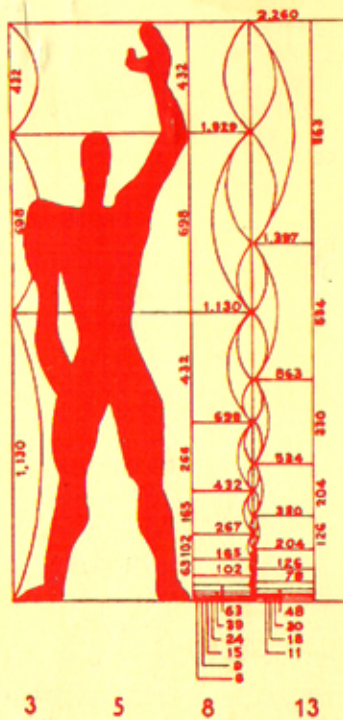


EXPERIENCING ARCHITECTURE



STEEN EILER RASMUSSEN

Solids and Cavities in Architecture

Seeing demands a certain activity on the part of the spectator. It is not enough passively to let a picture form itself on the retina of the eye. The retina is like a movie screen on which a continuously changing stream of pictures appears but the mind behind the eye is conscious of only very few of them. On the other hand, only a very faint visual impression is necessary for us to think that we have seen a thing; a tiny detail is enough.

A visual process can be described as follows. A man walking along with bent head receives an impression of blue jeans; a mere hint will suffice. He believes that he has seen a man though actually all he saw was the characteristic seam running down the side of the leg. From this one small observation he concludes that a man has passed him on the sidewalk, simply because where there is that sort of seam there must be jeans and where there are moving jeans there must be a man inside them. Usually his observation ends here; there are so many things to keep an eye on in a crowded street that he cannot bother his mind with his fellow pedestrians. But for some reason our man wishes to have a closer look at the person. He observes more details. He was right about the jeans but the wearer is a young girl, not a man. If he is not a very dull person he will now ask himself: "What does she look like?" He will then observe her more closely, adding detail to detail until he gets a more or less correct picture of her. His activity can be compared to that of a portrait painter. First he forms a rough sketch of his subject, a mere suggestion; then elaborates it enough for it to become a girl in jeans; finally he adds more and more details until he has obtained a characteristic portrait of that particular girl. The activity of such a spectator is creative; he recreates the phenomena he observes in his effort to form a complete image of what he has seen.

This act of re-creation is common to all observers; it is the activity that is necessary in order to experience the thing seen. But *what* they see, what they re-create when observing the same object, can vary enormously. There is no objectively correct idea of a thing's appearance, only an infinite number of subjective impressions of it. This is true of works of art as of everything else; it is impossible to say, for instance, that such and such a conception of a painting is the true one. Whether it makes an impression on the observer, and what impression it makes, depends not only on the work of art but to a great extent on the observer's susceptibility, his mentality, his education, his entire environment. It also depends on the mood he is in at the moment. The same painting can affect us very differently at different times. Therefore it is always exciting to return to a work of art we have seen before to find out whether we still react to it in the same way.

Usually it is easier to perceive a thing when we know something about it beforehand. We see what is familiar and disregard the rest. That is to say we re-create the observed into something intimate and comprehensible. This act of re-creation is often carried out by our identifying ourselves with the object by imagining ourselves in its stead. In such instances our activity is more like that of an actor getting the feel of a role than of an artist creating a *picture* of something he observes outside himself. When we look at a portrait of someone laughing or smiling we become cheerful ourselves. If, on the other hand, the face is tragic, we feel sad. People looking at pictures have a remarkable ability to enter a role which seems very foreign to them. A weak little man swells with heroism and a zest for life when he sees a Hercules performing daring deeds. Commercial artists and producers of comic strips are aware of this tendency and make use of it in their work. Men's clothes sell more readily when they are displayed on athletic figures. The observer identifies himself with the handsomely built model and believes he will resemble him simply by donning the same apparel. A middle-aged woman uncritically buys the costume she sees in an advertisement on

a shapely glamour girl. The boy with glowing cheeks who sits spell-bound over the adventures in a comic strip imagines himself in Tarzan's or Superman's stead.

