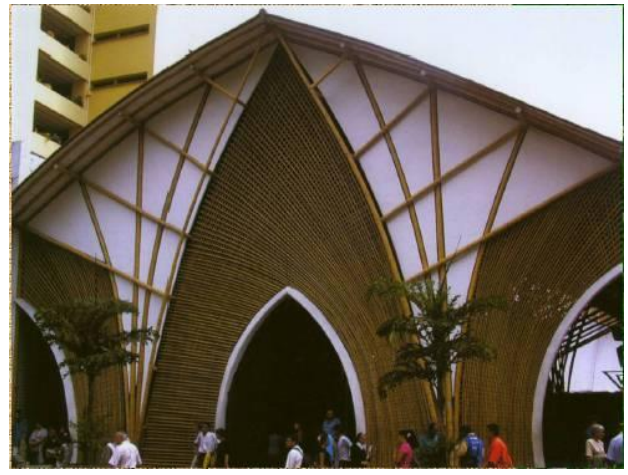


Image 35: Church, Pereira, Columbia, arch. Simon Velez

- Church, Pereira, Columbia, arch. Simon Velez

The load bearing structure is built with full length curved bamboo canes (guadua species), each arch being composed of five guadua culms, fastened with transverse braces to avoid buckling.

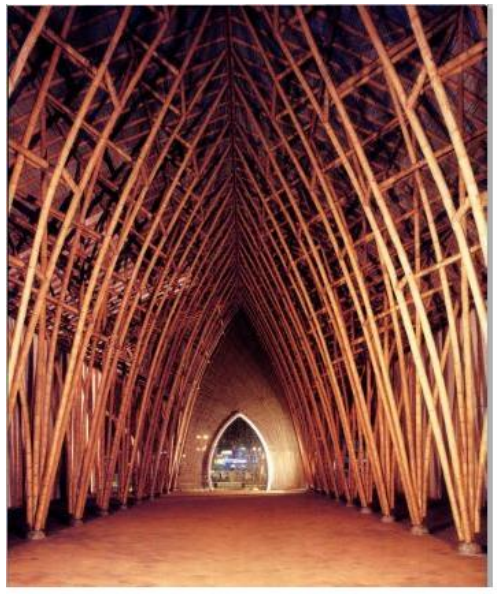


Image 36: Church, Pereira, Columbia, arch. Simon Velez

Image 37: Church, Pereira, Columbia, arch. Simon Velez

- HPP Hentrich-Petschnigg& Partners KG, Car park, Leipzig Zoo

A bamboo cladding was chosen for this five-storey construction, in order to fit with the building site. The facade consists of vertical bamboo culms, 10-12 cm diameter, fastened to a steel frame with adjustable braces and positioned at 7.5 cm intervals. Thus, the sunlight penetrates the exterior wall, illuminating the wooden walkway that surrounds every level of the car park and that is placed behind the bamboo screen.

Image 38:Car Park, Leipzig Zoo, arch. HPP Hentrich-Petschnigg& Partners KG, 2004

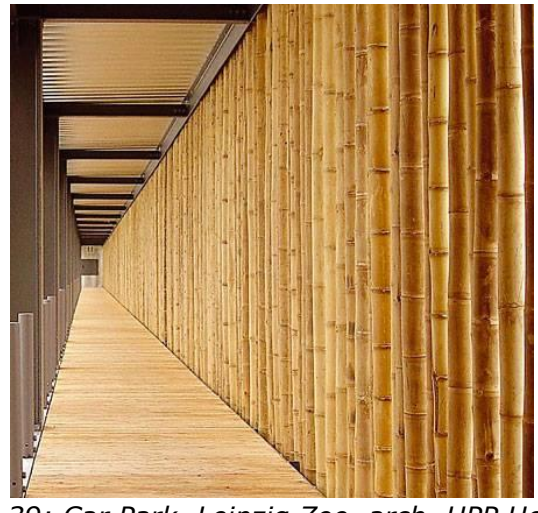


Image 39: Car Park, Leipzig Zoo, arch. HPP Hentrich-Petschnigg& Partners KG, 2004

- Spatial structures

A team of architects and engineers calling themselves Bamboo Space considered the tubular shape of the bamboo canes as ideal for building spatial structures. They created a type of connection which is light and consists of a spherical steel knot and steel tubes with a conical termination. This connection is suited for temporary construction. The steel tubes are inserted into the bamboo canes and fixed with bolts.

Image 40: „Prototipo Mariposa", National University of Colombia

Image 41: „Prototipo Mariposa", National University of Colombia

Illustration source

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THE CONCEPT AS A CONCEPT AND THE IMPORT OF WORDS AS IDEAS

Prof. PhD. Arch. Anca Sandu TOMASZEWSKI[*]

Concept and *conceptualization* in democracy

Concept is the key-word of the last decade in the Romanian school of architecture. It roots in Eisenman's *Conceptualism*, who took it over from the visual arts, which on its turn it sounded so good in philosophy. Dealing with such transfers is not actually a new phenomenon, as modern architecture and its criticism often adopted terms and ideas from the epistemological area of other disciplines, especially those that are sovereign in judgment and rhetoric on abstract fields. Roland Barthes asserted that the future of the art criticism consists in taking over the theories to be expired in the philosophical thinking.

So did the conceptual approach in arts and later on in architecture – but not the use of the term *concept*! While initiated during the 60's, this idea launched a new way of thinking and even managed to reorient practice. The Romanian architecture, as well as many other producers of objects containing a small amount of creativity, extracted the word *concept* from the conceptualist discourse, thus pretending with unconscious serenity as directly rooting in philosophy. Thus downgraded in that way from its superior position of product of a repeatedly distilled thinking, the term of *concept* has been subjected to an innocent and generous democratization, not to say vulgarization. And so it happens that now terms like *concept, conceptualization* or *conceptual thinking* are popping up hauntingly in any comment, jury grading, even in any small talk between architects – to the satisfaction of dilettantes, the bewilderment of pedants and the amused tolerance of the connoisseurs with a sense of humour.

However, all the straightforward and good-natured architects nowadays, who are designing different things – a gas station, a masterplan or a post office –, seek to endow their initial quests with the term of *concept*. True, they were "talking in prose" before the emergence of the magic word, but they didn't know it. Now, since they retrieved their conscience, everything that amounted to ordinary working tools – sketches, scale models, texts and diagrams – has now miraculously become "*conceptual thinking*". Students in particular, as the most impressionable professional category, are beginning to proclaim as concept any functional scheme, volumetric sketch or abstract drawing, only to turn the same "concept", in the end, into justification, by the same naïve rhetoric. And so everybody is busy "*conceptualizing*", each in his own way.

If we expand the meaning of the notion far beyond the original definition, then we would definitely include the Paleolithic artists from Lascaux, who relied on a "*concept*", and a metaphysical one, twenty thousand years ago, when they symbolized and fetishized referents on the grotto walls, in order to hunt and eat them. Furthermore, beyond its figurative appearance, this transcendent intention was so internalized, that the participants to the ritual were only able to fully grasp it in a state of trance. And then, generally speaking, what can be more "conceptual" than the intentional core of the pyramids,

[*] Prof. PhD. Arch. Anca Sandu Tomaszewski: Faculty of Architecture, *Spiru Haret* University, Bucharest.

ziggurats and all temples and sanctuaries? Or the imaginaries of Boullée and Ledoux? Or even the totalitarian architecture? While taking matters further, there is no naturally genuine architecture without a "concept", if we consider beauty, purity, usefulness and aspirations to the sublime being also concepts, along with everything the history of architecture has ever produced, or if we consider nowadays that an attitude, a colour, a proportion, an analogy, a movement, a sign can also be concepts.

Could it be that way? Well, then maybe a feeling or a tactile sensation can also be referred to as a concept, just because it lies at the origin of an aesthetic intention. Or this would be abusive, because it blatantly contradicts the meaning of the term. These are, for instance, Peter Zumthor's working tools: he is interested in the sensory, not the intellectual and specialized perception of his architecture; he does not believe in the objectivity of architecture, but in architecture, starting from the real things and returning to the real things. Both his stances place him in the very opposite sphere to the conceptualist one, causing us to conclude that every great, deep, consistent and sensitive architect is not necessarily a conceptualist.

As a matter of fact, out of many objects which contain creative effort, there are some with so much intellectual content, that the viewer's conscience is exclusively engaged by this nucleus of ideas, so forceful that it neutralizes the materiality of the object. It is only at that point that we are allowed to speak about *Conceptualism*.

Is there actually any Architecture in the absence of the act of conceiving? No. And, of course, there is no architecture without a thematic substance. Does Architecture issue conceptions? Yes. But all these cannot be called *conceptual thinking*, and certainly not *conceptualism*. Not every pondering is *conceptualization*. Nor is it an intuition, an inspiration or a revelation. The germinating nucleus of any project cannot be qualified as *concept*. *Conceptualization* consists in soaring ideas to high abstract levels and this is solely the task of philosophy.

Consequently, there are some questions to be asked. Is the sin of using terms empirically and improperly so serious or do the benefits exceed the effects of mystifications by degrading them? The excessive resort to "*conceptualization*" might not be harmful, but a harmless bragging or possibly beneficial, i.e. motivating. Even the architectural ideology referred to as *Conceptualism* has not achieved its very declared goal. However, in an oblique and belated fashion, it ultimately managed to put an end to the inertia of the traditional architectural culture, to revitalize it by ascribing new meanings to it and to open new horizons. All this, while running the predictable risk of deviations. But did the trivial circulation of these noble words produce any change in creative design within the Romanian school? Or was it just euphoria around the import of fashionable words that vainly parasite the architectural rhetoric?

