



Prelude: **Baker Hall stair** video loop

Welcome to The Architecture of Antoni Gaudí.

Questions > **Raise Hand & Chat questions to Erin (co-host).**
5 to 10 minute break & 10 to 15 minutes at end for **Q&A.**

Gaudí's **warped form** distortions **weighted by metaphor**, achieving compositional **stability in convex inversions**, realizing completely **liberated living form.**



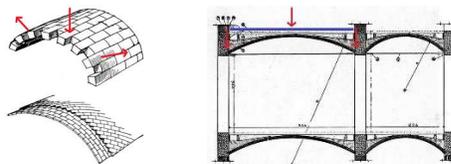
Parti: Bóvedas Tabicadas (vault partition)

“We call thin brick vaults (Bóvedas Tabicadas) those that are made by bricks placed one against the other in a flat way following the curve, so that its curve is like a thin wall (tabique ‘partition’). Depending on the place of the vaults in the building, they can be made of double or single bricks, ...sometimes three, never more, as if they were thin walls placed one over the other, the one that is on top has to have its joints over the brick underneath (woven).”

– Friar Lorenzo de San Nicolas (Madrid, 1633-1664)



Originating in **Valencia**, Spain (**Jofre Chapel of Santo Domingo Monastery** by master mason **Juan Franch, 1382**), by Moorish builders as **lightweight** and **inexpensive** way to **infill the webs of stone-ribbed vaults.**



Traditional stone vault must be **supported on wooden formwork**, will only support own weight once the **keystone** is in place and results in **lateral thrusts**. **Bóvedas tabicadas**, thin bricks (6”x12”x1”) laid flat, **layered to adhere across staggered joints**, acting as **cohesive whole, horizontal partition, w/o thrusts.**



Most significantly, by use of **fast setting mortar** (Plaster of Paris), bricks can be laid out from the supporting wall, corner or rib, in successive **herringbone pattern**, building out with **2 edges each brick in contact**, to **stabilize while mortar sets up**, enabling **construction of vaults without formwork** (senza armature).

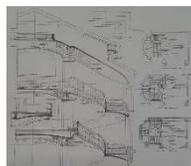


Baker Hall (Carnegie Mellon University)

Example of **Catalan open center, spiral staircase**, **supported only on one side**, designed and constructed by **Rafael Guastavino Jr.** in **1914**. 4 inch thick shell of **brittle ceramic brick tiles**, **without any steel reinforcing**. **Empirically designed** for **compressive equilibrium** using **graphic statics**, bricks placed at thrust lines. Today's engineering studying **material behavior**, **difficulty calculating** in 3D. Governed by **(compressive) stability, not (tensile) strength**. +1K, never failed.

Rafael Guastavino Sr. (1842-1908) educated as both architect and **engineer** at school of “**masters of works**” in Barcelona in 1860s, by **same professors** who taught Gaudí (educated as an architect, 1873-78). [Immigrated to U.S. in 1881, Boston Public Library (McKim, Mead & White, 1889), after Boston Fire of 1872.]

Lime used originally in **14th century**. In **1800s**, Ecole des Beaux Arts introduced **gypsum** (**hardens quickly**) as **Plaster of Paris**. Turn of **1900s**, English introduced **calcium** (**greater strength**) in **Portland Cement**, used by **Guastavino** and **Gaudí**.



Section drawing used for building permit, notation of **herringbone pattern** and most significantly, **catenary curve springing from outside wall utilizing gravity**.





Sagrada Familia Nativity Façade (1892-1910)

During same time **Guastavino** began work in U.S. (Boston Public Library, 1889) Gaudí began work on **Nativity Façade** of Sagrada Familia. Following **death** of his good friend/religious mentor, **Bishop Grau** in **1893**, Gaudí's strict **vegetarian diet** was halted completely for a **Lent fast** in **1894**, when he turned to **skin & bones**, inspiring **study of human anatomy** for sculptural figures on **Nativity Façade**.



The **study of Natural Form**, **casting directly from nature** (anatomical, flora, fauna), **freed Gaudí from stylistic eclecticism** (Mudéjar in Casa Vicens, Gothic, Baroque), forms drawn with a compass, to **seek dynamic rhythms implying movement**, his **search for a Living Architecture**.

