



Günther Feuerstein

**Open Space. Transparency – Freedom – Dematerialisation**

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The aim of the study is to analyse and describe in detail one of the most important trends in architecture in the 19th and 20th centuries: the evolution leading from the closed, hermetic spaces of the early cultures and the Middle Ages to the »open space« and transparency of the 19th and 20th/21st centuries. Historically, the focus is on the »diaphanous« space of the Gothic cathedral, the opening of the late-Baroque dome towards the sky, the transparency of exhibition halls and hothouses in the 19th century, and the glass dreams of the early 20th century. The steel-and-glass technology of the past one hundred years has permitted even more transparency, openness, and dematerialisation on a scale never seen before. It is notable – to quote just one aspect of the study – that many modern glass buildings have been compared to a »crystal«. This is the material with which we associate concepts such as purity, transparency, and order. We have thus also found a symbol for clarity and trans-lucency in architecture.

One key objective of the study is to demonstrate that this trend has been driven by no means only by a functionalist, pragmatic, or physical motivation but that, as in past epochs, the »opening up« of architecture reflects elementary desires of humankind: these are, first of all, psychological, aesthetic and artistic desires, the wish to overcome gravity as far as possible and, last but not least, the liberation of architecture and the attempt to resolve the heteronomy of »indoors« and »outdoors«. Many statements have suggested that this touches even on the borders of the irrational and the metaphysical.

The study should therefore also contribute to a fresh debate on the boundaries of architecture and, most importantly, should serve as a plea to allow architecture to remain open, free, light, and transparent even in the future.

Günther Feuerstein, who was a professor at the Hochschule für Gestaltung in Linz and also a lecturer at the Akademie der bildenden Künste and at the Technische Universität in Vienna, must be considered *the* catalyst in the Viennese post-war architectural scene, as almost all architectural avant-garde groups of the town have come from his circle. As an author, Feuerstein addresses areas where art history and sociology intersect with architecture. Feuerstein is one of the earliest critics of functionalism and pleads for an »expanded architecture«.

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Menges



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Freedom  
Dematerialisation

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# **Open Space**

**Transparency  
Freedom  
Dematerialisation**

**Edition Axel Menges**

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## Foreword

The aim of the study is to analyse and describe in detail one of the most important trends in architecture in the 19th and 20th centuries: the evolution leading from the closed hermetic spaces of the early cultures and the Middle Ages to the »open space« and transparency of the 19th and 20th/21st centuries. Historically, the focus is on the »diaphanous« space of the Gothic cathedral, the opening of the Late-Baroque dome towards the sky, the transparency of exhibition halls and hothouses in the 19th century, the glass dreams of the early 20th century. The steel-and-glass technology of the past one hundred years has permitted even more transparency, openness, and dematerialisation on a scale never seen before. It is notable – to quote just one aspect of the study – that many modern glass buildings have been compared to a »crystal«. This is the material with which we associate concepts such as purity, transparency, and order. We have thus also found a symbol for clarity and translucency in architecture.

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## 1. The notion of space

The following study will deal with space in the context of architecture. The author might therefore be expected to begin by defining the term »architecture«. However, this book cannot possibly address the multitude of definitions, or choose one definition over another. Rather, it is intended as an attempt to delimit the topic; derived from this delimitation would be only one type of definition, which can be regarded as the basis of the remarks that follow.

1. Architecture is a perceivable, visible category. There is no doubt that the sense of touch, directly or figuratively, plays an important part in the reception of architecture, but visual perception has precedence. Acoustic spaces, to name another category, are rarely produced by architects but for the most part by artists in other disciplines, and represent a peripheral area of architecture at best. The senses of smell and taste, too, have hardly had a place in architecture; these, as well, occupy a niche in the other fine arts. At best, the smells of building materials or furnishings can be associated with the architecture of spaces. Thus, for instance, the smell of the wood of the Japanese Ise shrines is an essential part of their architecture: once the smell vanishes, the shrine should be completely rebuilt. On the other hand, secondary smells brought into a building, for instance in connection with cults, are not factors in architecture.

2. Architecture is a three-dimensional category. The spatial and the physical, concave and/or convex spatiality or physicality with all the transitions between them are essential components of architecture. I will come back to this in the next chapters. Façades or ground plans are not, or not yet, architectural structures.

3. Architecture has direct social and/or personal relevance. It goes without saying that today we need to see all art, all culture in more or less intensive context with society. In the case of architecture, however, this connection is immediate, direct and intensive, and is a crucial factor in how society, how each individual is affected by it. Its effects are particularly evident in urban planning (which must obviously be subsumed under the term architecture), in residential architecture, in school architecture, in public buildings, but also in office buildings, hospitals and houses of worship.

4. Architecture goes well beyond the visible category referred to in section 1, transcending it as it were to some extent. In other words, the criteria listed in sections 1 – 3 must be supplemented, exceeded, beyond the functional, pragmatic, rational aspects. First and foremost, aesthetic, formal, artistic qualities – but also psychological, philosophical and literary tendencies – can be brought back into architecture. And not least, even today, we need to bring back irrational, metaphysical, symbolic, metaphorical aspects that are familiar to us from historical architecture, aspects which are still important, though often hidden. It is these latter aspects in particular that will be used as a fundamental basis for this study.

### 1.1. The notion of space: a spectrum

The discussion about what »space«, broadly speaking, actually is has been going on for decades, for centuries – and particularly in recent times. Instead of a detailed review I shall mention only a few salient points.

In the classical categories we basically differentiate between three conceptual sets: mathematical space, physical space and philosophical space. In recent times a large number of concepts of space have been added to the above – for instance, the space-time continuum of the theory of relativity, and the concept of social space. Of course these by no means exhaust the conceptual spectrum of the notion of space. Theology, no doubt, needs to define the space of the divine, of the sacred, of heaven. Astronomy, cosmology, aerospace research address the notion of space in their own way. The space of an artist's thoughts or ideas largely evades definition, and an individual's space of freedom especially can hardly be definitively explained.

In **Alexander Gosztonyi's** (b. 1925) standard text *Der Raum* [Space] (1976), »perceptual space« is included as one of no less than 29 spatial categories. It is »the space that is revealed by the various types of perception. It depends both on the sense organs and on those functions of consciousness that contribute to perception being possible ... The components of perceptual space are spatial constructions and their spatial relations.« This notion of space is supplemented and amplified in »Anschauungsraum« (virtual space). According to Gosztonyi the latter includes »lived and experienced space, perceptual and object space, as well as spatial orientation. It is thus the space that is experienced, perceived, recorded and determined by measuring, move-

ment and action and incorporated by establishing points of reference for purposes of orientation. It is thus ›more‹ than perceptual space.« And later, Gosztonyi states: »Three-dimensional Euclidian space is closest to virtual space. It is defined as the set of the triple (x, y, z) of real numbers (or coordinates) that describe the points of the virtual space. Its formula is  $R^3n$ .« Gosztonyi has thus – perhaps not explicitly, and yet indirectly – defined architectonic space.