It is too late now to be rigorous when it comes to terminology, so we cannot be but tolerant, it is only highly recommended to make it with full knowledge.

Installations

As early as 1913, Marcel Duchamp introduced the *bicycle wheel* as the world turned upside down. It probably was the first form of non-art and one of the last consequences of the Avant-garde, issued avant la lettre. Duchamp was thus the one who paved the way for the future conceptualists. He had ruled out not only the artist's craftsmanship, but any other subjective involvement on his part as

well, any personal means of making an idea expressive, and all this, to the glory of the object *per se.* It was his way of protesting against the formalism of the bourgeois art.

It was then during the 60's when the *conceptual art* was launched as a sort of Duchamp-Revival trend. It also jetted the traditional aesthetics of the work of art, favouring the *"idea art".* The conceptualists considered the *conception* and the very *process* of creation as more significant than the ultimate material form. Sol Lewitt defines conceptual art as: ""*I will refer to the kind of art in which I am involved as conceptual art. In conceptual art the idea is the most important aspect of the work. … It is the objective of the artist who is concerned with conceptual art to make his work mentally interesting to the spectator, and therefore usually he would want it to become emotionally dry. … Conceptual art is made to engage the mind of the viewer rather than his eye or emotions...* (Duchamp, too, aimed to save the traditional art from being simply "retinal" and to put it in the service of the mind.) … *The idea becomes a machine that makes the art… When an artist uses a conceptual form of art, it means that all of the planning and decisions are made beforehand and the execution is a perfunctory affair.*"[1]

One thing is clear. Visual arts as well as architecture hijacked the term in order to give an intellectual name to the most cerebral artistic trend of all the times: *Conceptualism.*

The *Concept* as a concept and noodles packaging

When searching *conceptual art* on Wikipedia, you find first a note: Not to be confused with *philosophical conceptualism*! Apparently, Wiki has its experiences as well.

The general temptation of innocently confusing the terms was big and proved to be irresistible. After the elegant use of terms like *conception, conceptualization*, *conceptualism*, and after Eiseman's *Conceptual architecture*, a wave of ponderers ruminated on such terms thereafter. After all, uttering them with noble easiness makes you feel so clever! Why not adding to the repertoire the term *concept* as well? It is a simple derivation and it does not hurt anyone.

Image 1, 2. "The most insolent… we are the creators of concepts!" (Deleuze)

Could that ingenuous finicalness have moved Deleuze to deal, in *Qu'est-ce que la philosophie*[2], with the issue of concept – so that it may become clear for everyone, once and for all? Or could it have been the fact that Peter Eisenman had actually taken over to the field of architecture some concepts from his writings, unleashing thus the dilution and the degeneration of the ideas among visual artists? The sure fact is that in 1991 the philosopher stated that the production of concepts was a process pertaining exclusively to the sphere of philosophy. They are not products for sale, as some might think, he said. "*The most insolent are the information technology, marketing, design, advertising and other disciplines from the field of communication, which have granted themselves the prerogative of handling the notion of concept, saying: it is our business, we are the creators of concepts!*"[3] The inflationary use of such term practically deprived it of any meaning. "*It is hallucinatory how noodles packaging has become a notion or concept, and its designer, a philosopher!*" Deleuze defines philosophy as knowledge through concepts and says that no idea becomes a concept without the intervention of the philosopher. Art, which departs from social needs, cannot even handle concepts, let alone produce them. The concepts are imagining of the spirit, solely produced by thought; abstract projections, intellectual units, theorems...much like meteorites. The same thesis has been promoted by Nietzsche, according to whom thought is a creation of notions. Philosophers do not receive the concepts as gifts from an enchanted world, but produce them through thought; otherwise, any gift would be suspicious. The truth exists only when it is produced by thought, stated Nietzsche.[4]

What are then the notions and concepts doing in art and architecture? Are they forbidden to enter it? Under what conditions are they allowed to cooperate with philosophy? Deleuze explained: all arts can intersect with philosophy, and successfully so. Philosophy provides the concepts, which the arts transform into ideas that are very beneficial for the production of objects. No synthesis here; each idea remains a unique creation in its discipline, and in order to process it, the discipline uses its own means.[5]13 In the art object, the idea and even more so its conceptual kernel remains connected to the specificity of that art. Thus, a concept expressed in an art is completely different from the same concept expressed in a different art or in architecture, and, naturally, something completely different from the philosophical concept.

Maybe, then, conceptualism could give us a Deleuzian, or a Derridian, sometimes a Kierkegaardian art – just thinking.

Finally, working with concepts entails cooperation between artistic disciplines, also says Deleuze, and gives an example: a writer turns a philosophical concept into an idea for a novel, and the filmmaker follows the idea of the novel and makes a movie. But beware: ideas are not concepts. Therefore, some architects, like Campo Baeza, are right to avoid the term *concept* and to replace it with *idea*. It is wiser on our part to remain friends with the vain philosophers. Aren't we just like them, anyway?

From Conceptual Architecture to playing games with concepts

The adventure of the concept in architecture probably began with Eisenman's speculation titled *Notes on Conceptual Architecture: Towards a Definition*[6] and a few experiments, unconvincing, but interesting as intellectual exercises.[7] Who would have thought back then that those bizarre entities conflicting with the traditional logic of architecture would trigger an architectural trend, cause us to read postmodern philosophers and launch the extraordinary career of the concept of *concept*? Two were the declared origins of Eisenman's speculation: the conceptual art of the 1960s, which had just about run its

course, and the philosophical theories still fashionable in Paris.

Thus, forty-five years ago, *conceptual architecture* was launched with a very clear meaning in the world of theoretical architecture: "*A conceptual structure is that aspect of the visible form, whether it is an idea in a drawing, or in a building, which is intentionally put in the form to provide access to the inner form or universal formal relationship. … In order to approximate a conceptual intention, the shapes which are perceived would have to contain a structure within their physical presence which would have the capacity to take the viewer from the sensed (immediate) perception, to a conceptual attitude, and at the same time requiring of this structure a capacity to suppress the possible primacy of a sensual response.* "[8] And thus, one hundred years ago, art historians discovered the soul of the work under the influence of psychoanalysis, while in 1970 an architect by the name of Eisenman tried to discover the hypostasis of an object's "being" (Sein) following the suggestion of philosophy.

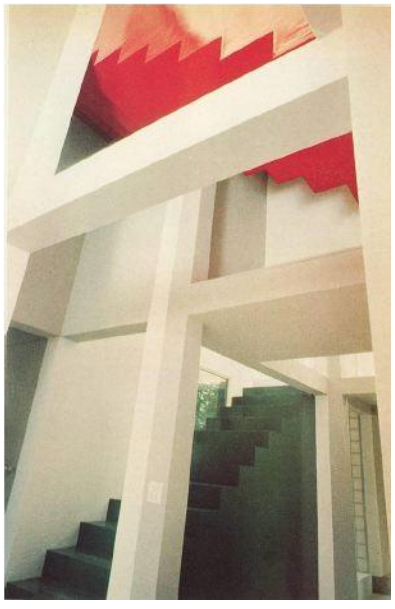
Then, quite surprisingly for an ultra-elitist, meta-disciplinary, sharp and extravagant ideology, it produced a small earthquake. The earthquake was followed by aftershocks and aftershocks to aftershocks, which caused its dissemination. The debates went beyond the circle of the initiated, thanks to those who translated it to the understanding of architects, mitigating its pointed intellectualness and endowing it with more plausible readings. Finally, its increasingly diluted reverberations reached our old mundane architecture which nurtures on reality and hopes, satisfies needs and produces emotions, as we have known it for thousands of years. It was still strong enough to shake some of its certainties though and to trouble our thoughts of good-natured architects. What I mean by that is that it troubled our "vertical thinking", logic, linear, school-trained, formed in the left part of the brain, and forced us to shift our efforts to the right side of the brain, to the "lateral thinking", the quicksand, harbouring creativity and heuristic solutions. What followed was the generalized popularization of the *concept*, as I said, with deviations and misunderstandings, so that the term ended up gaining as many meanings as there are architects on Earth. Things finally settled and a sort of compromise was thus reached, by each architect in turn, according to his possibilities, between the good side and the naughty side of his brain.

Image 3. Marcel Duchamp, 1913: the world turned upside down

Damn the utility and the Overcoming of Metaphysics in Architecture

Eisenman took over ideas from Duchamp and from the conceptualists adapted them to architecture. Since the architect does not manufacture his own objects, he caused him not feel any empathy, to the glory of his intellectual contribution to unveiling the object *per se*. He did so because the closer the object, as receptacle of the idea, gets

to a relative transparency, the purer and more deprived of subjective attachment it becomes. Moreover, because the purpose of art was to elevate the artist's work from manual production to intellectual production, Eisenman abolished the only manual artistry personally produced by the architect, namely the beautiful drawing. The diagrams, axonometries, scale models, naïve sketches were accepted. Further, in order to underline their objectuality, the rough, conceptualist artworks floated in an atemporal space. It was a natural thing for the 20th century, which had marked the victory of space over time.[9] In their turn, to underline the same objectuality, Eisenman's objects were axonometries deprived of a context. Where Duchamp denied the conventionality of art spaces (galleries or museums), Eisenman denied the actual site and its relationship with the object. Where Duchamp despised the public's shallow admiration, Eisenman released architecture from the terre-à-terre claims of its clientele.[10] He was thus liberating architecture from function, disjoining it from the reality which had once determined it and from the future in which it was destined to function, from causality and social effects, to anchor it in an isolated, freestanding present. Where Sol Lewitt had said that the artist's sole contribution lies in the creation of ideas, Eisenman's belief was that the principles of design should not be provided by constructive logic, as had been the case for millenniums, but by a number of abstractions: ideas disseminated through texts, diagrams, scale models, art installations. "Damn the utility", as Rem Koolhaas would have put it.



