Romanesque architecture

-The nineteenth century historians of architecture called the Western European architecture of the eleventh and twelfth century Romanesque because its structural basis was derived from ancient Roman construction

Romanesque architecture

-Politically, the Romanesque period acquires its Roman dimension from the political entity from which art and architecture emerged.
-The entity was the Holy Roman Empire.
-The Holy Roman Empire is considered to have started with the Carolingian rule represented by Charlemagne, who restored the term Roman Emperor.
-The Carolingian kingdom had a clear consciousness of restoring the Roman grandeur.
-Later, after the Carolingian kingdom dissolved, Otto I restored the territory of the Carolingian kingdom in 950.
-Since then, it lasted officially until its conquer by Napoleon Bonaparte at the turn of the 19th century. (France, England, Spain developed their own nation state. France, after the dissolution of the Carolingian kingdom, gradually became independent, and later eventually conquered the empire in the 19th century).
-The Holy Roman Empire at its height included what are today Germany, the Netherlands, Austria, Switzerland and two-thirds of Italy.

Romanesque architecture

-Architecturally, the primary reason ‘Roman’ is put into Romanesque comes from its strong foundation on the Roman arch and vault.
-Some of the Romanesque architecture adopted other classical elements such as the orders, but the most significant element was the vault.
-Structurally and spatially speaking, the task of the Romanesque architecture was to create a new vaulting system that covers the nave, while providing light to the space.
-the vault was supposed to substitute the early wooden structure for the ceiling of the nave

# Types of Vaults

Groin Vault

-what is called ‘groin vault’ or ‘quadripartite vault’ was the result of efforts to resolve this issue.

-The groin vault is made out of four curvilinear planes that arise at the moment of crossing two vaults perpendicularly.

-the vault often performed an important symbolic function: the first main spans to be vaulted were invariably those over the sanctuary and presbytery.

-This implied that the vault was at that time seen as a permanent altar canopy.

-This does not mean, however, that the wooden ceiling was seen as inferior. Before the 11th century, all the great longitudinal churches of Western Europe were wood-roofed, while vaults over the main span occurred only in tiny Alpine structures of little more than rustic status.

Groin Vault

-This does not mean, however, that the wooden ceiling was seen as inferior.

-Before the 11th century, all the great longitudinal churches of Western Europe were still wood-roofed

-The explanation for this lies in the technical difficulties involved in spanning wide spaces in stone

-Another reason was the immense prestige enjoyed through the Middle Ages by the wood-roofed basilicas of Early Christian Rome

-This prestige was so overpowering in Rome itself that it was not until the mid-15th century that a high vault was erected over a church nave in the city.

Pier

-piers have existed ever since builders decided to support structures with something less cumbersome than solid walls.

-However, it was the Romanesque period that developed a highly sophisticated system of piers to replace the classical order.

-the classical order is a kind of pier. But, we are differentiating it from the pier for the sake of accuracy

-The columnar basilica of the early Christian architecture (2 images) comes to be joined (from the 5th century onwards) with arcades carried on piers.

-(This kind of churches first appeared in the eastern Mediterranean and, by the 9th century, in the Carolingian empire)

S. Sabina, Rome (422-432)

Santa Maria Maggiore, Rome, 432-40

-Another Basilica style church with a semi-circular apse
-But, unlike St. Sabina, this one is of classical orders with architraves

*Nevers, France, St.Etienne, ca.1083-97*

Pier

-there was a steady improvement in construction techniques.

-Stone was cut much more accurately than before

-the near rubble of earlier centuries to the small, roughly shaped blocks called petit appareil or small-stone construction of the earlier part of the period, and then to the large, beautifully squared blocks of stone (grand appareil) that characterize fully developed Romanesque

-A pillar, generally rectangular in cross section, supporting an arch or roof

-This substitution of the pier for the column is one of the prerequisites for the formation of the Romanesque style

-there are five types in pier:

1. clustered
2. compound
3. cylindrical
4. pilier cantonne
5. quatrefoil

# Types of Piers

Pier

-Piers before the Romanesque were mostly of square

-But, there emerged five new types during the Romanesque:

1. clustered
2. compound
3. cylindrical
4. pilier cantonne
5. quatrefoil

Pier

-Piers before the Romanesque were mostly of square

-But, there emerged five new types during the Romanesque:

1. clustered

-a pier consisting of multiple contiguous shafts set radially around a hypothetical central core.

-The shafts are not structurally distinct, but are constructed from horizontal courses, while the core may often have a rubble fill.

-The shafts may be of different diameters and profiles.