**Otto Friedrich Bollnow** (1903–1991) helps us gain access to a few additional approaches to architectural space. Starting out initially from mathematical space, he names the following as its most important properties: in addition to its homogeneity there is, first of all, the fact that no point stands out from the rest and secondly, that no direction stands out from the rest. Furthermore, mathematical space is not articulated, and infinite. Bollnow finds that there is not much we can do in architecture with the mathematical concept of space, and quotes the notion of »lived space« by **Karlfried Graf Dürckheim** (1896–1988). »Concrete space varies depending on the being whose space it is, and depending on the life that is being lived in it. It changes with the person who dwells in it, changes with the actuality of certain attitudes and intentionalities that, more or less instantaneously – control the whole themselves.« Bollnow modifies the concept of »lived space« and speaks of an »experienced space«, to which he assigns the following predicates: it has a center, it has a system of axes, and it has places that are qualitatively different. That means it is even more distanced from mathematical space and approaches »the real, tangible space in which our lives take place«. (Bollnow, 1963, 1984) For Bollnow space »continues to be a space that is not restrictive yet is fundamentally closed; it is by no means infinite by nature. Even in the case of free space we are not dealing with an abstract infinity, but with the possibility of advancing without restraint ... thus space becomes a space where human life can unfold, which is measured according to subjective, relative definitions of confinement and vastness.« In the study that follows, I will repeatedly contradict the assertion of an »inherently closed space« that is »by no means infinite by nature«.

When we consider »outside« and »inside«, »out there« and »in here«, we get even closer to architectonic space. To put it simply, human beings always seem to be either »out there« or »in here«. Asked at arbitrary times of day or points in our lives, we are almost always able to say whether we are »outside« or »inside«. Gates, doors, portals, thresholds, curtains, barriers form a generally very clearly defined transition between »out there« and »in here«. Perhaps this is also connected with an elementary primordial experience: We begin our lives by spending a whole nine months »inside«, and in a pretty cramped space at that. Then, very abruptly, we cross the threshold to the »outside« into a vast, open space that is not always purely pleasurable. That is why we often understandably wish to be back »inside« again: freedom versus need for protection is an age-old problem of human beings, and of architecture.

For **Philippe Boudon** (b. 1941) »... architecture [is] ... an inside that shines through to the outside«. (Boudon, 1971, 1991) This is an elementary statement that may, for long stretches, be regarded as the basis for this study. The »shining through« at its various intensities is an elementary architectural motif and in the end leads to an »open space« whose limitation is reduced to a minimum.

The French philosopher **Gaston Bachelard** (1884–1962) recognizes the dialectics of the »outside« and the »inside« and its significance: »When he says inside and outside, the philosopher is thinking of being and nothingness. The profoundest metaphysics is rooted in an implicit geometry, and this geometry – whether we like it or not – spatializes thoughts; would the metaphysician think if he were drawing? The open and the closed are ideas for him.« (Bachelard, 1987) Bachelard provides us with perfect evidence that primarily architectonic concepts must definitely be understood in an intellectual, or even philosophical, sense as well.

**Rudolf Arnheim** (1904–2007) also points to the significance of outdoor and indoor spaces in architecture: »No spatial problem is as characteristic of the work of an architect as the need to create a connection between outside and inside, i. e., to make them visible synoptically as elements of the same conception.« This elementary relation between outside and inside can be defined and structured in myriad ways. My book is intended to show how relative and complex this »outside« and »inside« are, indeed how they can even merge.

## 1.2. The concept of space in architecture

The words »space« and »body/solid« have become more and more important in verbal discussions about architecture. As is so often the case, since architectural terminology tends to lack conceptual clarity, the definition of the two terms has hardly been precise. I do not intend to con-

tinue these endless discussions in this study: I intend to use very simple notions of space as my starting point. The previous chapter began by taking a few tentative looks at the concept of architectural space.

If we want to agree on a workable formulation, the definition of space we use must be modified or supplemented by the definition of architectonic space. Apparently the crucial feature of architectonic space is that it is not limitless and that its limits can be recognized physically, through the senses, and experienced by the body. We can walk through most architectural spaces, can approach or move away, can measure them as it were. We can thus experience the great variety of perspectives, as well as all aspects of the space in confrontation with our body, possibly including the third dimension, the vertical plane, particularly whenever we actually and physically move in this dimension by means of staircases, ramps, elevators etc. This aspect is by no means self-evident, for reception in the Renaissance, to name one example, was undoubtedly determined by the fixed eye-point of mathematical, geometric perspective.

I am sure another medium – film, which has a great affinity with architecture – is also responsible for our modern perspective. Though it is actually a two-dimensional medium, it has the illusionistic potential to generate almost any number of spaces in our reception. The editing of the film, montage, rapid sequence, the fictitious movement of the spectator are undoubtedly elements that have significantly influenced our habitual ways of seeing.

»Space« is of course as old as architecture itself, since architecture is, to a large extent, defined in terms of space. But in the 20th and 21st centuries theoretical debate on this topic has ranged far and wide.

The assertion that human beings cannot live without space is a cliché. But what is the nature of the spaces appropriate for them? It is not the intention of this study to analyze this. Rather, this book will discuss only a few specific aspects of space. Without any claim to being comprehensive, we shall turn to a number of art historians with questions about the nature and properties of architectural space.

As early as 1905, **August Schmarsow** (1853–1936), in his work *Grundbegriffe der Kunstwissenschaft* [fundamental principles of the science of art] (1897, 1998, 2001) discusses the problems of architectural space. He puts it clearly and succinctly: »Architecture by its very nature is the shaping of space.« As for the borderline case of physical space, Schmarsow describes it, too, very clearly: »Four posts, or even four fixed points suffice to challenge us to willingly complete the entire interior between them.« Of course in such cases space, as a closed and three-dimensional structure, is created only by the fact that we complete it in our imagination: i. e., by completing the dots or the posts by means of lines or surfaces and only then obtaining the real, physical, space. The poles, stuck in the ground, merely mark »places« , to which we will come back in chapter 1.3. Schmarsow continues: »Admittedly we know that human beings can actually only deal with what they call space by transferring the temporal idea to the spatial notion. But we know as well that they can deal with what they call time only with the help of spatial dimensions. Movement and inertia are the humanly possible approximations of both extremes.« Perhaps Schmarsow was thinking of the previously cited connection between space and time, in bold anticipation of modern thinking about the relations of space and time, based on physics. But we are also in complete agreement with the postulate that architecture deals creatively with the spatial environment: »Accordingly architecture is supposedly the way human subjects deal creatively with their spatial environment, with the outside world as a spatial whole, in accordance with their ownmost nature. At the same time it can respond to human beings not only as corporeal beings, as was probably thought, but necessarily acts according to the special constitutive quality of the human intellect, its intellectual as well as its bodily organization.«