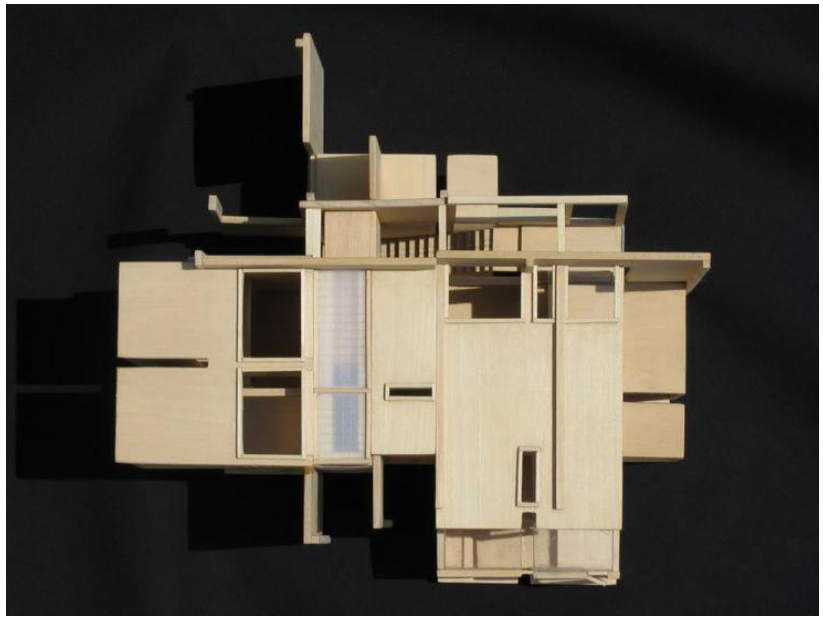


Image 4,5. Peter Eisenman, House VI:
Pillars hangigng from the upper floor, beams carrying nothing, and the red stair that cannot be climbed and leads nowhere

The Idea as Model.

Eisenman has been working on overcoming metaphysics in architecture ever since. In his trans-disciplinary discourse, he commented, among others, the truly modern architects. He criticized modernism because it has only changed the language, but as far as its intimate relationship with reality is concerned, has merely continued a millennium-long tradition. Since it started from real needs and not from concepts, modernism has never managed to formulate a theory, he said. A pertinent theory of modernity would have been a mental construction, which would have confronted the entire set of problems pertaining to modernity in relation to its architecture. Yes, it is true, Gropius aspired to fuse the architect with the craftsman, while Eisenman was now aspiring to fuse the architect with the philosopher. He also talked about how architects worked with the media tools and the alternative materials, about performance as present action, communication, objects in space with preeminently conceptual attributes. His discourse recalls Deleuze, Foucault, Derrida, implicitly Nietzsche, occasionally Chomsky and Vattimo.

For instance, Eisenman takes over from Michel Foucault the thesis of the de-centered subject, according to which the absence of the subject is a pre-requisite for the object to disclose part of its essence, as otherwise the subjective language would render the object's intention unrecognizable.[11] He also criticizes anthropocentrism, saying that man, who had been positioned at the center of the world by Renaissance, needs to take a step back. Thus, the objects must be freed from man's omnipresence and from the obligation of referring to him continuously, in order to be let to talk only about themselves and their objectuality. This is how we can attain an architecture similar to a self-referential sign, to a conceptual structure, an architecture about architecture and not one conceived by man for himself, to embody him and his needs. Such an architecture goes beyond its function, constructs and geometric logic. It is an architecture deprived of the meanings ascribed by subjects through introspection, following their imagistic or aesthetic experiences, which are derisory anyway compared with elevated thought. Here we come across Derrida's thesis of the presence of the object as text, beyond which there is nothing.[12]

Consequently, Eisenman wishes to separate architecture from function, history, beauty, reality, visions and other creative drivers, to reach an object-per se - which can exist independently from man. It is only in that art/architecture conceived as text that the concept can be read. The rest is commodity. Since Malevich, Mondrian, Joyce, Schönberg and others had successfully pulled this off in painting, music, literature, photography, film and mathematics; he tried on his turn to achieve it in architecture as well, organizing an exhibition where he only exhibited models with roles of concept-objects. "*It seemed that models, like architectural drawings, could well have an artistic or conceptual existence of their own, one which was relatively independent of the project that they represented*", he commented.[13]

Image 6. Peter Eisenman, Memorial for the Murdered Jews, Berlin, 2004

Theory and Practice

The conceptualist "theory" is unrealistic when it comes to architecture, and this was obviously known by its creators: Archigram, Superstudio, Bernard Tschumi, Peter Eisenman, Diller + Scofidio, John Hejduk, Daniel Libeskind (each with his own contribution). Colin Rowe, a level-headed man, described Eisenman as a *radical formalist* and *post-humanist*. Nor can there exist in architecture self-referentiality, un-historicity, non-functionality, non-contextuality, anti-constructivism, or autism. An abstract architecture, impossible to perceive through the traditional systems of subjective significances, cannot exist. An architecture deprived of memory and visionary future, floating freely and serenely like a fiction in a sterilized present, an architecture independent of reality, which it ignores and does not represent anything, would be a failure. However, the concoction of this story about an architecture which can only be philosophically inquired flattered the architects and revitalized the architecture itself.

It has certainly flattered the Romanian architects, too, and set about thinking in the school of architecture. So far, this is all.

However, in other places, the idea of interdisciplinary borrowings, for instance, which can be found in the definition of conceptual architecture, expanded the borders of architecture. The professed intention of the introduction of ideas from linguistics, philosophy, biology, physics, literature, mathematics, film, music, photography, sociology, psychology, plastic arts, digital technique or dance

was to liberate the object of architecture from the dictatorship of the beneficiary and also from the sufficiency of craftsmanship and technology. Now elevated to the rank of an autonomous, pure and elitist existence, architecture could only be fertilized epistemologically, in vitro. For whom, in fact? It doesn't matter. What matters is that in this refined way, conceptualism functioned as a gateway towards other fields of knowledge.

Although a little arrogant, conceptualism was an elegant and open trend. It acknowledged ab initiam what it owed to systematic thinking and artistic ideologies. Eisenman owes a lot to Derrida, Deleuze and Guattari, to Chomsky, Foucault and Vattimo; Tschumi owes to Guy Debord, Diller + Scofidio to Lacan and everybody to Nietzsche, Heidegger and Benjamin. It was also a nonchalant trend: so what if an experiment with a Deleuzian blob or a deconstructivist theory were, in reality, less interesting than their "theories"? We criticize the building, but we retain the theory and try it again. It would be nothing, if there were just projects. However, Mark Kingwell was concerned[14] with the costs of such an attitude, when the star architects constructed big "I-con's"[15] following ideas by Heisenberg or Gödel, using a lot of public money, and asked the rhetorical question: what shall we do when the circus leave town and the commotion is over? Shall we have to live and work in and among the concept buildings? But time has appeased its worries. The time of the big star architecture is over.

What would be the conclusion? Conceptualism, neither in its ethereal, nor in its vulgarized version, has destroyed the traditional notion of architecture as functional edifice, as creator of emotions and aesthetic experiences. Because the ethereal one remained only in theory; the vulgarized one was distorted and adapted. All they did to our architecture was to shake it a little, so as to prevent it from falling asleep, and to shock the architects also to stop them from falling into a deep sleep, comforted by their usefulness and their beneficiaries. And it also opened up some new paths.

It also meant a step forward in the development of the architecture's self-awareness. As proof, we have the development, since then, of its theoretical and critical mechanism, albeit taken over from professional thinkers.

There is pnly a couple of variants of conceptual architecture that have remained nowadays. One of them is focused on design as a heuristic and research process. The project begins with an idea, the idea is processed through experiments, and the outcome is a lesson, expressed in forms which are not meant to be used for construction. What matters are the intention and the endeavour, which questioned old and new values such as mobility, context, communication, the space-time relationship, typology and archetypes, inter-and trans-disciplinarity, formal aesthetics, sensory perception, complete reception etc.

Another field opened to conceptual architecture or whatever is left of it is Microarchitecture and any experimental architecture, mobile or ephemeral: pavilions, temporary facilities, installations, exhibitions, performances, shelters. Mona Mahall calls these reactions to what she names "globalization in a mobilized form"[16]16, i.e. a reaction to star architecture of the Guggenheim-Bilbao kind. All these small, innovative objects are almost self-referential, thus responding to one of the basic claims of conceptualism; they are individualized. This architecture is able to probe the unexplored facets of the discipline and entails niche specializations and extra-disciplinary specializations of the authors. The research relating to this architecture does not revolve around the classic architectural values, but explores unusual perspectives, uses unconventional, often cheap and unpretentious materials and systems, new or borrowed from industries and unrelated to architecture.