However, Gaudí nearly dies from the fast and after ending it (vanity), he focused more on his **spiritual life**, than on architectural works **for 4 years**, until accepting a townhouse commission of an **associate of Güell's** textile business, **Pere Calvet**. Following defeat in **Spanish American War (1898)** and loss of industrial colonies in America's (**Cuba, Puerto Rico, Guam, Philippines**), manufacturing industrialists sought new investments in **real estate development** (**L'Eixample/ The Expansion**).

Casa Calvet (1898-1900)

Baroque curve, **sinuous line**, **pediment/parapet** extending above **Municipal limit**, **Town Council Best Urban Building** award (1900), **rewarding the act of rebellion**, Gaudí's **first cry of non-conformity**, past freedoms of expression were restricted.

Baroque façade, **undulating surface** of protruding balconies, inspired by Calvet's love of mushrooms, an **amateur mycologist**, corbelled supports of gallery window from Múrgulas mushroom (**morel**) Devil's Egg. [wrought iron railing (Matamala)]

Sept.-Dec. Catalans head to forests (**Berguedà**), like **Hansel & Gretel** devouring gingerbread house, to **hunt/scavenge** for mushroom fungi, **bolets**.

3:20

Interior **door peep-holes** made by Gaudí's fingers **deforming wet plaster**, referencing **Morchella esculenta** (morel).

Calvet Chair, all wood (oak), carved to body, **without the traditional upholstery**, **non-imitative naturalism**, departure from **naturalism figures of Nativity Façade**, foreshadowing the evolutionary **undulating & sinuous freehand line** to come.

*"The silhouette of a monument is born out of its structure, everything has a positive reason, and if our instinct finds a **line repellent**, it is because the line is **not really right**, nor in tracing a line do we work solely by the power of rationality."*

Esterostàtic model (1898-1908)

In Casa Calvet chair, **inclined rear legs**, following study **Equilibrated Structure**, deriving **inclined props (bones)** from **catenary curve (natural gravitation)**, **deforming structure**.

Park Güell Viaducts Colonnade (1900) **inclined back bench seat**

Sloping form of **colonnade vault** inclined toward to hillside it retains/supports with the **viaduct & inclined props**. Application of the gravitational studies with the **Esterostàtic model** discovering the **inclined supports, becoming inclined vault**. [14 bricklayers, worked sunrise/sunset, **Julian Bardier** manage, Gaudí daily 3pm] **Undulating pathways**, Gaudí's **dislike of the sterile straight line**.

First use of **reinforced concrete** in Spain (colonnade vault & spire), using **Portland cement** and **wire bands from cotton bales** at Colònia Güell.

Utilizing new cement material **manufactured by Güell** beginning in 1901, **recommended by the Valencian architect Rafael Guastavino**.

Gaudí learned of reinforced concrete **method as a student (1873)**.

Miralles Gate (1901-02)

Wall and entry gate for a residence planned for a printer, **Manuel Miralles**.
Stone & iron wall in double continuous movement culminating in gate & roof.
[Reconstructed/Relocated]

“The **Catalonia rovellón mushroom**, gastronomically the most positive soft-factor of Catalan mysticism.” - **Dali**, “**Beauty will be edible**, or it will no longer be.”
[Camagroc (yellow footed **chanterelle**) mushroom]

Gaudí preferred **relaxed appearance** as if **material formed by the elements**, rather than man. He moved away from drawing board, **returning to talent making, working with hands**, on forms in space. Models visualize easier, than drawings.
No longer measured by the straight edge, lines became Freehand, sketches, designs became much more **fluid, sculptural, plastic**.

Leitmotif: Fluid Plasticity

This **freehand** is **not a ruled line**, not a geometric line. **Nor an arbitrary line**, a random line. It is a line drawn by the hand, **a natural line, drawn by nature**.

*“Creation works ceaselessly through man. But **man does not create, he discovers**. Those who seek out the **laws of Nature** as support for their new work collaborate with the Creator. Those who copy are not collaborators. For this reason, originality consists in **returning to the origin**.”*

The scale of the wall & gate, enabled Gaudí to **experiment with irregular form, without the structural implications** of a larger construction.
Decorative stonework, clad finish, not structurally stacked.
Suggesting **hidden structure, not honestly reflecting** true construction within.
Yet, the **wall widens at the base**, to provide stability, proof of adherence to natural laws of gravity, **intentional rendering to emphasize the irregular free line**.