It is a well known fact that primitive people endow inanimate objects with life. Streams and trees, they believe, are nature spirits that live in communion with them. But even civilized people more or less consciously treat lifeless things as though they were imbued with life.

In classical architecture, for example, we speak of supporting and supported members. Many people, it is true, associate nothing particular with this. But others receive the impression of a heavy burden weighing down the column, just as it would a human being. This is very literally illustrated where the supporting element has been given human form, such as a Caryatid or an Atlas—a petrified giant straining all his muscles under his load. This same conception is expressed in Greek columns by a slight outward curvature of profile, the "entasis," which gives an impression of straining muscles—a surprising thing to find in a rigid and unresponsive pillar of stone.

~ The various parts of a chair are given the same designations that are applied to human and animal members—legs, arms, seat and back. And often the legs are actually shaped like animal parts, such as lion paws, eagle claws, and doe, goat, ram, or horse hooves. Such surrealist forms have appeared periodically ever since ancient times. Besides these, there are many examples of "organic" forms which neither resemble nor represent anything found in nature. They were employed in the German Jugend style around the turn of the century and appeared again not only in a later furniture style but also in other design. An automobile, for instance, is called a "Jaguar" and in keeping with the idea association its lines recall the speed and brute force of its namesake.

Even things which in no way suggest organic forms are often invested with human characteristics. We have already seen how riding boots and umbrellas can affect us as real personalities (p. 31). In Dickens' novels, buildings and interiors acquire souls

in some demoniacal way corresponding to the souls of the inhabitants. Hans Andersen, who gave a ball and a top the power of speech, used to cut out silhouettes in which a windmill became a human being, just as it was to Don Quixote.



Portal of Palazzetto Zuccari, Rome

Portals are often described as “gaping,” and the architect of the Palazzetto Zuccari in Rome actually formed an entrance of that building as the gaping jaws of a giant.

The Danish architect Ivar Bentsen, who throughout his life retained a remarkably original view of architecture, said at the dedication of a new wing of a folk high school in Denmark: “We usually say that a house *lies*, but some houses *stand*—towers always stand. This house here *sits* with its back against a hill, gazing towards the south. Go outdoors in any direction and observe it and you will see how the schoolhouse lifts up its head and peers out over the broad countryside south of the town.”

Such animation of a building makes it easier to experience its architecture as a whole rather than as the addition of many

separate technological details. To Dickens a street of houses was a drama, a meeting of original characters, each house speaking with a voice of its own. But some streets are so dominated by a conspicuous geometric pattern that even a Dickens cannot give life to them. There exists from his hand a description of the view from the Lion Inn in the old town of Shrewsbury in England: “From the windows I can look all downhill and slantwise at the crookedest black-and-white houses, all of many shapes except straight shapes,” he wrote. Anyone who has visited one of the towns in Shropshire with their tarred half-timber Tudor houses will remember the strong impression made by the broad black lines on white ground and will understand that here even Dickens must see shapes and not strange personalities.

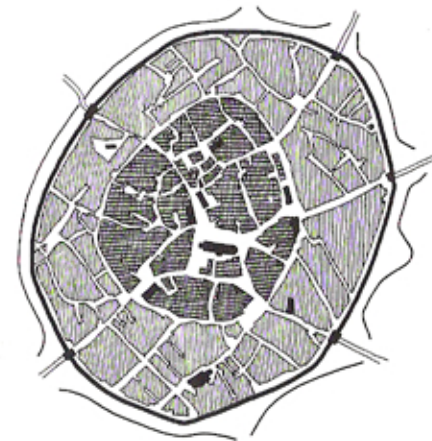
But how do we experience a street when we perceive the houses as geometric forms? The German art-historian A. E. Brinckmann has given an elucidating analysis of a picture of a certain street in the little German town of Nördlingen.

“The beauty of the situation at Schäfflersmarkt in Nördlingen is due entirely to the fine relations of its forms. How then are the proportions of the two-dimensional picture converted into proportions in three dimensions, into a conception of depth? The windows are of almost identical size which gives the same scale to all the houses and makes the three-storied in the background outgrow the two-storied in the foreground. All roofs show approximately the same pitch and complete uniformity of material. The ever-diminishing network of the tiles helps the eye to apprehend the distances and thereby also the real size of the roofs. The eye passes from smaller to larger roofs until it finally rests on the all-dominating one of the Church of St. George. Nothing indeed creates a more vivid illusion of space than the constant repetition of dimensions familiar to the eye and seen in different depths of the architectural perspective. These are the realities of the architectural composition and their effect is enhanced by the difference in tones caused by the atmosphere. When finally the complete forms of the houses are realized—the two-bayed and

the four-bayed, all with horizontal divisions—the tower seems overwhelming in size with its concisely articulated masses rising high into the air.”