In the meantime, the reality of life has managed to soften Eisenman as well. The Memorial of the Holocaust in Berlin, for instance, definitely allows, in my opinion, a "conceptualist" reading – if it must have it – only there are so many things "beyond the text"! Evocation, emotion, haptic experience, response to subtle social needs. And none of the provoked sensory perceptions or the suggested analogies contests its intellectuality. And so it happened that he, the very patriarch of abstract architecture, has proven to all of us that at least here, during our life on earth, the spirit cannot be severed from the matter.

Illustration Source

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[9] Michel Foucault, *Des espaces autres*, 1984. The 19th century was concerned with history, development, time, evolution, cycles, while the 20th century was confronted with space. To build as much space as possible (possibly in the shortest period of time, author's note). Michel Foucault would call it the modern obsession with space.
[10] The peak of his contempt for function, House VI from 1973, with its red staircase which cannot be mounted, leading to a floor which doesn't exist, is merely a complex geometrical system. It does not answer any needs or expectations of its beneficiaries, being merely a game of the representation of a unique reality: the reality of the object's presence.
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[16] Mona Mahall, *Eupalinos and the Duck: Conceptualism in Recent Architecture*, in Journal #28, Oct. 2011. The mobility in architecture means to mobilize plenty of cash in the name of the immovable.

CONTINUITY AND FRACTURE, OR MEMORIES ABOUT A STRONG DISCONTINUITY

Prof. PhD. Arch. Anca Sandu TOMASZEWSKI*

It seems that polemics, the Avant-garde and the revolutions have generated the great ruptures in the history of civilization and in the aesthetic culture, along with big leaps in the world's evolution. They have awakened the critical reason, which on its turn has supported the brave ideas and the new mentalities. In arts, they have favoured the originality and adequacy. It is a true fact that the inevitable fractures in the continuity of the existence have bothered the sweet laziness of the popular spirit, but the spirituality has enriched. As Gianni Vatimo said, the aggressive thinking has disturbed the "pensiero debole", i.e. the "weak thought" which is always comfortably settled in the cultural inertia.

Talking about the "progressive weakening ontology" of postmodernism compared to modern times, Vatimo continued a Nietzsche-Heideggerian demonstration. While favoured by the present crisis of Hegelian dialectic and a decay of the strong metaphysics, the decline of differentiated thinking is accompanied by a "weakening of the being", he noted. In other words, great thinking has become more and more defensive when facing the challenges coming from the fundamental research; it increasingly indulges in daily contextuality and transience and dissolves itself in the networks of a society that turned to be a simple body of communication. This means a simple and trivial way to Jürgen Habermas' "undistorted communication", which is spontaneous and uncontaminated by abstract judgement. We therefore live in a society of generalized weak thinking, which is both good and bad. It may be more tolerant, more permissive, thus mitigating the other fracture, the one between elites and masses. But it is also a sign of failure, showing that man gave up the common old culture of the big thoughts.

The great historical ruptures of the old strong times have therefore led the humanity towards either disaster or progress, most often to beneficial leaps accompanied by injustice. However, they have refreshed the sensitive world with either the help of a papal bull or a guillotine. Things happened more peacefully in the art world before the time of avant-garde when Mondrian, for instance, said in his advocacy for abstraction: "I think the destructive element is far too neglected in art!" Now, we, the ones weakened by postmodernity, are yearning for the welfare of continuity in the most condemnable and shameful fashion; we indulge in the spirit's drowsiness, witnessing the hijacking of astral moments into déjà-vu clichés.

One thing is clear: continuity is comfortable, rupture is thrilling. The question remains: should our art and architecture be comfortable for the sake of the masses or thrilling according to our ambitions? The popular aversion against revolutionary theories and the avant-gardist thinking is understandable, but on the other hand, abdicating from their values is hard for the survivors of the great thinking.

I don't have a clear-cut answer, but I see people who want to see continuity where architects agree there were ruptures. For instance, in an article published in "Dilema veche", an anthropologist (Vintilă Mihăilescu) has stated his approval towards a doctoral thesis on the history of architecture, when he read that the author asserted that Ceausescu's type of urban project had not been invented by

* Prof. PhD. Arch. Anca Sandu Tomaszewski: Faculty of Architecture, *Spiru Haret* University, Bucharest.

communists, but it could be traced back until the ancient times. That is true, only the reiteration of the hegemonic moments here and there in the history does not mean either the continuity of totalitarianism in history, or the monumentalist city planning in the life of the European cities. The mankind has not evolved continuously according to the urban principles of the Mesopotamian kings, but it was also an agora built by those ancient Greeks who invented democracy. Eventually, there were countless other moments of urban democratic and progressive thinking between the creation of the Procession Way of Babylon, Speer's axis for "World's Capital Germany", Le Corbusier's segregationist and functionalist-monumental vision of the Modern City, and Ceausescu's "Victory of Socialism" Boulevard. The European medieval city organization is an example of an organic and cohesive community atmosphere. As for the communist civic centre in Bucharest, the reiteration of an old hegemonic urban vision at the end of the second millennium AD meant a fracture in the evolution of the city, while the breaking of thousands of human destinies meant a fracture in the evolution of the Romanian society.

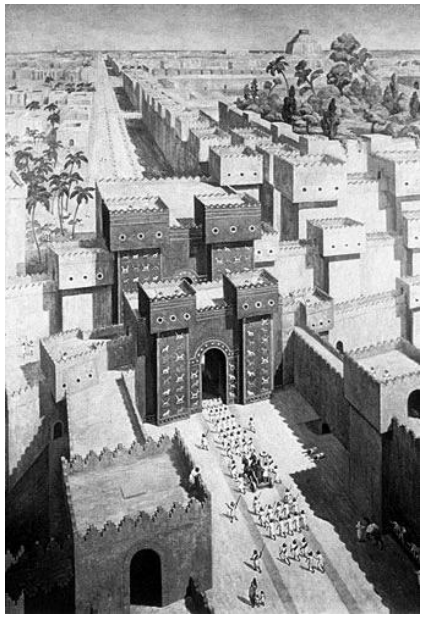

Image 1. The Processional Way in Babylon, built 615 BC them, binds the royal palace to the temple site and passed through the Gate of Goddess Ishtar.

Image 2. "Avenue of Glory" ("Prachtallee"), a monumental axis within Albert Speer's reconstruction project for Berlin, during the Third Reich; an idea designed in 1942. The project was called "capital of the world, Germania". "As world capital Berlin will only be comparable with Ancient Egypt, Babylon, and Rome! What is London, what is Paris compared to that!" commented Hitler.

Image 3. A famous replica from the 1980's: Boulevard "Victory of Socialism" in Bucharest.

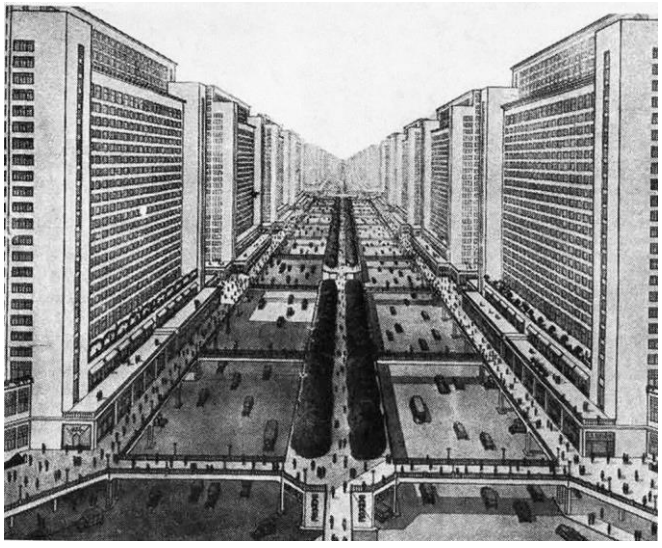

Image 4. „La ville radieuse", Le Corbusier's project of 1922.

Image 5. Sheik Zaied Road in Dubai.

Image 6. „Victoria Socialismului" ones more, viewed from Ceauşescu's balcony.

The author was obviously looking at things from another social-human perspective when saying that none of the last three tragic moments in Romanian history – neither the war, nor communism, nor

the '89 revolution - managed to break the Romanian society into three. Maybe not, but it is true only when we are looking at the big scale of history and society. Perhaps, our own existence as Romanian does not indeed consist of two lives, one during communism and one during capitalism. Perhaps fascism, nationalism and the extreme leftism have failed to derail either anthropological structures or the evolutionist flow. Maybe most political turning points have not succeeded to change the social and individual destiny of mankind as much as they would have liked. Then it makes sense to me when Vintilă Mihăilescu says that "*society and the people who compose it spend their time in ways far too subtle and profound than those suggested by our temporary classifications and frontiers*." I am not sure whether *subtle* or *profound* are the right adjectives, but *stable* and *pragmatic* would certainly be.

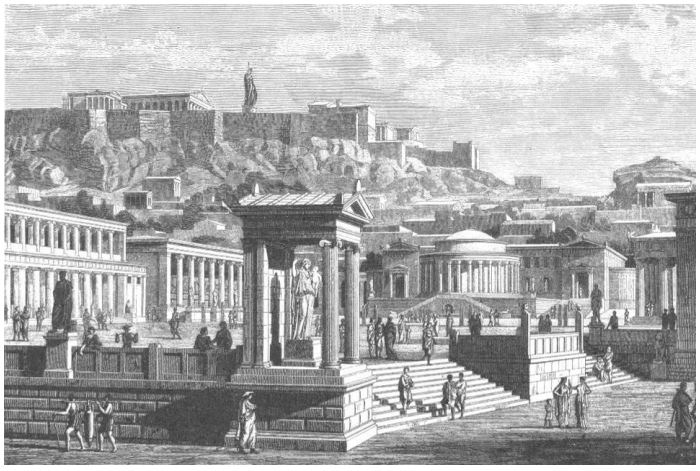

Image 7. A reconstruction of Agora of Athens.