For the architect and art historian **Herman Sörgel** (1885–1952), too, the third dimension in architecture is a factor of experiencing. »Spatial structures can be viewed and received as art only as one walks around, successively, so that people have no idea what to do in a space with two-dimensional, flat ›pictures‹ ... Strictly speaking you cannot ›see‹ the third dimension at all, you can only feel and experience it ... artistic space in architecture is quite different than Kant's space in philosophy or Euclidian space in stereometry.« Sörgel thus distances himself from Kant's thoroughly acceptable reflections and from Euclidian geometry, which of course left its mark on architecture for long periods of time, but professes his loyalty to a very comprehensive notion of architecture: »According to its general meaning architecture is nothing other than that which structures the entire visible spatial world, from the smallest spatial cell, furniture, to the immense space of nature ... Architecture has no less a task than structuring the entire visible world.« And once again Sörgel emphasizes the importance of space in architecture: »Thus, although it is perhaps

an exaggeration to call architecture an art that produces space under all circumstances, all architecture is certainly very closely related to a space, it is a dimensional, spatial art ... It is the hollow space, not the material solid cube, that is the actual architectural work of art. The fundamental law of architecture lies in spatiality, which, like a red thread, runs through all the other laws. How does the work of an individual fit into the spatial whole of what already exists, i. e., a section of space that is given its special quality by local dimensions? This is the first and most important criterion, and a building's style, form, associations and, up to a certain point, the specific local ambience must come second.« (Sörgel, 1918, 1998) To sum up Sörgel's argument, it is psychological, rational and optical components that constitute the perception of architecture. Today, we need to add a few more components to the list.

Probably also useful in understanding the concept of space in architecture is a comment by Gaston Bachelard. He speaks of three expressly defined spaces: the space of perception, geometric space and configuration space.

In connection with the notion of space in architecture we would say that concretely and processually experienced **three-dimensionality** also changed substantially in the course of architecture history. Again and again – and particularly in the 20th century – an architectural structure that is articulated only on the level of the floors and the pure flatness of the façades, walls and ceilings is superseded by tendencies towards an intensive three-dimensionality in which the space-constituting elements can no longer be seen and treated as an individual surface, but rather represent integral components of a complex spatial structure. The consequence of this three-dimensionality is that human beings do not move only in one plane, do not physically experience space based on the two dimensions of the floor, but rather are also drawn into the three-dimensional system of coordinates that constitutes the movement of the body. A related issue is the ultimate rejection of the rigid eye-point perspective of the Renaissance, and dealing with the above-mentioned camera perspective of films and television.

### 1.3. Space as place: topos

**Jürgen Joedicke** (b. 1925) explains space as follows: »What we call space in architecture is therefore only real for the onlooker once the delimitation has been constructed and can be perceived. Space is the sum total of relations between places.« (Joedicke, 1958) The concept of **place** thus enters the conversation, and it should be noted that the **topos**, the specification and marking of a place, which may be a point or a space, is inseparably linked with architectural space. The term »place« is frequently used in architectural discourse. Here too, however, there seems to be no binding definition. Above all this begs the question as to the dimension of the place. Admittedly we seem to have no problems with this in general usage, for »place« [German *Ort*, Trans.] is also the term used for a human settlement, and there are signposts that exactly mark the beginning and end of a place. A »change of place«, to choose another example, means that we are changing our local position, our domicile, our (micro-) geographical position. But what is the dimension of the place? Does it depend on establishing an individual ambience? Is the dimension in all cases defined by the person, by groups of persons, by the community? Or could it be that »place« is only a point, perhaps even a dimensionless element?

**Martin Heidegger** (1889–1976) puts building, living and place in one field of reference when he writes, philosophically and poetically: »The relation of human beings to places and through places to spaces is based on being domiciled ... That is why building, because it constructs places, is a creating and fitting together of spaces. Building produces places, and that is why inevitably, as their spaces are fitted together, space as *spatium* and as *extensio* comes into the reified structure of buildings.« (Heidegger, 1965)

Admittedly, a definition of the term space cannot be derived from the statement that building produces places. If Joedicke states that space is »the sum of the relations between places«, it becomes clear that place can in no way be identical with space.

Speaking about space and place in the Middle Ages, **Michel Foucault** (1926–1984) writes: »... we could say that space in the Middle Ages was a hierarchizing ensemble of places: sacred places and profane places; protected places and open, defenseless places; urban and rural places: for the real life of human beings.« (Foucault, 1990)

The debate around the term »place« must not be taken to mean that we are talking merely about a point or a narrowly delimited region. The definition of space as »topos« can therefore be quite misleading, and will be largely excluded from the present study.

### 1.4. Spatial »effects«

When we speak of architectonic space, there is no doubt that it must be seen in connection with human beings – one, several, or many people. The »effect« of space on an individual, or on people in general can't be explained easily and is subject to various speculations. Such aspects as individual sensory perception, psychological effect, and influences on human behavior are still being debated.

Architectonic space as we define it today is above all also characterized by the fact that it must be seen in connection with a human being or human beings, with persons who act, i. e., with persons in motion or in positions, and that the reception of space cannot be abstracted from individual points of view. We are essentially dealing with the »space of bodily presence«. (Böhme, 2006)

**Gernot Böhme** (b. 1937) refers us to the art historian **Heinrich Wölfflin** (1864–1945): Wölfflin »had worked out that the spatial form of architectural structures is not merely a matter of visual perception, but rather is experienced in and on the body, felt within, so to speak.« (Wölfflin, 2006)

Naturally a prerequisite for the reception of space is **depth perception**, i. e., the ability to tell apart front and back, up and down, with all the stages in between. With our two eyes we are able to see stereoscopically, and yet binocular vision is not, as was once assumed, the only basis for depth perception. We know that we have good depth perception even with one eye; this makes possible the ways we experience the visual world. Space as a sensory category is generally perceived with several senses. The eye has the largest share in space perception. It is hardly possible to calculate a percentage of visual perception, yet for seeing persons it is probably at least close to 90 percent. In this study, we will be primarily concerned with visual space perception.

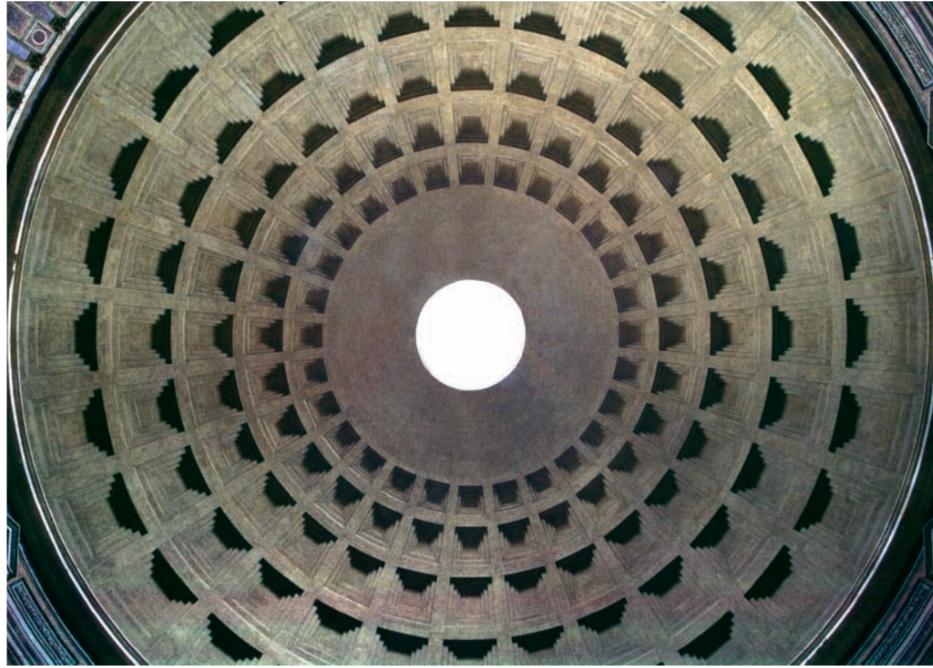
Physiological perception, psychological effect and physical preconditions are inseparably linked; the first two factors are individually and subjectively variable, while the latter factor can be objectivized and measured. We are largely familiar with the physical constituents of space. In addition to the elements that delimit space, light is of elementary importance. Notwithstanding the fact that light is individually and subjectively perceived, felt and interpreted very differently, there have been repeated attempts to make universally valid statements about it. Probably the most general statement is the one which ascribes positive, divine, sacred, joyous qualities to light, brightness, radiance and the sources of light, particularly the sun, while darkness is linked with what is negative, evil, sorrowful, satanic, demonic, infernal.