-They are usually arranged symmetrically in groups

2. compound

a pier combining shafts or half-shafts with a non-circular core

3. cylindrical

-a cylinder shaped pier.

-Similar to the Classical column and ultimately derived from it. -But, it lacks the latter’s careful proportions and detailing.

4. pilier cantonne
    -a pier with a circular or octagonal core and four attached shafts projecting in the cardinal directions
5. quatrefoil
    -a pier with four lobes or shafts projecting in the cardinal directions
    -the pier is the basis of the bay system, the setting for the pilaster and shaft, and without it there would be no alternating system, whereby the arcade is made up of piers and columns in alternation.

Pier of the Cruciform type, Sant Pere de Casserres, Spain, early 11th Cent

Vezelay, FR, Ste.Madeleine, ca.
1104-32

## Development of the apse

Conques, St.Foy, ca.1050-1120, top, site plan, bottom, ground plan and transverse section through the nave

Development of the apse
-During the 8th century and the early 9th, church building developed to take account of the increasing popularity of relics, changes in regulations governing the use of altars and an increasingly complex liturgy.
-Extra chapels and sanctuaries known as outer crypt were built under and beyond the east end
-In the Carolingian period these adjuncts looked like independent buildings or attachments to the church proper (as at Corvey Abbey, Germany).

Development of the apse
-But, by the turn of the millennium and the advent of Romanesque they had been organized into spatial and volumetric units that, although readily identifiable as separate shapes, unequivocally formed part of a single whole design.
-The elements of the outer crypt were brought together into the ambulatory with radiating chapels, by the simple geometrical expedient of using the central point of the main curve of the apse as the center for the curves of the ambulatory walls and the radiating axes of the chapels.
-Sometimes, the transept also acquired aisles on its both ends, and around the aisles were added small apses.
-according to Pevsner, this development of the radiating plan was made in particular in the area of what is now France. For instance, Ste. Foy, Conques, ca. 1050-1120 (images from Kostof)

Conques, St. Foy, int. looking east

Conques, Ste.Foy, view from the east

## How to design the nave elevation?

Elevation of the nave, Speyer, Germany, 1030-61

-tall orders
-barrel vault sitting on arches
-the nave covered with a vault
-an apse

028 St.Savin-sur-Gartempe, FR,
abbey church, ca.1060-1115, nave

-Instead of tall orders, walls appear above composite piers
-still barrel vaults
-articulation of three stories
-second story called triforium
-the top story is called clerestory

Nevers, France, St.Etienne, ca.1083-97

Vezelay, FR, Ste.Madeleine, ca.
1104-32

-Composite piers supporting walls above
-Groin vault for the nave
-articulation of three stories (
-Islamic influence

-articulation of four stories
-horizontal continuity emphasized, instead of vertical continuities
-Composite piers supporting arches

Tournai, Belgium, cathedral, int.
from ca. 1110

# Gothic Architecture

Medieval Metaphysics of Light

-Grosseteste (1175-1253), bishop of Lincoln

-Abbot Suger (1081-1151), St. Denis

*Istanbul, Hagia Sophia, 532-37*

Pseudo-Dionysius the Areopagite (5th century) (a mystic of neo-Platonism)
-blended Plato's philosophy with the theology of light in the Gospel of St. John

From Plato
Plato defined the good as the cause of knowledge as well as of being and essence. Then, the good was compared to sunlight. Sunlight is "not only the author of visibility in all visible things but generation and nourishment and growth." (In the sixth book of the Republic)

From the Gospel of St. John
The light (*lux*) that has become corporeal (phenomenal)
-the divine Logos as the true light that shies in darkness.
-This light created all things and enlightens every man on earth.
-the creation of the world is the self-revelation of God.
-All creatures are lights that by their existence bear testimony to the Divine Light and thereby enable the human intellect to perceive it.
-All created things are theophanies, manifestations of God. . . And of all created things (the phenomenal) light is the most direct manifestation of God."

The influence of the metaphysics of light on art and architecture

-One aspect is the appearance of concentric circles around Christ

-Each circle is representing its proximity to the immaterial light of God.

-Each circle diminishes natural brightness more and more as it moves towards the center.

-When the circle reaches the center, the circle "loses its brilliance and is spiritualized to the point of losing its natural properties.“

-”Brilliant Darkness”

-Another aspect is the use of gold as the material in the creation of the shiny radiating background for icons.

-Gold itself in this case is considered to be less a matter given a color than "glimmering light and brillance."

-This use was not confined within halos, but extended to vestments, sacred objects, and biblical books.