Image 8. A fragment of Raphael's painting "The School of Athens"; Plato and Aristotle are in the foreground.

Image 9. Civic space in Venice around 1730-35, a painting by Canaletto.

Image 10. A street in Edinburgh during the Victorian era, painting by Louise Rayner.

The democratic vision.

Image 11. Along the Avenue de la Grande Armée, in Paris-Défense („the Mitterand axis")

Image 12. On the steps at la Grande Arche.

A combination between the two visions.

When looking at history, politics and society in this manner, things maybe do happen in the same way when it comes to architecture and urban planning. Ideological points of no return and classifications are made by "strong thinkers" whom the decent people usually have no an idea about. While great upheavals were going on in Renaissance, Neoclassical or Romantic arts, decent humanity kept on practising its common art in a touching – or is it annoying? – the millennial continuity. It was only in the twentieth century that Modernism managed to produce a crevasse between a "strong" Modern art and an audience that was too "weak" to assimilate it. But this is another discussion.

The turning points have always been caused by the restless peoples, who have permanently tried to change the trajectory of history or art because they did not have the time to stand on the side and watch them unfold so slowly. As a rule, it was the vain ones who, imbued with revolutionary gusto, hindered the progress of the world with their perpetual new beginnings. On the other hand, the geniuses are those who managed to derive beneficial renewals. It all depended on the value of the individuals and the position of the constellations. What is certain is that the road from the revolutionary innovation to the changes within social conscience is winding and tricky. It has firstly to cross the crevasse between the innovators and the public, and then to deviate that flow of popular inertia. But what would happen if society spontaneously absorbed all extravagances arising from our pathetic search for originality? Wow! And this is would be a topic for a later discussion.

The artistic avant-garde has caused the rupture from society out of sincere love for society. The modernists asserted that the millennium-long evolution had led to individualism in art, a most damaging

social effect. Therefore, they have struggled to mend the rupture between the individual and the universal, until they gave abstract art to the people. That one was now reduced to some sort of "universals" – for everyone to understand. Well, "they struck at Tib and down fell Tom" the people would have said, had it been aware of what was happening. Only that he didn't understand, didn't even try to understand, and didn't accept it, either. The art world alone went its own way.

Than Heidegger, a moderator between people and its benefactors rehabilitated the individual. Speaking about architecture, the creators who were overwhelmed by Heidegger's authority immediately became individualists again, and started to bestow new noble distinctions upon one other, such as *existentialist* or *phenomenologist*; it was in the line of *count* or *baron*. If some architects in the north of Europe, let's say the Netherlands, were keeping in touch with the people, they would be called *structuralist* by the French people*;* that was some sort of a *Lord*.

Although post-structuralism dealt with all sorts of reweaving of torn tissues, nobody has drafted a "popular aesthetic theory" of architecture in order to redo the link between the big creation and the people. The critique keeps on issuing theories, resorting to philosophical terms and ideas, probably aiming the production of a more beautiful and ethical architecture. When ordinary architects have finally translated those strong theories, a new leap tends to derive out of this tension. In the meantime, society keeps on happily building its balusters. And this happens, in spite of our indignation, the architects, historians, sociologists, philosophers of culture or anthropologists. In other words, the society goes about its continuities, and we go about our *polemics*, *avant-gardism* and *revolutions*.

A couple of years ago, thinkers like Manuel de Landa, *the co-rupter*, used to propose new leaps on the roads opened by the digital revolution. There were, indeed, much more exciting than the continuity of mediocrity in the creation of the community, an obsolete theme, as well as a lost cause. But society involved itself from the beginning and things went meanwhile out of control.

We could also meditate, à propos, on a theme such as rupture vs. continuity between generations. We should not forget, for example, that Manuel de Landa is Gilles Deleuze's successor and his challenger as well. But we are going to do it in the autumn. Until then, we shall have spent our holiday amidst nature or well-preserved historical centres. That is, in the world of sweet laziness of spirit and individualistic passions, where mawkish, outmoded leitmotifs such as *partir c'est mourir un peu* still hold their ground. *Partir* means a sort of *rompre*.

Illustration Source:

1, https://i.pinimg.com/736x/47/2c/8e/472c8edb908e0ba2e27e7b12f7dbef01.jpg
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SKELETEON, SEMANTICS OF REPRESENTATIONS

Assistant Lecturer PhD Sculpt. Arch. Oana POPESCU- COLIBAN*

Abstract

The world of today instinctively uses a series of symbols and representations whose source and initial connotation are lost. The skulls and skeletons flashed on the pink T-shirts of the teen girls, phone case covers, baby onesies and cartoons are just a mere fraction of the contemporary interpretations. The tattoos, dramatic representations, horror movies where skeletons come to life, though dreadful, are not malignant or tougher than certain historical depictions – engravings, paintings, sculptures or architectural or decorative sets. All these forms and images need to be semantically decrypted in the temporal and cultural context of association. The image, a communication code, is also an instrument of manipulation. The man will initiate a certain relation with life via religion or its denial thereof. The pure representation of the skeleton or of the skull triggers a great emotional load, refers to life and its ending.

Keywords: *skeleton, skull, death representations, symbology of representations, fear, memento mori, macabre dances*

INTRODUCTION

The skeleton and the skull in particular is part of the cultural data, filled with symbolical senses, which also belong to the universal non-verbal language.

The representations of the skeletons and skulls are nuanced, enriched by a diverse semantics, depending on the message to be conveyed, the cultural context and, clearly, on the historic time of reference.

These images, non-natural yet always traceable human representations come from the desire of shocking, of drawing attention or of outlining a certain type of space or event.

A bizarre but also frequent thing is the representation of the skeletons in spontaneous attitudes, of the living, and not of the decomposed bodies. The dissociation of the living and dead worlds is specific for only certain cultures, while others are seeing to melt away this frontier, to *lead* the living world by a constant reference to the *after-world*.

It is sure that all the semantic decryptions concerning the skull and skeleton have a connection with death, even when dreaming about life, in an antithesis.

The emergence of such type of representation is lost in time and the lack of data and images are limiting my observations to the stage of suppositions. The few examples herein are trying to lay out some aspects, connotations and mentality changes in the public conscience.

* Assistant Lecturer PhD Sculpt. Arch. Oana Popescu- Coliban, Spiru Haret University, Faculty of Architecture, Bucharest.

THE FIRST REPRESENTATIONS OF THE SKELETONS – *assumptions*

While the most theories connect the emergence of the representations of skeletons and skulls to the ‚Black Plague'[1], when death was turned into a personal form and present everywhere, that was surely not the first contact of the people with the dead bodies and their bones.

The beginnings of the medical science are quite distant but this study will consider relevant the surgical interventions conducted in the prehistorical times – trephine and amputation. The Egyptian surgeons were opening the abscesses and doing the circumcisions, while the embalmment techniques proved a superior knowledge of the human body. In ancient Rome, surgical instruments were invented, such as forceps, scalpel, speculum and the surgical needle. The Latin space preserved representations of skeletons prior to Vesuvius [2] eruption in Pompeii. The first mosaic shows a skeleton holding two wine amphorae, a sign for going to a party[3], while the other one displays a less decomposed body, in a more pleasurable attitude.

Image 1. Roman mosaics found in Pompeii vila

Despite of the above, it seems that the oldest representation of a skeleton is a mosaic from the 3rd century AD, called the ‚**Reckless Skeleton'** and discovered in Hatay Province at the Turkish-Syrian frontier, in the ancient Greek-Roman city of Antiocheia. According to the archaeologists in the Museum of Archaeology in Hatay, there were also two other scenes in mosais that were adorning the dining room of a house belonging to a high-class family.

Image 2. Reckless Skeleton, mosaic, 3rd century AD, Hatay Province, Antiocheia

The unusual representation blows life into earthy remains when placing them into attitudes vivants (the lying position was the banquet stance for the Romans) close to the riches, wine chalices and amphorae and also a loaf of bread. The position of the skeleton makes reference to the wordly merriment – ‚Be happy and live your life'[4]. The translation of the Greek term *euphrosynos* refers to the party-goer, the *one of good cheer*. Whoever spent all his life having fun, eating and drinking, never thought of death, even it would also touch the ones living wordlessly. The image can be thus construed as a very early *Memento mori.*

THE FUNERARY SYMBOL

Even though the first representations are true discourses for supporting life and feasting, the most popular symbols are funerary, the ones exploiting the idea of turning the living body into a skull or skeleton. Nowadays, the funerary space still clusters such images on slabs, crosses, funerary stelae or complex sculptural ensembles but they date from the early Christianity. The tomb stones were assigned this symbolical language before being given inscriptions with the names of the deceased.

The skull and bones – is to be found on the monuments of the most Christian rites and it is always schematized, carved in bass-relief or even engraved. It can turn into a decorative motive when receiving volutes or vegetal elements but it is easily recognizable. The mandible is missing but the two bones (femora) are present most of the time. They are very often placed under the skull, not behind or in front of it.

The skulls can be included in real monumental compositions, statuary or architectural, thus forming sophisticated parables, accessible to only those knowledgeable of deciphering symbolics.