The opening of architectonic space will mean one thing above all: an opening to the light. But how we define »light« may vary a great deal. First and foremost, of course, it is daylight, i. e., the light of the sun, celestial light. But here we immediately realize that this light, as it eventually reaches our eyes, is not a constant magnitude. The change of sunlight in the course of the day changes due to the weather and various environmental circumstances cause very different qualities of light. Added to this are such factors as our individual mood and mental structure, our knowledge and experiences, so that the conditions that determine our reception of architecture and space vary greatly. Ever since the invention of electricity, artificial light has been increasingly in competition with sunlight (cf. chap. 12).

**Haptic, tactile perception** seems to be of lesser importance. We may assume that tactile perception takes place not only through the fingertips, through the body's surface, through the skin, but rather that our eyes palpate space and its boundaries, so to speak; if that is the case, we could say that haptic, tactile perception plays a very large part in how we perceive space. But it appears that optic and haptic perception are hardly distinguishable. Thus it will scarcely be necessary and usually not possible to palpate with one's fingers a highly sculptured, modeled space, for instance, in order to discover its haptic qualities.

**Acoustic perception** of a space can refer only to secondary information: A space as such can never (except in the case of isolated experiments) give us acoustic information. But acoustic phenomena that are independent of the space can certainly be changed by the space. The vast field of spatial acoustics offers countless examples of this. If a blind person can nevertheless perceive a space up to a certain degree, it is because of this person's extreme sensitivity, which allows him or her to interpret even the slightest noise in relation to space. Can blind and profoundly deaf people describe a space? This is a controversial issue – a kind of »sixth sense« cannot be ruled out.

**Olfactory perception**, too, is mostly of a secondary nature. Certain processes cause olfactory phenomena: activities, work, manufacture, cooking, eating, smoking. But human beings, too, are the cause of more or less intensive olfactory emanations: perspiration, body odor, perfumes.



- 3. Pantheon, Rome, 1st century BCE.
- 4. Villa of P. Fannius Synistor, so-called »Roman Room«, Boscoreale near Naples, 50–40 BCE.
- 5. Baths of Caracalla, Tepidarium, Rome, ca. 211 to 217. Engraving 1890.
- 6. Hagia Sophia, Istanbul – Constantinople, 326 to 360, 532–37.



**Early Christian and Byzantine architecture** »opens« the cupolas, conchas and walls in a number of ways, into the sky, into the landscape. In the ingenious building of the **Hagia Sophia** (326–360, 532–537) in Constantinople/Istanbul, the dome represents heaven, and the numerous light openings of the dome ring ensure that it can rise up above the heaviness of the building (illus. 6).

The enormous pressure of the vault, which is 33 meters wide, is diverted over two semi-domes with three smaller cupolas each: this technical method creates a longitudinal tendency, as a result of which the Hagia Sophia is substantially different from the great domed structures.

The **early Christian basilica** is physically an absolutely closed space: even though the thin translucent marble windowpanes provide subdued light, they prevent a view of the outside. For body and soul are oriented toward theophany, the point of aim of the space, where Christ is thrice present: in the hieratic mosaic of Christ blessing, in the Eucharist and in the celebrant. Figures and events dominate a largely abstract pictorial space, which is often divided in two horizontally: the saints stand or rather walk on the flowery meadow, forward toward the apse, but their bodies extend into the abstract gold of the heavens.

On the other hand, the apse of **Sant' Apollinare in Classe** (549) in Ravenna (illus. 7) gives us a view of a stylized landscape inhabited by sheep and horses, which are oriented toward Saint Apollinaris in the posture of prayer. Almost a half of the concha is occupied by the rhythmical garden with shrubs and trees on flowering meadows. The *crux gemmata* in the Cosmic Circle leads the eye to the gold of the heavens.

We find a similar type of »opening« in the dome of the west vestibule of **San Marco** in Venice (13th century). Since ancient times the representation of Paradise has been a welcome motif, allowing artists to address the landscape and the naked human body. In this case, there is a de-

the opening unprotected. Although the Romans were familiar with glass, a glass roof would have been somewhat problematic, but that was not the idea anyway. The Pantheon was dedicated to all the gods. However, recent research has tried to demonstrate that the building was intended for a god of light, and that the open crown of the dome was meant to ensure he had unobstructed access to the vastness of space and to human beings; and vice versa, human prayers were meant to be able to rise to heaven unhindered.