-No shadow
-No darkness

The quality of light in the Romanesque Architecture

-The Romanesque architecture was filled with the subdued light.

-It was somber and dark.

-The tactile presence of the walls was strong on the part of the nave

Nevers, France, St.Etienne, ca.1083-97

The quality of light in the Gothic
-In contrast, according to an author, "the Gothic walls are porous: light filters through it, permeating it, merging with it, transfiguring it."
-But, this sense of permeating light was still different from, for instance, the glass-enveloped buildings of contemporary architecture.
-The stained-glass windows did not bring light in its crude brightness
-It still filtered light into a distinctive quality of light, not as subdued as that of the Romanesque architecture, nor crudely bright as in glass-skyscraper

St. Denis, 1144, Nave

The quality of light in the Gothic
-The stained-glass windows of the Gothic cathedrals were not simply openings made on the wall
-Rather, it was the replacement of the wall
-A kind of a transparent wall.
-Gothic architecture is characterized from this point of view as “transparent, diaphanous architecture.”

St. Denis, Nave

-In this transition from the space of subdued darkness to the space of splendor, the metaphysics of light and the aesthetic preference of the glittering objects should be seen as its primary motivation.
-One building and one priest who supervised its construction are particularly important in the history of gothic architecture.
-The name of the priest Suger, who was the abbot of St. Denis
-He replaced a dark choir of the original St. Denis with a bright one.
-By doing so, he, without knowing, opened a new chapter in the conception of church architecture.

Scenes from the life of St. Denis

Above: his consecration as bishop

Below: his work as theologian

Location and History of St. Denis

-St. Denis is a Benedictine abbey and located in the northern suburbs of Paris.

-It had a long history of development before Suger launched a renovation project.

-St. Denis was founded as the tomb and shrine of St. Denis (d? AD 258).

-St. Denis was the first bishop of France.

Ile-de-France, with the main sites of Gothic churches

-The first church on the site was built in the 5th century.
-The shape of this original church is not fully clear
-It was the principal French Royal monastery from the 7th century until the Revolution.
-The church became the main burial place of the French kings and the depository for their regalia.

-The church left on the site was built during the 8th century (around 754 or 768)
-It measured about 60 meters from east to west
-It had a full transept probably with a crossing tower.
-It also had an extended choir ending in a single, large apse and set over a crypt.
-The structure was decorated with frescoes.

St.Denis, plan of the original nave and transept and the plan of the extension

Renovation of this church

-The renovation was necessary because the importance of the Carolingian church as a spiritual center of the kingdom increased.

-The church became too small to fulfill its many requirements as the chief church of the kingdom and to accommodate larges mass.

-It was reported that in a big mass, people had to walk over the heads of other people to move forward.

Renovation of this church

-For this reason, Abbot Suger began to enlarge the building.
-He extended first the west end (1135-40).

Renovation of this church

-It has three portals

-In the center is the first known example of a rose window in a west front.

-The block was further provided with an interior entrance hall or narthex. (The western block is 33.75 m wide and 20 m deep.) (The nave and the transept were replaced in the 13th century. Only foundations and a few column bases from the nave survive.)

-The overall form of the facade influenced most subsequent Gothic facades. It provided the direct inspiration for those of the cathedrals of Chartres (next slide), Notre-Dame in Paris and Reims.

Chartres, Facade

-Abbot Suger also extended the east end (1140-44)
-This extension marks one of the most significant turning-points in medieval architecture.
-The choir was built in just over three years and consecrated on 11 June 1144.
-It is 30 meters long.
-The first characteristic of its is the double-bay ambulatory

St.Denis, plan of the original nave and transept and the plan of the extension

-the continuity of space round the ambulatory is also characteristic of the church, compared to a Romanesque church (next slide for comparison).
-the seven radiating chapels are not separated from one another.
-The chapel and ambulatory spaces flow uninterruptedly into one another.

-The two-circular bays of the ambulatory rise to the same height.
-The walls of the choir and surrounding chapel area were replaced by vast expanses of coloured glass.
-The thinness of the walls and columns gives the impression of slight physical substance.

-The technical virtuosity of the choir at Saint-Denis is significant.
-The walls and columns were thin.
-Yet, they still had to support relatively heavy rib vaults built of stone.

-How the upper part of the choir was treated remains speculative.

-It probably contained clerestory windows and openings at triforium level.

-This elevation with an unprecedentedly large amount of opening must have required some sort of lateral strengthening to maintain the structure’s equilibrium.

-There is no evidence that flying buttresses were adopted in this building.

-In the absence of evidence that flying buttresses were adopted by Suger, the church might have at least a series of stepped exterior buttresses.