By keeping an eye on the picture while reading Brinckmann’s description it is possible to experience the whole thing exactly as he describes it. But when you see the place in reality you get a very different impression of it. Instead of a street *picture* you get an impression of a whole town and its atmosphere. Nördlingen is a medieval town surrounded by a circular wall. Your first glimpse of it, after passing through the town gate, gives you the conception of a town consisting of identical houses with pointed gables facing the street and dominated by a huge church. And as you penetrate further into the town your first impression is confirmed. Nowhere do you stop and say: “It should be seen from here.” The question that interested Brinckmann, how a two-dimensional picture can best give the impression of three dimensions, does not arise. You are now in the middle of the picture itself. This means that you not only see the houses directly in front of you but at the same time, and without actually seeing them, you are aware of those on either side and remember the ones you have already passed. Anyone who has first seen a place in a picture and then visited it knows how different reality is. You sense the atmosphere all around you and are no longer dependent on the angle from which the picture was made. You breathe the air of the place, hear its sounds, notice how they are re-echoed by the unseen houses behind you.

There *are* streets and plazas and parks which were deliberately laid out to be seen from a particular spot. It might be a portal or a terrace. The size and position of everything seen from there were carefully determined to give the best impression of depth, of an interesting vista. This is particularly true of Baroque layouts which so often converge at one point. An interesting example of this, and one of the sights of Rome, is the celebrated “view through the keyhole.” On Mount Aventine, above the Tiber, the peaceful Via di Santa Sabina leads you past ancient monasteries



*Schäfflersmarkt with St. George's Church, Nördlingen, from Brinckmann
Below, plan of Nördlingen. Scale 1:15000*



*Views of Nördlingen from the city gate to Schäfflersmarkt
There is no particular spot from which to experience the street*



and churches to a small piazza embellished with obelisks and trophies in stucco. Above a brown door to the right are the arms of the Knights of Malta. But the door is closed and barred. Through the keyhole alone you can get a view of the sequestered precincts. And what a view it is! At the end of the deep perspective of a long garden walk you see the distant dome of S. Peter's swelling against the sky.

Here you have all the advantages of a deliberately planned view because you see reality as through a telescope, from a fixed point—and nothing interferes to distract your attention. The view has only one direction and what is behind the observer plays no part in it.

But this is a rare exception. Ordinarily we do not see a *picture* of a thing but receive an impression of the thing itself, of the entire form including the sides we cannot see, and of all the space surrounding it. Just as in the example of the girl in jeans, the impression received is only a general one—usually we do not see any details. Rarely can a person who has “seen” a building give a detailed description of it. If, for example, a tourist visiting Nördlingen suddenly saw the church, he would immediately realize it was a church. We regard a church as a distinct type,



*Church of St. George, Nördlingen, seen from Schäfflersmarkt
The impression of the buildings is formed from a series of observations*

a symbol as easily recognized as a letter of the alphabet. If we see the letter L we recognize it without knowing what sort of L it is, whether bold-face or lean-face, whether grotesque or Antiqua or any other type. Simply seeing the vertical and horizontal strokes together tells us that it is an L.

In the same way we know that we have seen a church when we have merely received an impression of a tall building combined with a steeple. And if we are not interested in knowing more we usually notice no more. But if we are interested we go further. First we attempt to verify the original impression. Is it really a church? Yes, it must be; the roof is very high and steep and at the front there is a tower like a block standing on end. As we observe the tower it seems to grow. We discover that it is higher than most towers, which means that we must alter our first impression of it. During the visual process we seem to place the octagonal tiers on top of the rectangular block—originally we had not noticed that they were octagonal. In our imagination we see them rising out of the square tower like sections of a telescope until the work of re-creation—which the entire visual process is—ends at the topmost tier where it is checked and terminated by the little rounded calotte. No, it is not finished at that. To