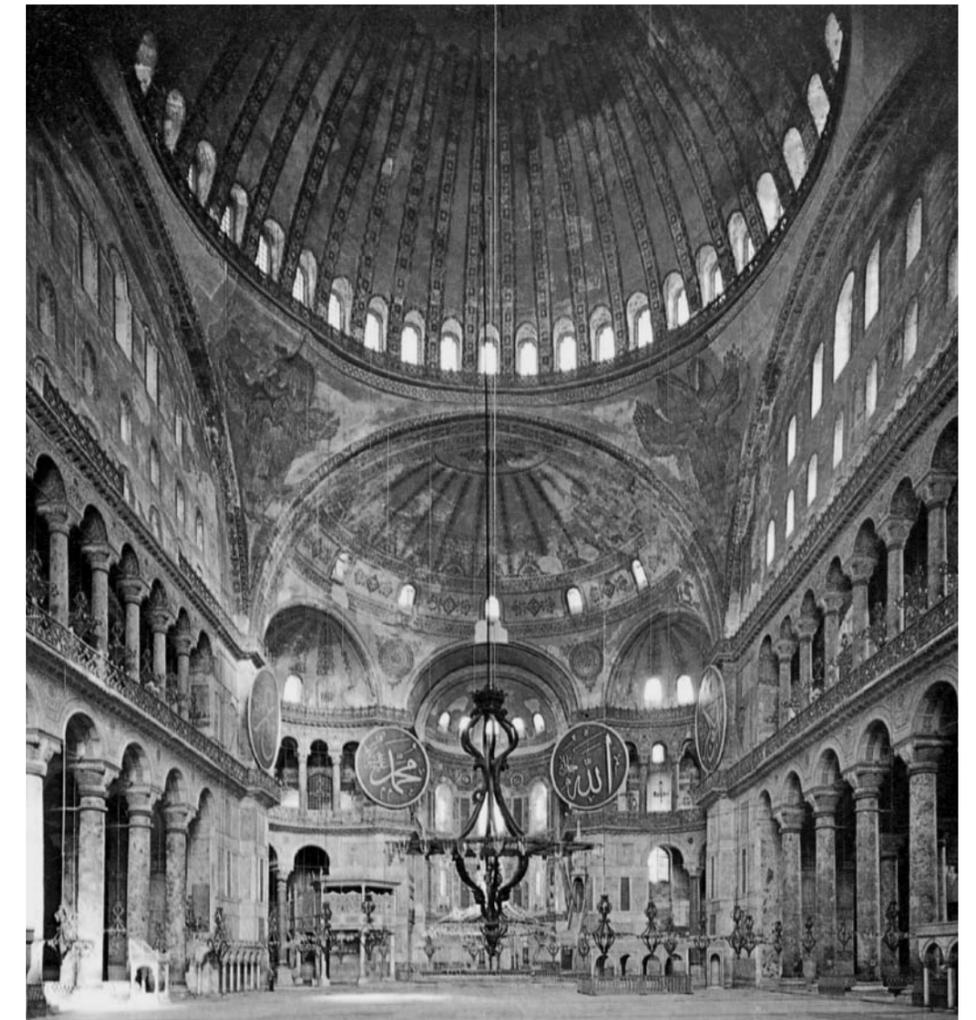
We have thus broached a fundamental topic: the opening of space vertically, upward, into the sky, the region of the irrational, the metaphysical, toward the gods. But the dome not only opens into the sky, it also signifies, symbolizes the sky: The panels of the dome were decorated with stars on a blue background, making visible, bringing closer what we see through the opening: the cosmos.

The idea of central lighting and a simultaneous view of heaven or at least the light of heaven has become a favorite topos of architecture – and still is today. The Renaissance puts the lanterns in the zenith of the dome, Baroque art opens them picturesquely in glorious celestial scenarios (cf. chap. 3.4); the 19th century covers galleries, banks and passageways with glass cupolas (cf. chap. 4.4), and the 20th century builds sports palaces with central openings for light. Frank Lloyd Wright takes the spiral of the Guggenheim Museum in New York to a dome of light, and for Hans Hollein the glass-covered rotunda is a central design motif: in the central office of the Banco de Santander in Madrid, in the Vulcania Museum in the Auvergne, in the unimplemented Mönchsberg Museum in Salzburg.

The Roman private house, like that of the Greeks, may definitely be regarded as »Open architecture«: In the prosperous, urban residence several rooms opened into the atrium, which was usually equipped with an *impluvium*, a basin for rainwater. In many towns, including towns outside Rome, an artistic method of opening up space was used.

The **Villa in Boscoreale** at the foot of Mount Vesuvius contained not only a valuable treasure but also spacious rooms with amazing murals that had been painted between 50 and 40 B.C.E. (illus. 4). From the interior of the villa, we have informative views of the outside on several levels: Thus a first level of the mural shows a three-part gabled portico; on the next level we see a small rotunda and then, even farther into the depth, the perspectives of columned halls. In another field a fantastical architectural collage projects into the wall panel, a motley collection of forms, reminiscent of Lequeu's surreal collages of revolution architecture ca. 1800. There is plenty of landscape as well: rocks, caves, trees, shrubs, hedges fill other panels of the space.

The compactness of the exterior structure in Roman architecture is often in surprising contrast to the »interior« openness of the monumental spaces leading into large interior courtyards, such as in the Baths of Caracalla (illus. 5).



does the space in which the figures act actually look like? The angel utters his greeting in a typical posture as he bends his knee, raises his hand in blessing and offers the lily of chastity. Mary, in an attitude of prayer, kneels on a stepped platform, on which stands a small shelf with a Scripture lying open on it and with symbolic objects. On the shelf stands the lectern (not unlike a modern standing lamp). It appears as if Mary had carried part of her possessions outside the house – which, with a large door, forms the background on the right – in order to welcome the angel. There is an unusual background: The dove comes flying from the bare, stylized landscape with three stereotypical, transparent trees. The whole landscape looks like a painted panel placed in front of the wall. The openings in the wall, which have broad frames – a window and a door – are half open.

The event of the *Annunciation* in the painting of **Carlo Crivelli** (ca. 1430–ca. 1500) almost becomes window dressing in comparison with the sumptuous architecture of the house and the street (illus. 69). The angel scarcely turns toward the Virgin, but rather toward Saint Emidius, the patron saint of the town of Ascoli, who shows him a model of the town. »Pope Sixtus IV granted the town limited self-government in 1482. The news reached Ascoli on the Feast of the Annunciation (25 March). The painting celebrates this event.« (Phaidon, 2004) The magnificent two-story palazzo opens between two pilasters and we catch sight of Mary in her chamber. Like a laser ray coming from heaven, the Holy Ghost pierces the wall and lands on Mary's forehead. The top floor shows part of an open loggia, with plants, birds and a symbolic peacock on the balustrade. The substantially shortened façade of the building is part of the narrow lane in which the angel and the saint have encountered each other. Again the perspective draws us far into the depth of the space, through a bridge-like archway to a walled courtyard, all of them enlivened by people.

It almost seems as though **Sandro Botticelli** (1445–1510) had reversed the roles: The kneeling angel appears to be submissive. His gesture towards Mary's hand is graceful, and she »responds« with a similar gesture (illus. 71). With all of her humility, the Virgin through the charming curve of her body and almost Gothic S-shaped movement radiates dignity and confidence. The angel's crouching posture allows us to see a wonderful, highly detailed landscape: a fortress, a castle with a bridge, meadows and shrubs. In the foreground there is a delicate tree before an atmospheric sky, but what is the significance of the trough that links the little tree with the large opening? The space shows the few details precisely and rigorously: The squares of the floor begin with a frieze, but end without one. The profiles of the door frame are clear-cut, as are the contours of the lectern.

**Paris Bordone** (1500–1571) obviously uses the *Annunciation* only as a pretext for portraying a magnificent Mannerist architectural structure whose depth effect is most unusual (illus. 73). A courtyard is enclosed, presumably on all sides, by cross-vaulted arched arcades. Between the plinths of the columns and the columns, a pedestal with figures has been incorporated and a fragile rudimentary architrave forms a transition to the archivolts. It is thus that the artist brings off the mannerist trick – evoking the character of an unusually slender pillar while preserving the classical proportion of columns. The airy ground-floor hall leaves open, in the background, a view of additional arcades that belong to a two-story palazzo, which apparently also has a courtyard that we can guess at more than we can define it. The sumptuous complex of buildings separates the powerful figure of Mary in the foreground from the angel in the background who, surrounded by a cloud and a dove, is only now approaching. Not only in comparison to Mary, but also in proportion to the columns he is passing, he seems to be much too small, and the direction of his flight and his gaze are hardly directed at the open arms of the Virgin. What connection does the column on its massive pedestal behind the Madonna have with the complex of buildings? None, apparently – its only purpose, like that of the drapery, is to serve as a background, a theatrical set piece for Mary.