-The upper parts of the nave were later during the 13th century given clerestories with flying buttresses supporting the thin wall.

-Suger was proud of the achievment in the choir

-He said it is permeated with new light "*lux nova*."

-He defined the religious role of this new light in a sacred space as transferring "that which is material to that which is immaterial."

-The cathedral itself has now become a luminous object, more precisely, an inhabitable object.

-As the luminous object guides the mundane vision to the sense of the divine, the cathedral in its splendor guides the occupier to the sense of the heavenly kingdom.

St. Denis Abbey, nave and choir (nave part begun c.1231)

-Because the cathedral is now an inhabitable object of splendor, the human being dwells "in some strange region of the universe which neither exists entirely in the slime of the earth nor entirely in the purity of Heaven."

-Man's life on earth is the search for, and the march towards the One, the Father of the Light. (von Simson, xvii).

-“The supernatural manifested itself to the senses.” (von Simson, xvii)

-Although it was not the heaven, the cathedral existed as “the symbol of the kingdom of God on earth.”

St. Denis Abbey, nave and choir (nave part begun c.1231)

-Light was the foremost factor in the design
-The side aisles, the galleries above them, the ambulatory and chapels of the choir became narrower and shallower
-the exterior walls pierced by continuous rows of windows.
-The cathedral appears as a shallow, transparent shell surrounding nave and choir
-Two layers: the inner layer of foil for the illumination of the inside, and the outer layer operating as the structural basis for the first layer

St.Denis Abbey, nave and upper chevet, int.
looking east, begun c.1231

Significance of Structure in Gothic architecture

-Compared to Romanesque and Byzantine architecture, Gothic architecture present a clear awareness of the structure itself.

Structure in Romanesque and Byzantine Architecture
-Structure was rather an invisible means that upholds an artistic end.
-The wall was covered with murals, sometimes covering poor workmanship.
-Even the entire edifice was a scaffold for the display of murals or mosaics
-Sometimes, structure itself was modified to meet the dimension of the murals.

Significance of Structure in Gothic architecture

-But, in Gothic architecture, the entire ornament is subjected to the pattern produced by the structural members, the vault ribs and supporting shafts.
-Aesthetic intent did not determine or modify the structural system.
-Quite the opposite was true.
-The aesthetic system was defined by the structural system of the cathedral.
-With the emergence of Gothic architecture, the mural art somewhat declined.
-The perfect workmanship that the builders of the gothic cathedral shows at least to a certain degree marginalizes the mural work which worked sometimes as a way of masking poor masonry work in Romanesque period

Advancement in Construction Technologies
-Flying buttresses
-Pointed arch.
-Rib-vaults

Flying buttresses

-Flying buttresses were one of the most innovative achievements in gothic architecture

-Indeed, at which building flying buttresses were first adopted remains unresolved.
-They appeared sometime during the mid twelfth century and became instantly popular.

Beauvais Cathedral

Beauvais Cathedral, cross section. by Benouville

*SK14-019*
*Charters*
*Cathedral, flying*
*buttresses*

# Pointed Arches

# Medieval vaulting, diagrams

Rib Vault
-Vault that resembles a groined vault but has ribbed arches
-A vault in which the surface is divided into webs by a framework of diagonal arched ribs (quadripartite, sexpartite)

Sexpartite rib vault at Laon Cathedral

Quadripartite at Chartres Cathedral

Were the ribs of the Rib Vault structural?

-Ribs of the rib vault or responds are not necessarily structural.
-The ribs are helpful structurally, but are not indispensable (von Simson, 7).
-The responds are so frail.
-Without the bracing walls, they could not support themselves, let alone the vault.
-The main thrust of the vault was received by the flying buttresses that are hidden from the inside.
-The thickness of pier was constantly rendered as if it were a collection of a bundle of shafts.
-This emphasis on linearity from the shafts to the ceiling may have encouraged the addition of linear elements called ribs
-The ribs can also be seen as the visualization of the dynamic between thrusts and supports (visualization of the structural logic)
-The structural ingenuity achieved through the flying buttresses and the thickness of piers were never allowed to appear.

Structure in Gothic architecture

-This means that the gothic cathedral is not a work of pure structural rationality in modern sense.
-If an element is structurally unnecessary, but appears in the edifice, it is seen as betraying the clarity and consistency of the logic of the building.
-This is the modern notion of the architecture of structural rationality.
-Gothic architecture was of pure structural rationality in modern sense to some degree.
-However, it also respected appearance of the building from the inside
-the linear continuity from the shafts to the ribs in the ceiling