A relevant example is the funerary monument of Grigorie Dimitrie IV Ghika[5] (b. 1765 – d. 16.10.1834) in the small cemetery around the Chapel of Ghica Palace[6], mentioned above in the paragraph about Eshaton.


Image 3,4. Funerary stelae in the Cimitirul din Deal – Cemetery of the Evangelical Rectory in the Medieval Fortress of Sighisoara

Image 5. Elena Flilti's Slab (1823 – 1878), Bellu Cemetery

Image 6. C. Cantacuzino's Slab, Bellu Cemetery

FUNERARY PARABLES – the skeletons

The western countries have collected the most parables in the funerary space, monumental developments of large dimensions, meant to shock the onlookers, to convey strong feelings about departing this world.

Image 7. Image of the goddess of death, Hel, unfinished project

Image 8. Death sitting on a rock crushing a boat, arch. J. Alaux, Tomb of Captain Catherineau, Bordeaux, Chartreuse Cemetery

Image 9. Grim Reaper in Melaten Cemetery, Köln, author - Marco Verch Sursa foto?

The first chosen image is an allegoric representation coming from the Norwegian mythology – Hel, the daughter of Loki and Angrboða. When Odin[7], the supreme god, gave away gifts to his children, he handed her power over nine worlds. She became the mistress of the ones dying of old age or sickness, namely non-heroic deaths that were not worth of a place in Valhalla. This goddess of death was living in Niflheim, a world of coldness and ice, of nine frozen rivers that stand for the nine realms of her kingdom. The deity takes the shape of a young female character, winged angel and draped on her right side, while the left side, the same decomposed presence limits to the skeleton covered by rotten drapes.

The second funerary sculpture shows the *Death sitting on a rock crushing a boat,* arhitect J. Alaux, a spectacular allegory in the manner in which the struggle of the death time at sea is counterbalanced by the pyramidal composition, stable and even static to which the death personification brings its contribution. The draped skeleton, the scythe in her hand, is expressionless but embodies an impacable presence, disconnected from time and events.

A third example is Grim Reaper in the shape of a draped skeleton. The volume, carved in stone, develops on the vertical direction into a slightly pyramidcal composition, framed by the stones in the inferior side and by the clepsydra on which the character is leaning his right hand. This element that symbolizes the passing of time left until meeting with Death is outweighted by another one, a scythe held in the left hand.

Besides the funerary monuments giving a real shape of the idea of death, another important funerary topic is where the deceased is represented on the bier, dead or in the form of a gisant[8]. These monumental shapes of marking the funerary space are favored by the aristocracy and the crowned heads. It is also them who would prefer the sculptural developments where the deceased – sometimes both spouses – are shown on their knees in prayer. An example is the Orans of Marie-Antoinette and Louis XVI (the monument commission was made by Louis XVIII in 1816 by Edme Gaulle and Pierre

Petitot, completed in 1830). Another representation of death is where the deceased lying on the bier is on the onset of decomposition – this is called *gisant–transi.* The oldest example preserved in France is found in the Museum of Laon as the monumnet of Guillaume de Harcigny, 1394. He is the famous doctor who provided medical care to King Charles VI.

The image of death among the four horsemen of Apocalypse

In the context of the largely diverse representations of Death, I will remind of a particular case, where Death is human and alive. It is the last of the four horsemen of Apocalypse[9], along with Pestilence, War and Famine.

Even since the Middle Ages, the representation of these horsemen has been given a symbolical code helped by the colors of horses, clothing and the accessories worn by these four, as well as by the dynamics of the characters or the dominant chromatics of the entire portrayal.

Death is neither the being riding the black horse (Famine), the red horse (War) nor the one on the white horse (Pestilence). All these horsemen were bringing all the wraths as the world knew them at that time, which were culminating with Death, the rider on a yellow-green, cadaverous color. This last horseman is not described as carrying a weapon or another object, but he is followed by Hades (the place or the state of the bygone spirits). He is often represented with a sword or a scythe.

Image 10. Lorvão Beatus, Lisbon, ANTT, Ordem de Cister, Mosteiro de Santa Maria de Lorvão, Liv. 44, fol. 108v.

Image 11. The Four Horsemen of the Apocalypse, Turin Beatus Codex, Beatus of Liébana, Spain

Image 12. Albrecht Dürer, 1498, The Four Horsemen, from The Apocalypse

The skull and bones at the Knights Templar and the secret societies (freemasonry and *Skull and bones 322*/" Bilderberg Group")

According to certain sources, the skull and crossbones, displayed on some Templar flags, was the symbol of Christ crucifixion and rebirth. One hypothesis favors the idea of this flag as a loan by the pirates who were flying it to show support for the Templars' activities.

Another hypothesis is the one in which the dissolution of the Templar Order has triggered the borrowing of the already existent pirate flag by the exiled knights.

Image 13.

Image 14.

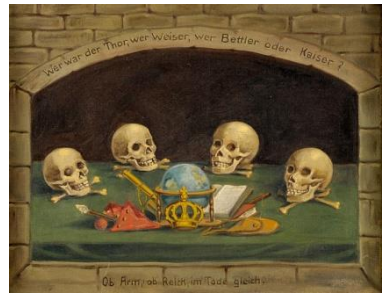


Image 15.

The emergence of freemasonry[10] is difficult to date, since there are deep roots in history, among the priests of the ancient Egypt, Pythagoreans and Templar Knights[11]. The skull with bones is a freemaansonry symbols, both for the third degree masons and also for secret societies derived from them - *Skull and bones 322* și "Bilderberg Group").

In freemasonry, the skull stands for the physical death, a requirement for the rebirth of the New Man. Death is a prologue of rebirth and evolution towards another level of life, a convention of the ruling in the spirit. The skull makes reference to this initiatory cycle. The secret societies often use symbols such as *Plumbline/Level* to provide Death with the role of a great leveler.

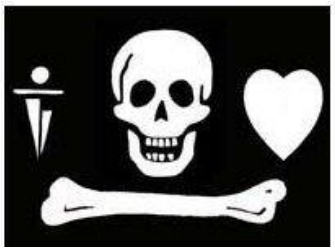
Pirate flags

Piracy has been a profession as old as sailing. Among the sea robbers, a rather large number of them were serving under governments and they were called corsairs. In dependence on the geographical area of operation, the pirates has different names: *buccaneers* in the West Indies; *kaper* or *vrijbuiter* (plumbers) in the Netherlands; *lanun*, in Indonesia or Malaysia and *picaron* were the Spanish outlaws.

The skull-with-bones flag, unanimously recognized as the pirates', was meant to frighten the sailing boats, it was a signal of the imminent attack. In English, it is called *Jolly Roger* (the Happy

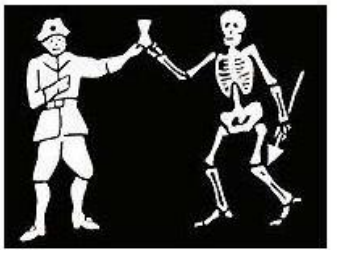
Roger). One of the likely sources can be the French *jolie rouge,* where the red flag was used by the Solomon's Temple knights. Here comes from the possible translation towards Jolly Roger (where *roger* meant vagrant).

Edward Teach (Blackbeard)



Stede Bonnet

John Racham (Calico Jack)



Bartholomew Roberts (Black Bart)

Image 16.

The first mention of the *Jolly Roger* flag was made in the 1742 edition of the *Oxford Dictionary*. Another etymologic source reminds of the same French origin by the history of the buccaneers; they had the habit to tie clothes soaked in animal blood to the mast so that they will frighten their future victims and persuade them to cave in without fighting; these ad-hoc standards were called ‚joli rogue', later borrowed by English.

In the meantime, the pirate black flags have received symbolical elements to customize them. Jack Rackham – also known as Calico Jack[12] – had two cutlasses crossed under the skull on his flag, while 'Black Beard's' (Thomas Thew) had an arm clenched on a cutlass. Flags from the golden age of piracy could be representations of entire skeletons; a known example is Bartholomew Roberts'[13] that includes, besides a skeleton (death), a clepsydra as a symbol of the time flying by for the people who happened to see that flag close up.

The first description of the black flag was made by the captain of the English ship *Poole* in 1700, as a result of the attack conducted by French pirate Emmanuel Wynne, in the vicinity of St. Jago Island.

It is the first depiction of a pavilion being '*black, with a skull and two bones crossed underneath, with a clepsydra next to them*.'

The skull with the bones crossed underneath was the international symbol for **poison**, irrespective of all the other interpretations and contexts.

The skull - Memento mori

The Latin expression has not only received forms and explanations in the plastic arts but also in poetry, photography art (mainly in the Victorian times), tattooes or cinema. The term shows for the first time on the emblem of the German order of *Death's Head* (Württemberg-Ölssischer Ritterorden vom Totenopf), established by Duke Sylvius Nemrod (1652).

The most popular form of memento mori consists in the representation of the *skull* along with other symbolical elements, such as the *Hourglass*- The "passage of time or that time has run out for the individual buried at the location. Its use associated with personified figures of Death and Father Time comes out of a long tradition of mortuary symbolism. Rarely used alone, it usually appeared along with hearts, stars, leaves and sacred flowering vines. It was also the frequent companion of winged death's-heads and bones." *Hourglass with Wings* - Time Flying; Short Life. There are also *sundials* or *clocks* referring to the Transience of life. *Candles blowing themselves out*, the inverted or extinguished - death. *Smoke* - Brevity of life. *Poppies* - Peace, rest, sleep, eternal sleep, consolation. *Rotten Fruit* - The "brevity and the ephemeral nature of life". *Wings, Winged skull* – "Flight of the soul from mortal man." *Wheel* – Wheel of fortune. There are also symbols like *Arrow/Dart* and *Gravedigger Tools* that indicates mortality; *Coffin* – Death; the end of life; *Cornucopia* - A fruitful life and the Urn, a popular symbol of mourning.