Around the middle of the 16th century, Italian painting to a large extent breaks with centuries of iconographic standards for depicting the Annunciation; the artists are looking for new models for composing the picture.

In the golden age of Baroque painting in Italy we are not surprised when **Jacopo Tintoretto** (1518–1594) jettisons ideas about representing the Annunciation that had been accepted until his time. In the Scuola Grande di San Rocco in Venice he has pictured the scene extremely dramatically. With lightning speed an angel rushes directly toward Mary through the open stone door frame and startles her as she is reading a book. Her hands gesticulate, astonished, fending him off. The Holy Ghost flies ahead of the angel, and a rapturous throng of little angels bursts in over the door frame. The separating structural element is there too: but the dilapidated wall now separates the workshop of Saint Joseph from Mary's chamber.



67. Domenico Ghirlandajo, *Annunciation*, 1482, San Gimignano, Italy.

68. Lorenzo di Credi, *Annunciation*, 1480–85, Uffizi Gallery, Florence.

69. Carlo Crivelli, *Annunciation*, 1486, National Gallery, London.

70. Rogier van der Weyden, *Annunciation*, John the Baptist retable, ca. 1440, 1454?, Louvre, Paris.

71. Sandro Botticelli, *Annunciation*, 1489, Uffizi Gallery, Florence.

72. Master of 1486/87, *Annunciation*, 1486/87, Polyptych, Striegau (Strzegom) near Breslau (Wrocław), Poland.

73. Paris Bordone, *Annunciation*, 1545–50, Musée des Beaux-Arts, Caen, France.



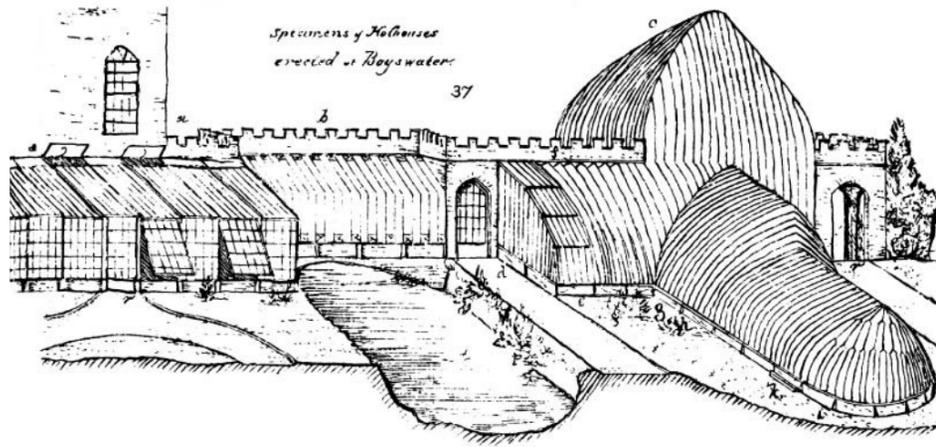
It goes without saying that the theme of the Annunciation was not limited to Italy. I shall now go back in time and describe examples from France and from the Flemish and German speaking art circles.

The **Ghent Altarpiece** (1432) by the brothers **Hubert** (ca. 1370–1426) and **Jan** (ca. 1390–1441) **van Eyck** distances the two figures from each other considerably, interposing two painted panels: the left panel, which is assigned to the angel, represents not the sacred, but the »world« in the form of a city, beyond the space where the action takes place; meanwhile the right-hand interposed panel probably shows part of Mary's extremely spacious house. The floor and the beam ceiling connect the figures, whose laconic language no doubt reaches the other's ears only with difficulty.

Contrary to the usual standard whereby the picture is intentionally divided and the angel and Mary are distant from each other, an anonymous fresco painter in the Grote Kerk in Breda (the Netherlands) almost joins the two figures spatially. However, the painter keeps the usual architectural structure: two painted arches frame the scene. These rest on half columns on the sides, and on a full column in the middle. Yet the strange consequence of the spatial merging is that the base of the column and its lower part must disappear behind a small stand. The art historian H. Rotgans has shown in a sketch that an »impossible space« was created, i. e., a space that cannot exist in reality. Is this a trick, was the artist aware of this lapse, or had he not sufficiently mastered perspective? When we examine the fresco carefully, we realize that something very similar is taking place in the background, with its expressively contorted spatial compartments. (Ernst, 2006)

In the *Annunciation* of **Rogier van der Weyden** (1399/1400–1464) in the Louvre, the angel and Mary are spatially very near each other (illus. 70). Only the curtain of the four-poster bed and a tasteful stand in the background create a little distance. Nevertheless the two figures appear dispassionate and distanced. The four-poster bed itself becomes a space within the space, and its three-dimensionality is much more clearly defined than that of the actual space of the Annunciation. Mary lives in a respectable, middle-class Dutch room with a fireplace (though it has a bench placed in front of it), a beautiful tiled floor and wooden ceiling. The friendly angel comes into the parlor for a visit. There is definitely a view of the outdoors: In the background a window allows us to look at a landscape.

An unusually dynamic three-dimensionality appears in the Annunciation of the **Polyptych of Striegau** (Strzegom) near Breslau (Wrocław) (illus. 72). The panel was created by an anonymous master in 1486/87, and is characterized by a contest between the magical gold background and the artist's approach to »modern« perspective. The break between the two figures could not be more pronounced: a bifora with a slender marble column is bounded by unadorned columns that look like concrete which form a window and a tall, slender portal in front of which the angel, half kneeling, blesses the Virgin. The artist is not quite satisfied with the traditional, magical gold ground – of which Mary's robe is made as well –, for he inserts a small landscape backdrop between the ornamented gold ground and the crude architectural structure behind both the angel and the Virgin. Strangely enough, the angel himself is also in a space that is open on all sides, only inadequately determined by a similarly clumsy perspective as that of Mary. The pronounced perspectival foreshortening looks as if the floor had been lifted up or as though we were observ-



one of the first who would not put up with the rectilinear form imposed by iron, but gave the transverse section of the buildings the form of a pointed arch or a spherical, barrel-shaped form (1817/18). Loudon wanted the incidence of light to be at a maximum, and so he transferred the structure to the level of the glass surface, thus avoiding the shadows cast by the iron profiles.

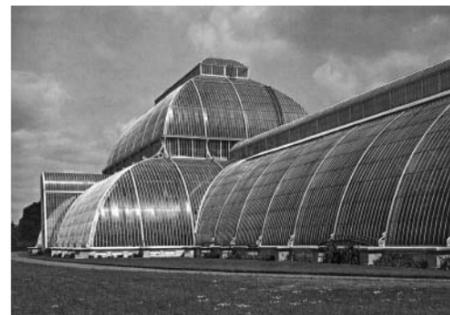
We first encounter a larger work by **Joseph Paxton** (1801–1865) in Chatsworth. In 1837–41, together with **Decimus Burton** (1800–1881), he builds a **conservatory**, i. e., a house for the preservation of plants, for the **Duke of Devonshire** (illus. 127). The narrow-mullioned but elegant two-story structure was built a decade before London's Crystal Palace. A little temple – the entrance – is a last homage to history. The **Duke of Wellington** did not visit the hothouse until 1893, i. e., long after the Crystal Palace, and yet he still found the building impressive: »I have traveled all over Europe and got to know many scenes of overpowering grandeur on many occasions, but I have never seen so magnificent a coup d'œil as that which unfolded before me [here].« (Kohlmaier, 1981).