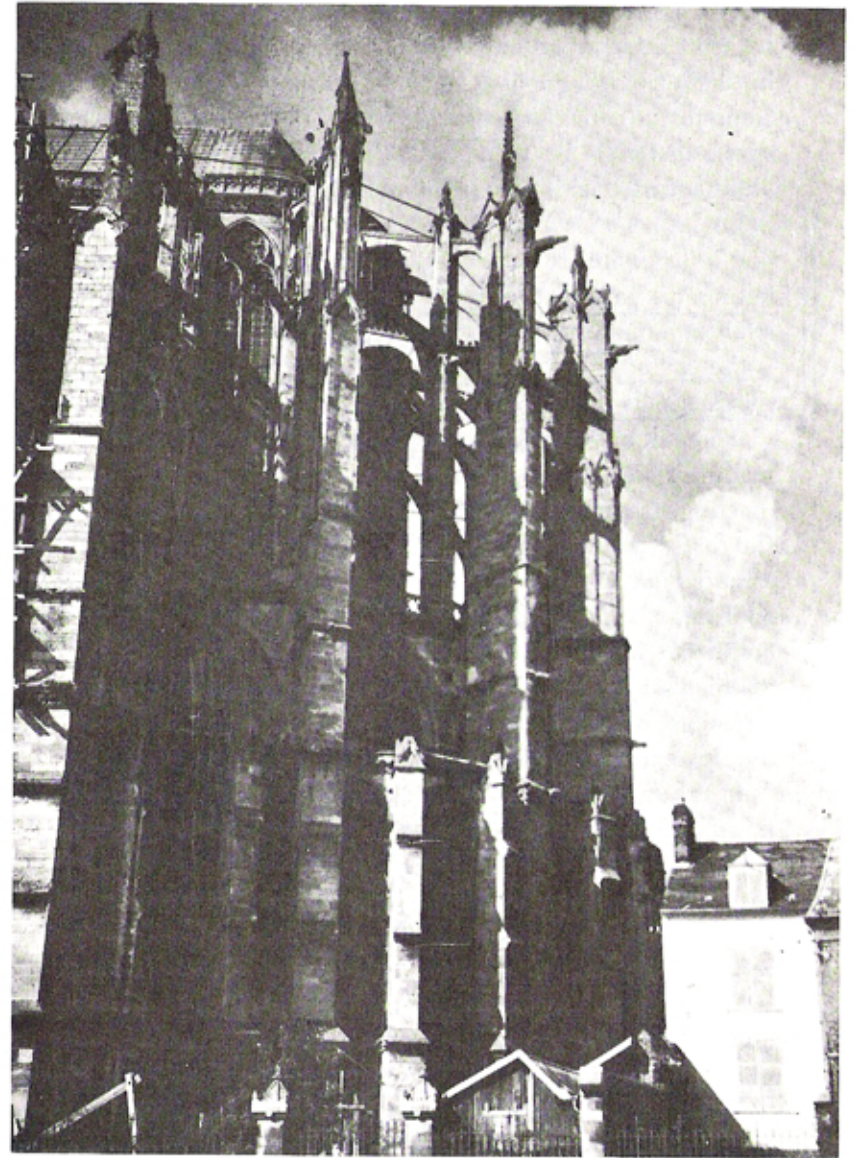
VISUAL PROCESS AS AN ACT OF RE-CONSTRUCTION

complete the picture it is necessary to let the crowning lantern rise out of the skull-cap and add the small flying buttresses and pinnacles at the corners of the square tower.

The mental process that goes on in the mind of a person who observes a building in this way is very much like that which goes on in the mind of an architect when planning a building. After having roughly decided on the main forms he continues by adding details which shoot out from the body like buds and thorns. If he has had manual training in one of the building trades he knows how the individual parts are produced. He mentally prepares the materials and combines them in one large structure. It gives him pleasure to work with the different materials, to see them change from an amorphous mass of ordinary stone and wood into a definite entity, the result of his own efforts.