Mallorca Cathedral Restoration (1902-14)

Gospel pulpit, giant **rovelló** (bloody milk cap) mushroom made of **plastered base**.

Park Güell Gatehouses Roofs (1903) Freehand Arch > Ruled Vaults

Güell diversified into real estate development following Spanish American War, modeled on **British Garden City**, estates away from pollution & noise of city
60 lots, **hypostyle marketplace, terrace playground**, views of Mediterranean Sea.

Undulating line of **serpentine bench**/hypostyle entablature.

Laborer, **stripped of clothes**, told by Gaudí to **make himself perfectly comfortable sitting in prepared bed of plaster**, to obtain **perfect profile form for bench seat**.

The gatehouses are **distorted in scale**, to have an **hallucinatory wonderland feel**.

The **magic mushroom crowning the roof** echoes Maragall's translation of **Humperdinck's Hansel & Gretel opera**, in coded narrative of fairytale salvation.

Amanita muscaria red capped, white spots atop **gardener's gatehouse**,

hallucinogen used in **ancestral religious and secular ceremonies**, including **trance, euphoric and soporific states**, popularized in 19th century by many artists and intellectuals, **Baudelaire, Hugo, Balzac, Nietzsche, Yeats, Picasso and Dali**.

As a **chimney cap**, above **oven the witch was trapped**, in her gingerbread cottage, the exiting smoke as the release of aromatic incense **pollenating the park grounds**.

In gatehouses, **structure, subject, decoration and function are fused together**,

Returning to Catalan craft tradition, **bóvedas tabicadas brickwork**, Gaudí created **hyperbolic paraboloid**, opened up a whole new language of form.

Casa Batlló Wave Props, Dragon Roof, Chair (1904-06)

Gaudí's **transformation** from the shining violet eyes of **young boy to mature man**.
Undulating surface of façade, waves of protruding balconies.

'right angle' / 'golden section' replaced by **irregular convulsive-undulating form** of St. George's dragon roof. Surrealist ontology and epistemology of transforming the **forms of the world according to the lineaments of our desires**.

Fireplace nook bench seat for young men calling, grandmother seat opposite.
 ceps (**porcini**) / llanega (**wax cap**)

Batlló Chairs lost intrinsic properties of wood, as if **clay warped by body weight** sitting, seat surface **deformed, legs buckling**, wood stiffness giving way to softness of molded clay, life breathed into chair by capturing gesture, creator's hand.
Soft architecture of amorphous surfaces, **liquefaction removing tectonic** qualities of the materials, fluidity of form.

Casa Milà Elevation & Roof (1906-10) Deformed Vaults > Convext Vaults

Considered most representative example of **Catalan Modernismo**.

Undulating linear waves on façade. Wrought iron sea weed railing (**Jojul**).

In 1906, Eugeni d'Ors coined the term **Noucentisme**, a Catalan cultural movement in reaction against Modernismo. It glorified **order**, the spirit of 20th Century, an idealist **expectancy of change**. A return to **Classicism, objectivity**, rejection of feelings and nature, in favor of the **ruled line**, anticipating **Art Deco** in a decade.

Free plan, floor slabs supported by **grid of cast-iron columns**, non-load bearing interior partitions and **curtain wall exterior facade**, decade before **Corbusier's Maison Domino** concept (1914), Pavilion de **L'Esprit Nouveau** (1924).

Attic/roof made of **247 unequal concave parabolic brick arches** form the **irregular undulating** terrace roof landscape, a promenade for residents, with panoramic skyline views. **Convex vaults** spanning between arches.

Sagrada Família Schools (1909) Convex & Concave Vaults

Temporary school house until the church was completed, where the classrooms would be located in the church basement.

Undulating roof & walls, by the **simplest means**: straight rafters and central beam.

“When masons build a wall, they place two plumb uprights and string a line between them horizontally. If one of the uprights goes out of plumb, which happens much more often than you may think, the masons, believing that they are building a flat wall, are in fact making a paraboloid. We have gone directly and deliberately to this form and seeing its beauty and the possibilities that it offers, we have also used it for the vaults.”