An understanding, and what is more, enthusiasm for this new (non-) architecture had finally taken hold now. People praised not only its technical bravura, but also its »non-material appearance«, i. e., a suggestion of something metaphysical hitherto reserved only for sacred buildings. They were looking not only at the abundance of light and the transparency of glass, but another quality as well – the fact that under certain conditions there were mirror reflections, that is, a quality that has been considered to be magical since time immemorial (cf. chap. 3.4.5).

The **Palm House** in the **Royal Botanic Gardens** at Kew/London (illus. 125) was built only a few years before the London glass palace, 1845–48. **Joseph Paxton** was involved, perhaps as practice for the Crystal Palace, which he pushed through together with **Richard Turner** (1798 to 1881) and **Decimus Burton**. Loudon's invention, the »curvilinear profiles«, was confidently used and formed the silhouette. Moreover, in the opinion of the design engineers, it provided optimum lighting.

When the building was cleared prior to its restoration it was possible to take an informative look at the imposing central hall. By means of unconventionally formed capitals, the slender iron pillars connect to the main girder on which a gallery has been mounted, and an exterior walkway corresponds to an interior one. The elongated glass dome begins in a gentle segmental arch, and the latticework structure is outside. An elongated lantern forms the upper closure. The lateral naves connect in a kind of round-arched, cast-iron ribbed vaulting.

Not to be outdone, the French vied with the British in developing light structures. The hothouses in the **Jardin des Plantes** in Paris (1833), at a total length of 172 meters, are among the largest buildings of this type during this period. The building sits on a monumental pedestal, and two 20-meter-high rectangular pavilions show their elegant structure of iron pillars, which faces outwards. Immediately adjacent to one of the pavilions is an 80-meter-long palm hall. The filigree »curvilinear« roofs sit on a monumental, historicist pedestal, a contrast that clearly shows formal lack of certainty. **Charles Rohault de Fleury** (1801–1875) is named as the design engineer. He learned from the English and continued the system of using prefabricated iron and glass in a masterly fashion, particularly in its technical detail and in the rational way the building was constructed. With this building too, visitors expressed their enthusiasm in terms that far exceeded technical admiration: »It is real joy to enter these magnificent rooms, where one's senses discover



124. John Claudius Loudon, Bayswater House, experimental glasshouse, Bayswater, London, 1817/18.

125. Richard Turner, Decimus Burton, Joseph Paxton, Palm House in the Royal Botanical Garden, Kew, London, 1845–48.

126. Hippolyte Meynadier de Flamalens, Jardin d'Hiver, Paris, 1846–48.

127. Richard Turner, Decimus Burton, Joseph Paxton, Palm House in the Royal Botanical Garden, Kew, London, 1845–48. Interior during renovation, 1995.



hitherto unknown charms ... Once inside, one feels dazed, and the feeling persists even after one resumes walking outside again ... The treasures of the vegetation ... give visitors the idea of a new world, which will suddenly close behind them.« (Bouché, 1886, after Kohlmaier, 1981) Even if in its fundamental principles the constructional system was already gradually evolving into a norm, there were constant innovations, for instance, in this hall, the use of three naves, almost suggesting church architecture, and of cast-iron double columns, which support the very elegant roof structure.

Fifteen years later, however, there was still more to admire in Paris: the most magnificent **Jardin d'Hiver** – among many like it – on the Champs-Élysées (illus. 126). The project was designed in 1846 by **H. Meynadier de Flamalens**, and the construction was completed in 1848 by **Charpentier**. It is true that the building was »only« 100 meters long, but the magnificence of the hall, which was 40 meters wide, with its mighty arched roof, had no equal and was yet another step forward in the development of glass and cast-iron structures.

**Gottfried Semper** (1803–1879), who a few years later would speak very disparagingly of London's Crystal Palace, has nothing but praise for the Jardin d'Hiver: He compares the glass »vault« with the imposing dimensions of Gothic cathedrals. Another eye witness comes away with the same impression: »The first sight of it is surprising. The arrangement and general plan of the building can best be compared to a Gothic church with its nave and transept.« And, full of enthusiasm, he goes on to describe the effect by moonlight when there is the sound of soft music: »One has the feeling of having been transported into a dream world, with elves and spirits whispering around one ... The elastic glass vault forms a veritable sounding board and the sounds have a power, brightness and loveliness that can be attained in no other way.« (Kohlmaier, 1981) The transfer of sacrality, of the irrational, indeed the mystical from sacred buildings to other building projects characterizes the architecture scene starting with the late 18th century. The comparison of a winter garden with a cathedral is a significant example of how »significance« has been transferred to so-called »secular« buildings.

The »jardins d'hiver« had long outgrown their function as plant houses and had become important social meeting places that were amazingly multifunctional: Especially the winter garden described here was, so to speak, an extension of the Champs-Élysées: Not only was the plant life complemented by fountains, rocks, sculptures, bird cages, an additional delight for the eye, but also people strolled lazily through a hall flooded with light, past cafés, pastry shops, billiard rooms, reading rooms, kiosks, art galleries and the like. The park and the street, the city and nature became one – though deceptive – entity. Large areas of the hall remained without vegetation, so that when there were concerts or balls there was room for up to 8,000 people.



In Germany **Hermann Muthesius** (1861–1927) has very similar views: »The construction engineer himself also partly shared the opinion that his buildings, while useful, were not beautiful. In every case where, according to old custom, beauty came into question, he would call in his half brother, the architect, who would then deck out his bridge entrances, his station concourses and the interiors of his steamships with so-called art, i. e., with historical forms of architecture. And even today there is a prejudice on the loose among architects and civil engineers that historical architectural motifs need to be used in order to design engineering structures ›aesthetically‹ ...« (Muthesius, 1904)

#### Railway stations and airports today (excursus)

The subject of railway stations is by no means exhausted today. The prophecy – which is only partially true of America as well – that cars and planes would make railways superfluous was not fulfilled in Europe: On the contrary, environmental problems, for which cars were responsible to a large extent, have led to a renaissance of rail traffic and thus to the building of new stations. I'd like to cite a few examples – buildings where the idea of an open concourse flooded with light is still an issue.