About 45 miles north of Paris lies the town of Beauvais with its great cathedral. Actually it is only the chancel of a cathedral that was never completed but its dimensions are so enormous that it can be seen for miles, towering above the four-storied houses of the town. The foundations were laid in 1247 and the vaulting was finished in 1272. It was one of those heavenward-aspiring Gothic structures with pillars like tall, slim trees which seem to grow right into the sky. They were about 144 feet high. The construction proved too daring, however, and the vaulting collapsed in 1294. The church was rebuilt about forty years later with the vault just as fantastically high as before but supported now from the outside by flying buttresses. And the builders were apparently so fascinated by this purely structural problem that they made a virtue of necessity and turned the supporting members into a rich composition of piers and arches embellished with sculpture. In other words, purely structural features were treated aesthetically, each one given almost sculptural form.

The architect can become so interested in forming all the structural parts of a building that he loses sight of the fact that construction is, after all, only a means and not an end in itself. The elaborate exterior of Beauvais Cathedral was developed to



Beauvais Cathedral

make possible the fantastically high nave—not from any desire to create a spiked monument striving to pierce the heavens with its sharp points. But it is understandable that the architect can come to the conclusion that the aim of his calling is to give form to the materials he works with. According to his conception, building material is the medium of architecture.

But, you may ask, can there be any other? And the answer is yes; it is possible to have quite a different conception. Instead of letting his imagination work with structural forms, with the solids of a building, the architect can work with the empty space—the cavity—between the solids, and consider the forming of that space as the real meaning of architecture.

This can be illustrated by an example. Ordinarily a building is made by assembling the materials on the site and with them erecting a structure which encloses the space of the building. In the case of Beauvais the problem was to raise a church on a flat tract of land. But let us suppose the site to be an enormous, solid rock and the problem to hollow out rooms inside it. Then the architect's job would be to form space by eliminating material—in this case by removing some of the rock. The material itself would not be given form though some of it would be left standing after most had been taken away.

In the first instance it is the stone mass of the cathedral which is the reality; in the second the cavities within the mass.

This can also be illustrated by a two-dimensional example which may make it clearer.

If you paint a black vase on a white ground, you consider all the black as "figure" and all the white as that which it really is—as background which lies behind the figure and stretches out on both sides with no definite form. If we try to fix the figure in our minds we will note that at the bottom the foot spreads out on both sides and above it a number of convexities also project on to the white ground.

But if we consider the white as figure and the black as ground—for example, a hole in the figure opening into a black space—

then we see something quite different. Gone is the vase and in its stead are two faces in profile. Now the white becomes the convexities projecting out onto the black ground and forming nose, lips and chin.

We can shift our perception at will from one to the other, alternately seeing vase and profiles. But each time there must be an absolute change in perception. We cannot see both vase and profiles at the same time.



The strange thing is that we do not conceive the two figures as complementing each other. If you try to draw them you will involuntarily exaggerate the size of the area which at the moment appears as convexities. Ordinarily convex forms are seen as figure, concave as ground. This can be seen on the figure above. The outline here being a wavy line it is possible to see either black or white convexities, as you choose. But other figures, such as one with a scalloped edge, are not perceptually ambiguous.

There are innumerable classic patterns which are identical no matter how you look at them. A good example is found in weavings in which the pattern on the reverse is a negative reproduction of the one on the right side. But most two-dimensional motives that are carried out in two colors force the observer to see one of the colors as figure and the other as ground.

In Carli in India there are a number of cave temples. They were actually created, as I have described above, by eliminating material—that is by forming cavities. Here the cavity is what we perceive while the solid rock surrounding it is the neutral background which was left unshaped. However, here the problem is

48 a more complicated one than in two-dimensional figures. When you stand inside the temple you not only experience the cavity—the great three-aisled temple hollowed out of the rock—but also the columns separating the aisles which are parts of the rock that were not removed.

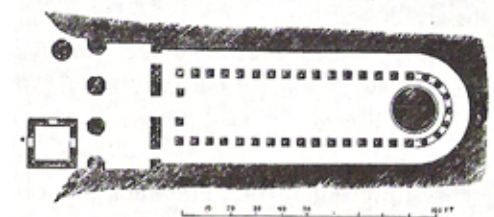
Why? I purposely use the word “cavity” because I believe it illustrates this type of architecture better than the more neutral word “space” so often used in architectural writing nowadays.