Corbusier, visiting Sagrada Família in **1928**, made drawings of the school, praising as the **most significant structure in all of Europe**.

Speaking to **Le Corbusier (1929)**, **Dali** said, “**Architecture will be soft and hairy**, and I categorically affirm that the last great **architectural genius** was called Gaudí, whose **name in Catalan means ‘enjoy’**, just as **Dali means ‘desire’**. Enjoyment and desire are attributes of Mediterranean Catholicism and Gothic Art, which were reinvented and brought to a state of paroxysm by Gaudí.”

Ten Minute Break

Manifesto: Colònia Güell Crypt Convex Vaults (1910-14)

Basalt, brick and stone inclined props support vaults curved in two directions, most significantly **inverted vaults, becoming convex, sagging between the supports, defying gravity, defying nature, defying God**. The lower church, **Crypt**, representative of the **early Christians**, **worshiping in hiding**, in the catacombs to **avoid persecution** by the Romans. A new plasticity, shaped by metaphor to express a feeling, a weighting, overhead, bulging, oppressing, illicit sense of **annihilation**, rather than elevation.

For reassurance, vulnerable center of span marked with **St. Andrew's Cross**.

In **1910**, Gaudí stricken with **Brucellosis/Maltese fever**, suffering almost a year with fever, swelling joints, violent mood swings, arguing insatiably, increasingly **isolating and turned inward**, walled off from friends.

The **benches**, of wood, **rigid shape allow sitting in only one position, upright**, substituting comfort for **ascetism**. Form and content are one, divinity converted to architecture.

Sagrada Família Vaults (1922) & Pinnacles (1923-25) Liberated Living Form
Rooftop ventilators reached fullest glory in final work, **venting spirit to heavens,**
full plasticity of liberated form, resurrected, a living architecture.

[Bishop's miter/hat, crozier/staff, ring]

“Men are divided into two categories: men of words and men of action. The former talk, the latter act. I belong to the second group. I lack the means of expressing myself. I could not tell you about my conception of art, I need to give it a concrete form. I have never had time to question myself. I have spent my time working.”

Recalling Gaudí's comments on **returning to nature, to find originality**, he said, *“Nature is our greatest teacher.”* Gaudí, looking at Sagrada Família's bell towers, *“Don't you see in them a certain resemblance to the needle rocks of the Mont Salvatge?”*

4:10



POLL: How would Gaudí want the Sagrada Família to be completed?

1. With the same Materials (ashlar stone) & Methods used by Gaudí.
2. Modern Materials & Methods finished to look like Gaudí's original design.
3. Modern Materials & Methods expressed honestly in new finish design.

When complete, Sagrada Família will be 1 meter less than Montjuïc, tallest mount in Barcelona, as Gaudí believed his building should not be higher than the work of God.



4:20

Requests for Villa Vuoto: time away from Gaudí & ethical conflict/promotion
Addition inspired by work of Antoni Gaudí > email for Zoom Aug./Sept.

Q&A

Guastavino's Pittsburgh buildings:

Allegheny County Courthouse
Allegheny General Hospital
Bell Telephone Company
B'Nai Israel Synagogue
Buhl Planetarium (Children's Museum)
Calvary Episcopal Church
Baker Hall (CMU) 1914
Hamerschlag Hall (CMU)
Porter Hall (CMU)
Doherty Hall (CMU)
U.S. Bureau of Mines (CMU)
County Office Building
East Liberty Presbyterian Church
First Baptist Church of Pittsburgh
Holy Rosary Church
Mellon Residence
Pittsburgh Athletic Association
Pittsburgh City-County Building
Post Office and Courthouse
Rodef Shalom Synagogue
Shadyside Presbyterian Church
St. Boniface Roman Catholic Church
Cathedral of Learning (Univ.Pitt)
Stephan Foster Memorial (Univ.Pitt)
Heinz Memorial Chapel (Univ.Pitt)
Western theological Seminary
William Penn Hotel

[Catalan mushrooms:

fredolic (grey knight)

ou de reig (royal egg/king's testicle)

tófona negra, trompeta de la mort (black trumpet, funereal inky-black horn of plenty)]