In a close connection with these topics there are the *vanitas-like still life*. They further bring a series of objects as well as *musical instruments* and *butterflies* epitomizing the "brevity and the ephemeral nature of life", plus other objects suggesting *wealth*, such as *wallets, crowns, fine clothing*, etc. They are a strong indication of the irrelevance of material goods after death. The *wine*, the *books* and the *bubbles* imply the transience of life with a direct reference to vanity (as in futility, wordly pleasures). *Serpents, Worms* – Temporariness of the body, uselessness of vanity.

The term originally comes from the opening lines of the Book of Ecclesiastes in the Bible: 'Vanity of vanities, saith the Preacher, vanity of vanities, all is vanity.'

This type of representations became more and more popular during the 17th century, a religious time when people thought that terrestrial life is a preparation for the hereafter, the beyond life. In spite of that, modern artists will turn to the same topic, eg. Pablo Picasso and his Goat's Skull, Bottle and Candle, 1952.

A genuine memento mori created between 30 BC and 14 A.D. was preserved in the same Pompeii. It is a magnificent mosaic that exhibits symbols with a later recognition. The skull seems to be inspired from the monkey anatomy, it has ears and a wide and strange proportion. There is a scales above it, letting hang a leaded-end thread. The skull lies in balance on a wheel of fortune. At the ends of the scales, the symbols of power are well balanced (the sceptre and the royal purple, on the left and

the ‚sack and the stick, symbols of poverty', on the right). A butterfly, symbol of the transient life, is between the skull and the wheel of fortune.

The second image is Jacob de Ghey's *Vanitas Still Life*, done in 1603. Starting with the 16th century, the vanity topic flourishes in Flanders and the Netherlands. While the macabre art was becoming more violent in its more explicit imagery of death, this topic was pleading for morality via subtle images of still life and objects filled with connotations.

A third image shows funerary headstones of the 17th-18th centuries in Maxton Cemetery, Scotland. The variety of the expressions of this widespread topic should be appreciated.

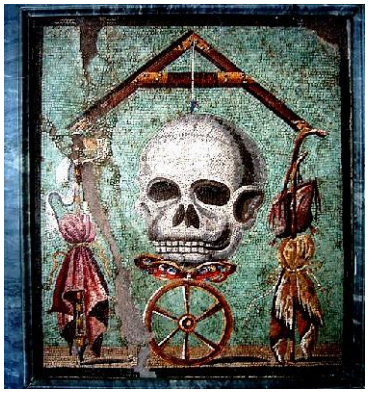


Image 17. Memento mori Pompeii between 30 B.C. and 14 A.D

Image 18. Jacob de Gheyn Vanitas (1603)

Image 19. Headstones in Maxton Churchyard, Scotland (17th/18th c.) Photo: Walter Baxter

Heraldry – the use of skulls and skeletons with an identity connotation

Heraldry is an identity manifesto, relevant for both the labeling of the affiliation to the caste, of the possessions, the influence area and also for the identity designation for the deceased people.

The funerary spaces are richly illustrated with effigies, emblems, coats of arms. There are 56 monuments in Bellu Cemetery [14] only bearing family pennons. The interior of the funerary space does not, however, display those crests receiving identity symbols based on skull or skeleton. The images below are peculiar by the choices made but they convey a series of stories that had already occured in the family history, while trying to erase certain erroneous interpretations hereof.

Image 20.

Image 21. Walter de Burgo, Northern Ireland

Image 22. Coats of arms for Hamond-Graeme family

Image 23. Typographic vignettes, 19th century

The Ossuary in Sedlec is an artistic, architectural monument, a history trustee that will use the human remains in an impressive manner yet hard to decipher by the viewing public. Even the well placed crest will have a difficult time to display the reunited symbolical elements.

To the grave – a rather bored skeleton of Walter de Burgo in the arms of the city of Londonderry, Northern Ireland.[15]

A rather gruesome crest of the Hamond-Graeme family, in which a skull is lifted from a spike in remembrance of an ancestor's 17th-century exploit.[16]

The effigy is completed on top by a ribbon featuring the inscription *sepulto viresco* (coming back from my own tomb).

The fourth image, an engraving, uses symbols related to memento mori - the skull (supplemented with a facial grimace), the clepsydra above the skull and the snakes flanking this outlandish crest. A monogram can be seen in its lowermost center.

Image 24. Duke of Rothes procession – heraldic funeral that took place on 23 August 1681, one month after he died

The heraldic insignias are to be found on the mourning flags, carried by high dignitaries when the deceased comes from an established family. The size of the funerary convoy, the quietness in clothing and the masting of the ceremony paraphernalia are ritualistic elements, mainly when the coffin needs protection and it is carried under a ridged funeral armour.

This small section of the funeral procesion of the Duke of Rothes includes his"cavalier" or champion and various types of mourning flags befitting a duke's degree.

The heraldic funeral par excellence: the coffin of the Duke of Rothers is covered with his arms and teardrops. Note this coronet on the coffin.[17]

Artistic compositions – personifications and death parables

There is no life without death. Death escorts us and sometimes it takes a detour, mindedly or not. Death is not all ears to us, does not fulfill our wish list….

A striking composition is the one with Adam and Eve in Eden's Garden, where they let themselves tempted with tasting from the *tree of the knowledge of good and evil* from the *Tree of Life*. The outcome was that they were banished from Heaven and became mortals. The *Tree of Life* is drawn as a skeleton as it mediates the touch of mortality.

Image 25. Albrecht Dürer. *The Blacksmith Fool*, in Sebastian Brant, The Ship of Fools, Basel, 1494

Image 26. The Tree of Life and Death
Typographic vignettes, 19th century

Another memorable composition that juxtaposes the living and the dead worlds is done in a 3D format around the *astronomical clock*[18] (or the Prague orloj) located in the tower of the Old Town Square – Male Namesti in downtown Prague. Along the skeleton, the clock also features the allegoric figures of Lust, Greed and Vanity. The clock was made in 1410, as a joint project of Mikulas from Kadan and Professor Jan Sindel, astronomer of the Charles University in Prague.[19] The presence of the skeleton holding a clepsydra stands for the *Fugit irreparabile tempus* sintagm (irretrievable time flies). The clock mechanisms activate the clepsydra that flips every hour, which gives the impression to the living that time is not on their side.

Image 27. Denumire?

The macabre dances



Image 28-33 Typographic vignettes

Danse macabre, Guyot Marchant, 1491


Lübeck, Dance of Death

Dancing with Death – the acknowledgment of death and unknown – the macabre dances are a constant concern in a Europe troubled by war, pestilence, the Little Ice Age and a dramatic food shortage. The presence of Death could not be missed, it had to be given the nod, taken in arms and subdued. The religious discourse has always placed a pressure of an eschatological connotation. The sermons of the monks were revolving around the end of the world and the Judgment Day. Both the macabre dances and memento mori represent plastic statements of an educational policy. The message to be conveyed would often turn into a play to be interpreted within the cemetery space.

The dance with Death is a stage of spirit readiness and the disparate images are not searching the temperance discourse in memento mori but rather the one of awareness.

The dance with Death will be signed up by poor people and crowned heads, farmers, fighters or priests, old and young alike. The extremes will open and end this dance.

The representation of the skeletons proves a poor knowledge of anatomy, as most of them have a still fleshy body, draped in rags.

The Day of the Dead in Mexico

Dia de los Muertos[20] or the Day of the Dead is both a Christianized holiday and a great festival…on a gruesome topic. Every October 31, the country fills with color, shows and parades, decorations, interpretations of skeletons and skulls. Cemeteries are not forgotten, the graves are gifted with ornaments, flowers, puppets and many candles. The churches will follow in this colorful and cheerful display, where each altar will be covered in a wide selection of representative objects. This is the day when families come together and pray for the relief of the souls of the people left on their spiritual journey. During this holiday, the skeletons are modeled and baked, being enjoyed as sweet treats. The solemn events featured in the costumed parades will become amusement for everyone.

Image 34. Dia de los Muertos

The ossuary and its artistic valences

The Sedlec Ossuary, mentioned in regards to coats of arms, gathers and uses the human remains of a large number of Capuchin monks (40,000 – 70,000). The discourse of the contemporary world is underlain on making an impression of the onlooker to the limit, but the message of this architectural and artistic conglomerate is ‚We used to be what you are now and you will be what we are now.'

Image 35. *The Sedlec Ossuary*

The Ossuary, a small Christian chapel, is located beneath the Church of All Saints in Sedlec, a suburb of Kutna Hora city in the Czech Republic. This is the reason why to be also called the ‚Church of Bones'.

The eschaton, the promise of resurrection

Eschatology, female noun, **is the sum of the religious beliefs concerned with the final events of humanity.**

Image 36.

Image 37. Grigorie Dimitrie IV Ghika's funeral Monument from Teiul

The eschaton can be deciphered in associating images of a rich symbolistics. The funerary space puts together and contextualizes a sequence of symbols that make direct reference to death and also to the promise for resurrection.