This question of terms is of great importance. German art-historians use the word “Raum” which has the same root as the English “room” but a wider meaning. You can speak of the “Raum” of a church in the sense of the clearly defined space enclosed within the outer walls. In Danish we use the word “rum” which sounds even more like the English word but has the wider meaning of the German Raum. The Germans speak of Raum-Gefühl, meaning the sense or conception of the defined space. In English there is no equivalent. In this book I use the word *space* to express that which in three dimensions corresponds to “background” in two dimensions, and *cavity* for the limited, architecturally formed space. And I maintain that some architects are “structure-minded,” others “cavity-minded;” some architectural periods work preferably with solids, others with cavities.

It is possible to plan a building as a composition of cavities alone but in carrying it out the walls will almost inevitably have certain convexities which will intrude on the observer in the same way as the pillars in the Carli temples do. Though we begin by conceiving the temples as compositions of architectural cavities, we end by experiencing the bodies of the columns. The opposite can also happen. You see a house under construction and think of it as an airy skeleton, a structure of innumerable rafters sticking nakedly into the air. But if you return again when the house is finished and enter the building, you experience it in quite a different way. The original wooden skeleton is entirely erased from your memory. You no longer think of the walls as structures but only as screens which limit and enclose the volume



*Cave temple at Carli, India. The temple was hollowed out of rock
Above: view of interior
Below: Section, plan*



50 of the rooms. In other words, you have gone from a conception of solids as the significant factor to a purely spatial conception. And though the architect may think of his building in terms of construction, he never loses sight of his final goal—the rooms he wishes to form.

Gothic architecture was constructional; all bodies were convex with more and more material added to them. If I were to point out a typical example of a Gothic form I would select the sculpture of St. George and the Dragon in Nicolai Church in Stockholm. The sculptor was so enamoured of spiky excrescences of all kinds that no human being could possibly conceive the shape of the space surrounding the dragon.

A column during the same period became a whole cluster of shafts. Seen in cross-section it looks as though it had broken out on all sides in small, round knobs. The transition from Gothic to Renaissance was not only a change from dominating vertical elements to dominating horizontal ones, but above all a complete transformation from an architecture of sharp and pointed structures to an architecture of well-shaped cavities, the same sort of change as that from seeing the vase as figure to seeing the two profiles.

The illustrations in the work of the great Italian architectural theorist, Serlio, clearly show the new conception. A favorite Renaissance form is the circular, domed cavity. And just as the Gothic pillar was expanded on all sides into a cluster of shafts, the Renaissance cavity was enlarged by the addition of niches.

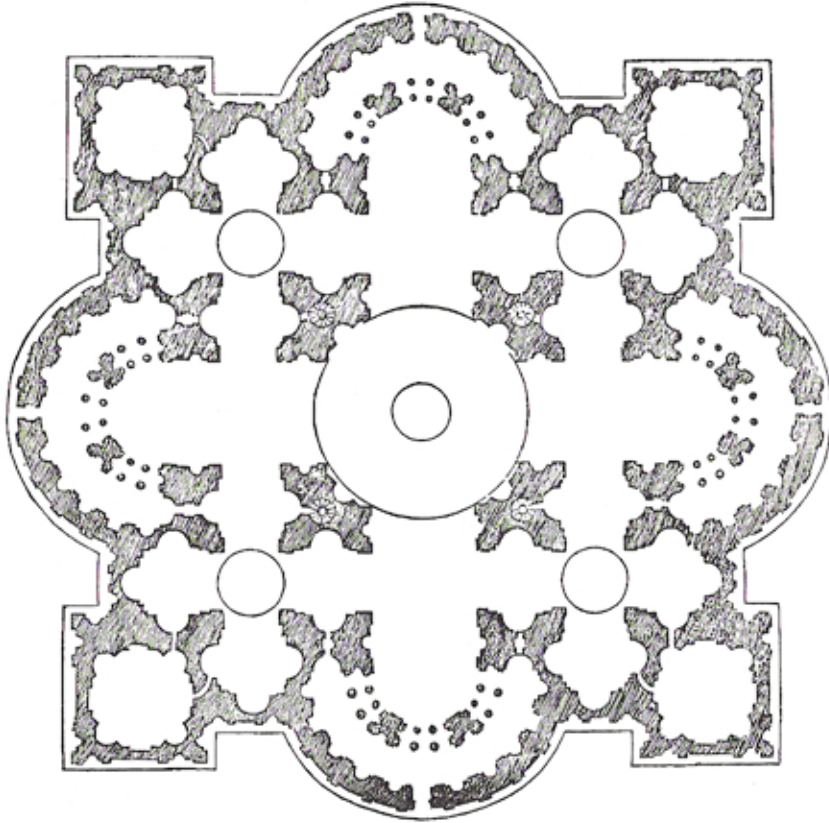
Bramante's plan for S. Peter's in Rome forms the loveliest ornament of round, domed cavities joined together and expanded on all sides by semicircular niches. If you consider the dark, hatched part as "figure" you will find that it forms a very queer remainder after the cavities have been hollowed out of the great wall masses. It is like a regular cave temple dug out of the enormous building block.

The plan, as we know, was changed and the church today has a somewhat different form. The sensitive observer will be dis-



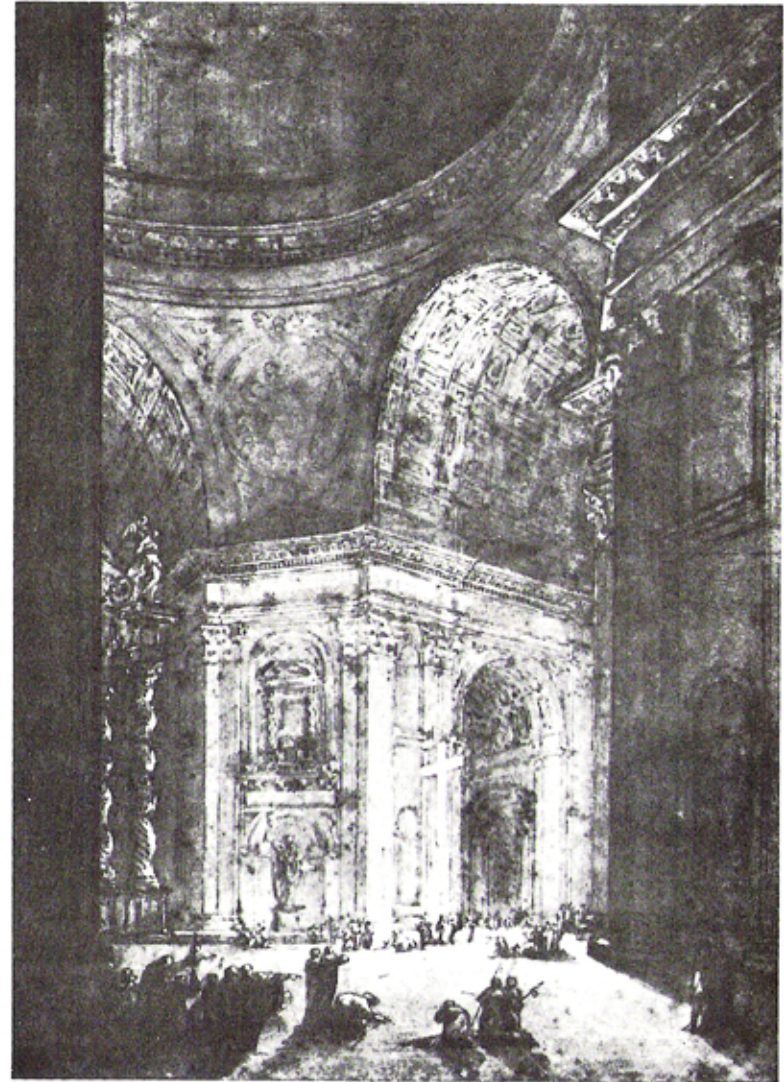
*Detail of the group "St. George and the Dragon" in the Nicolai Church, Stockholm
The picture shows the broken lance and dragon's head
Example of typical Gothic forms*

52 appointed at his first sight of the enormous room. In full daylight it seems uncomfortably vast and empty. But during the great church festivals the room is transformed. You now experience