The funerary monument right above belongs to Grigorie Dimitrie IV Ghika, located in the former family chapel within Ghica Palace (in the courtyard of Teiul Doamnei Ghica Church). It is a funerary and identity monument, with a carefully chosen symbolism. The funerary monuments of the development were not available to the vulgus, in terms of semantic decryption. As a composition, the center of gravity is the bass-relief in the medalion, the butterfly lifting up in the air and leaving its cocoon (the tomb). The entablement corners show skulls lying on crossbones. This death symbol is toned down by the central medalion with the promise for eternal life, the Eschaton. The western-like style of this monument is visible in the combination of the ronde-bosse sculptures, ‚weepers' and skulls, with symbolical bass-reliefs of a butterfly leaving the cocoon and the worm, which is death. The delicate symbolism is given by the classical or neo-gothic architectonic elements.

The monument has been joined by a contemporary tattoo, similar in simbolistics, which should be ‚translated' in the same manner. The butterfly seems to leave the forehead bone and represents the same resurrection of the dead at the end of the days.

The art of tattoo has branched out in time, going from shapes of a refined symbolistics or to a pure decorativism, emptied of connotations. The tattoos have more and more varied rationale, from superstitions or the equivalent of amulets to shapes triggering fear or hierachies. The skulls will be used as a shield from death and they also carry a component of defiance or confrontation with it, assertion of life or of the hedonistic living (‚Carpe Diem').

The death skull tattoo (and the crossbones underneath) is frequently seen among army people. Some motorcyle riders will get this tattoo counting on its charm value, a safeguard against death. It is often associated with the SS German/Nazi symbol, but its roots date back in time. The *Totenkopfring* (‚dead head ring'), the honor rings, as well as the SS Nazi troups insignia *Totenkopf*, (‚dead head') – have acquired a certain value. They would be the overcome of fear and death by absolute loyalty. Rumor said that such a tattoo on your forearm would help you cheat death.

The crystal skulls, a present concern beyond disputes and authenticity

Image 38. The crystal skulls

The emergence of those 13 crystal skulls debuted in 1924 with the discovery made by Anna Mitchell Hedgez[21].

In 1970, the skull was examined in a Californian lab and the conclusion amazed everyone. It was a facinating, perfect artwork, proved to be a Maya artifact. No traces would be found to point towards a manual work. The skull had been made with primitive tools, yet the precision and finishings were simply astounding. Many people wondered whether that skull had been sculpted by alien civilizations.

A number of 13 similar skulls were unearthed in various parts of the world. In 1990, a crystal skull had been placed by an anonymous person in front of the Smithsonian Institute.

The skull was enormous in size. The specialists tried to estimate its age but to no avail. Some experts were skeptical about these discoveries, stating that the Mayans did not have the necessary technology for this work. The Mayan legends say that these skulls had been made by Itzas for Atlantis' humans. The skull represent 12 worlds, including ours, where the life on Terra is the youngest. These skulls were brought to the Earth to have four civilizations created, namely Atlantis, Lemuria, Mu and Mieyhun. Those 13 skulls were held in a pyramid by the Olmecs, Mayans and then by the Aztecs. It is the last ones to be responsible for spreading them throughout the world.

THE SKULLS TODAY

There are few representations of the contemporary world to preserve the sobriety and expression required by the topic under study. The skulls and skeletons, mere graphic illustrations that inspire the clothing, convey only one message, *I am cool!* The matching jewelery, bandanas or

balaclavas, play the role of a mask, change the perception over an individual, without bringing a real and deep reversal.

Printed T-shirts – the nice skull and the ugly skull

Image 39. T-shirt stand from a rock concert

Image 40.

Image 41.

Image 42.

Image 43. T-shirt stand from a rock concert

Image 44.

Image 45.

Image 46.

The fashion trend of the *ugly* T-shirts, with skulls and aggressive symbols, is not at all new, as it is associated with rock music, style and attitude. The bikers are also building for themselves a *wild* image, starting from the T-shirts prints and accessories or even the ones from motorcycles. The symbols chosen for these prints are interpretations of consecrated topics to which forms and expressions are added, related to flying, freedom or being fearless. The texts often assist with conveying a message. Besides all these, the last years have brought a type of laicization, of removing the connotations of a

representation and of an outlining of a sweet, brightly colored or even frisky image. These prints are used many times by teen girls who are thus designing their maturing process.

Skulls and skeletons for everyday objects

Image 47.

Image 48. Halloween manicures

Image 49.

Image 50.

The loss of a connotation in a representation occurs when the market, the space have become replete with that exact image. The skull, more facile now, decorates the phone case covers with sparkling sequins, nails, jewels, gloves, mugs and desk gadgets, bikes and everything in between. The children clothes, Halloween costumes, the masks or kitchen aprons are everyday objects that display this urbanity veil. The rural space, more inflexible, does not give a green light to such hierachies and insignias. Over there, the skeleton has been assigned one place only....in the funerary space.

The funny skeleton – from cartoons to emojis and animation

Image 51.

Image 52.

Image 53. Emoticon

Image 54.

Image 55. Tim Burton's Corpse Bride (2005)

No matter how much we would befriend with *Death*, it still remains a deeply distressing experience even if lived by someone else. As for children, *Death* should be told about and understood so that they could deal with it better than we did...

How can you explain something you cannot completely apprehend? You narate and keep drawing, explain situations, makes suppositions and enjoy the way the *unknown* turns into *possible*.

How can you avoid nightmares? You *soften* them and stick a human face on them.

The cartoons, diagrams and caricatures make people laugh. Animation will carry us to the dreamland, either as children or grown-ups.

But what are these emojis with skulls and skeletons. Are they the new *macabre dances*?

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Endnotes

[1] The Black Death, the great pandemics that came to Europe from Central Asia around 1347 and lasted until 1351, during which a third of the world population perished. (according to medieval historian Froissart). This disease had a regular occurence between 1361 and the end of the 15th century. The last epidemy happened in England, 1665.

[2] The great eruption of Vesuvius mountain in 79

[3] According to archeologist Demet Kara on http://www.descopera.ro/istorie/15274701-un-mozaic-antic-cu-un-schelet-nesabuit-ii-uimeste-pe-arheologi-mesajul-pe-care-il-transmite-este-si-mai-surprinzator-foto

[4] idem

[5] 1793 – High Master of the Horses 1796 – High Supplying Officer 1799 – 1800 High Stewart 1808 – High Weaponry Officer 1813 – High Registrar 1817 – High Governor, Prince of Muntenia 12.07.1822 – 11.05.1828

[6] Today, Tei Church was built in an Italian neoclassical style in 1833 by Master Weltz.

[7] Odin, the supreme god of the northern mythology, also the god of death and war. He is associated with Zeus and also known as Rognir, Sann, Omi, Ohinn, Oer, Sidhott, Thund, Haptagod, Sidskegg, Sigtyr, Unn, Herran, Herteit, Hropt, Herian, Ialg, Iolf, Ialk, Iolnir, Sigfadhir, Skilfing, Svipal, Blindi, Nikar, Nikuz, Lusifer, Oski, Svidur, Lucifer, Svidrir, Thunn, Vakr, Fiolsvinn, Hergaut, Grim, Yggr, Grimnir, Valfadhir, Haer, Alfader, Haerbardhr, Ganglari, Hroptr, Fiolnir, Gaut.

[8] The representation of the deceased in a dignified posture, of the man standing with the folds compliant with gravity and thus falling towards the feet, but in an inverted and horizontal position, confirmed by the presence of a symbolical animal or a pet under the feet.

[9] The four horsemen of Apocalypse are described in the last book of the New Testament, Jesus' Revelation according to John of Patmos, chapter 6, verses 1-8. The Christian apocalyptic interpretation is that the four horsemen bring the Apocalypse over the world prior to the Judgment Day.

[10] The official version is that the first people who developed degrees of secrecy within the Fraternity were the Scots. This is where the famous Mason Word has been celebrated since 1638, even though, according to David Stevenson (The Origins of Freemasonry: Scotland's Century, 1590-1710, Cambridge University Press, 1988), the annual testing required by the Schaw Statutes drafted on December 28, 1599 might point to the existence of an esoteric instruction at the end of the 16th century

[11] The connection between the crusaders and freemasonry was made official in 1737, in the famous speech delivered in Paris by Scottish knight De Ramsay. The crusaders are hence proclaimed as real parents of Freemasonry, which leads to the settlement of the *Templar* trend in Germany and most part of Europe.

[12] John "Jack" Rackham (26 December 1682 – 18 November 1720[1]), commonly known as Calico Jack, was an English pirate captain operating in the Bahamas and in Cuba during the early 18th century.

[13] Bartholomew Roberts, (17 May 1682 – 10 February 1722) born John Roberts, was a Welsh pirate who raided ships off the Americas and West Africa between 1719 and 1722

[14] Bellu Orthodox, Military, Catholic and Greek-Catholic

[15] The Story and Language of Heraldry, S. Slater, Southwater, 2012, p.90

[16] The Story and Language of Heraldry, S. Slater, Southwater, 2012, p. the crest 57

[17] The Story and Language of Heraldry, S. Slater, Southwater, 2012, p.43

[18] The astronomic clock in Prague or Prague orloj (Czech: *Pražský orloj* [praʃskiː orloj]), was mounted in 1410 as the third oldest and the only one still operating.

[19] Posted in Watch personalities

[20] https://blog.icomexico.com/tag/diadelosmuertos/ - Instituto Cultural Oaxaca

[21] Until her death in 2007, Anne Mitchell Hedgez strongly claimed that she had discovered the skull in a mortuary room in a pyramid located in the Amazon Jungle.