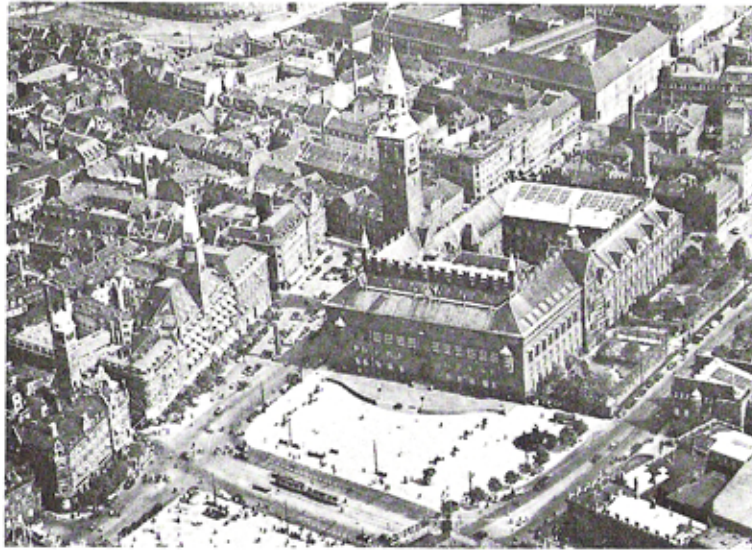


Bramante's plan for St. Peter's, Rome. From Serlio

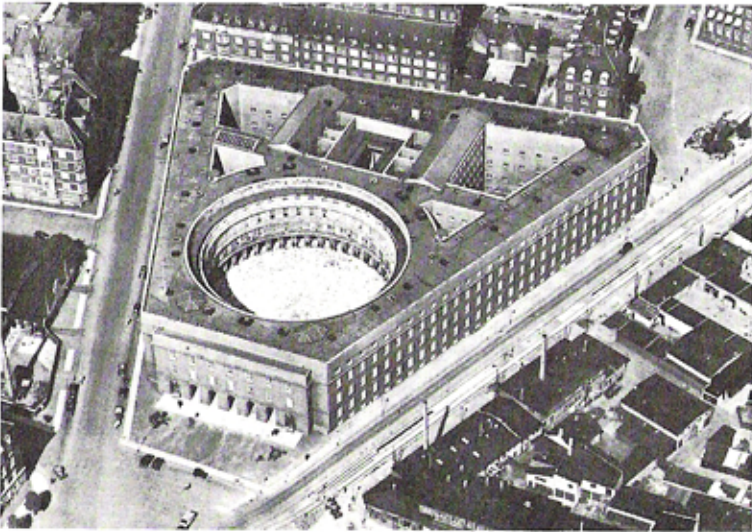
it as the colossal cave temple of the hatchings. All daylight is shut out and the light of thousands of candles and crystal chandeliers is reflected from the gold of vaults and cupolas. The church is now truly a vast sepulchral temple closing around Saint Peter's grave.



St. Peter's, Rome, in candle light. From a drawing by Louis Jean Desprez, 1782



Copenhagen City Hall in which the architect has particularly stressed the solids terminating them in peaks and spires



Copenhagen Police Headquarters. Here the architect has formed the cavities. The courtyards seem to be hollowed out of the enormous block

The extraordinary transition from Gothic love of construction to Renaissance cultivation of cavities can still be experienced. The Danish architect Martin Nyrop (1849–1921), who designed Copenhagen's City Hall, had like so many of his contemporaries the carpenter's view of architecture as a structural art. It might be called a Gothic conception. He was interested in making his constructions an æsthetic experience, among other ways by giving them rich ornamentation. Everywhere he showed how the building was put together. The City Hall is a large edifice with an irregular, spiked silhouette of gables, spires and pinnacles.

By the time the next monumental building was planned for Copenhagen the conception of architecture had swung full round. This building, Police Headquarters, is formed as a huge block cut off flat at the top. Nothing projects above the horizontal band which finishes the walls. All construction is carefully hidden; it is impossible to form any idea of how the building was made. What you experience here is a rich composition of regular cavities: circular and rectangular courts, cylindrical stairways, round and square rooms with absolutely smooth walls. Nyrop's City Hall is embellished with semi-circular bays which push out from the façade. The many cavities of Police Headquarters, on the other hand, are enriched with semi-circular niches pushing back into the solid masses of the walls.

Plan of Minerva Medica, Rome. From Palladio