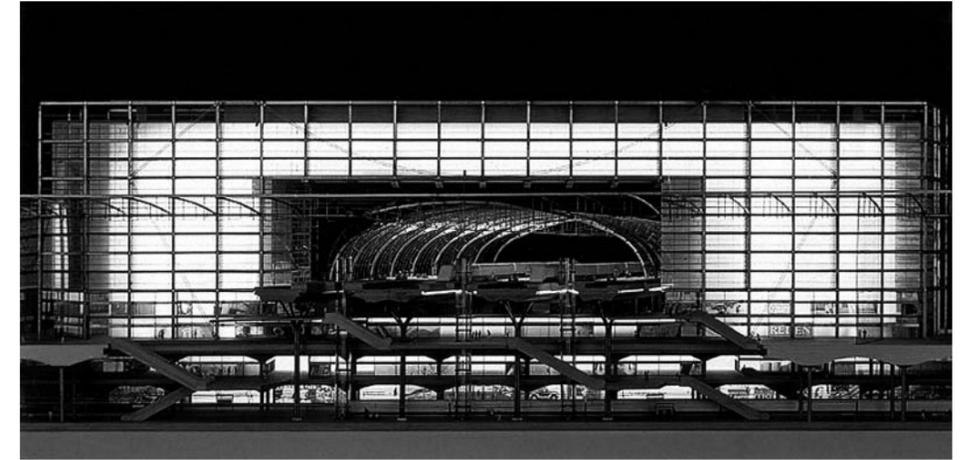
In London **Nicholas Grimshaw** (b. 1939) and **Partners** built the **Waterloo International Terminal** (illus. 158) in 1993. In the aerial photo we see no monumental hall, but a huge curved facility that is reminiscent of a gigantic reptile. The entire west side has a glass roof with very thin glazing bars. The primary structure consists of light tube truss girders with bracing, and the glass-bearing secondary structure, also turned outward, is suspended from the primary structure. The east side of the concourse has only narrow glass strips between the steel panels, so that the entering light is reduced.

The tradition of imposing railway concourses is continued in a large-scale project for the former **Lehrter Bahnhof**, now **main railway station of Berlin** (illus. 160). In 1992 the architectural firm of **Gerkan, Marg & Partner** (founded in 1965, Meinhard von Gerkan, b. 1935, Volkwin Marg,

158. Nicholas Grimshaw and Partners with YRM Anthony Hunt Associates, Waterloo International Terminal, London, 1991–93.

159. Busmann and Haberer with Polonyi, new vestibules at main station in Cologne, 1986–91.  
160. Von Gerkan, Marg and Partners with Schlaich, Bergemann and Partners, Lehrter Bahnhof, Berlin, 1993–2005.

161. Santiago Calatrava, Liège-Guillemins Station, Liège, Belgium, 1996–2009.



b. 1936) together with **Schlaich, Bergemann & Partner** designed the most modern railway hub in Europe, which was officially opened in 2005. It is surprising that open-platform roofing has fallen out of favor again. The vast concourse, made of glass down to the base, again demonstrates an incredibly filigree transparency. The flat arch structure, whose span is 60 meters, has a curved ground plan and is 450 meters long. The concourse itself, at 170 x 50 meters, has a barrel roof, like the platforms. But that is not all: the glazed face walls open to the concourse lobbies. Two huge bow-shaped slab-type buildings, offices and hotels, span the platforms.

In the **main railway station of Cologne**, built in 1986–91, the architectural firm of **Busmann Haberer** (founded in 1972, Peter Busmann, b. 1933, Godfried Haberer, b. 1933), has developed, by analogy with the 1894 concourse, a steel structure reminiscent of cross-ribbed vaults (illus. 159). In the comments of the planners, however, the tree motif is invoked, as though they did not want to admit that millions of trees were sacrificed to the triumphal march of the railroads: »The supporting pillars resemble the trunks of trees, from which bow-shaped branches grow at the forks.« The transparency of the rhomboid elements begins at the supports and determines the open character of the structure. In the 19th century, the railway station moved disturbingly close to Cologne Cathedral, which was not »completed« until then. Now, thanks to the large glass surfaces, the cathedral is, as it were, transferred inside the station.

**Santiago Calatrava** (b. 1951) shows the extent to which even a railway station can be regarded as an open building – not merely glazed, but really open. In 1996–2009 he built the **Liège-Guillemins railway station** in Belgium (illus. 161). A general overview gives us the impression of a gigantic, tent-like roof rather than of a railway concourse. In actual fact the 145-meter roof spans the five platforms and connects two heterogeneous parts of town. The problem of creating a transition between interior and exterior areas has been structurally masterfully solved; the bridge construction elements made it possible for the trains to keep running while construction was going on. As a result of the various very striking reinforced concrete arches the station retains a traditional character of solemnity, even of sacredness .

The fact that rail traffic has kept its importance was not enough to prevent many stations from losing their function. The protection of historic buildings and monuments often prevented their de-



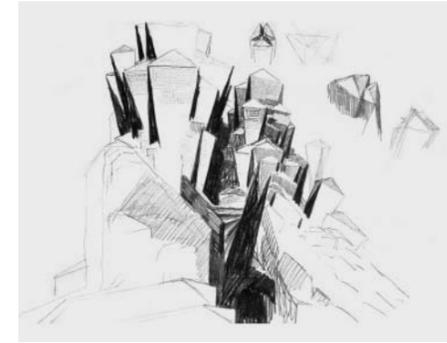


**Mies van der Rohe** uses the term »crystal« for architecture as a whole. »Architecture is dependent on its era. It is the crystallization of its inner structure, the gradual unfolding of its form.« **Sigfried Giedion** speaks of »crystalline transparency« in reference to Gropius' Bauhaus building in Dessau, and furthermore he feels that the building »was the only large building of the period that represented a complete crystallization of the new conceptions of space«. (Giedion, 1941, 1965)

As a follow-up to the preceding chapter and in connection with the image of the crystal, I would once again like to quote **Bruno Taut** as he describes the »crystal house«: »As sunlight streams through it, the crystal house stands in solitary splendor like a glittering diamond ... Built completely out of glass crystal – colored crystal. Reverent silence in the snow and glacier mountains. Ineffable silence. Temples of silence«. Bruno Taut is not content with the radiant, shining house, the crystal. He dreams of the *Stadtkrone* (city crown) (1919), which eclipses everything, like the cities of old. In the center are the large cultural centers for human minds and souls. The highest edifice in the middle is »pure architecture, completely detached from purpose ... It is the crystal house, made of glass – a building material, matter, yet more than ordinary matter due to its shimmering, transparent and reflecting character.« Human happiness and peace – where are they to come from if not from the glass house? And quoting his friend Paul Scheerbart, the man who inspired him, Bruno Taut continues, still on the subject of the crystal house: The light, »coming from infinite space, is caught in the topmost spire of the city, is refracted and lights up the colored panels, edges, surfaces and curvatures of the crystal house«. Taut expresses his high idealistic standards when he speaks of the light and imagines a crystal – the ancient light metaphor – in the center of the new city. Once again a crystal becomes the most impressive simile for idealistic ideas about architecture. It is faceted, sharply bent and folded, regular-irregular, non-rectangular, and while it is also a formal motif for a compact Expressionism, the radiance, the refraction of rays, the putative glow from within, the perfection of its form are occurrences that inspire the artists of the Glass Chain. Taut's idealistic interpretation of the crystal goes even further, however:

»Because of its prismatic properties it becomes a symbol for linking the cosmos and Earth: As an element of the earth and of light it stands for the mystical connection in earthly and transcendent matters which Taut and his fellow wayfarers strove to achieve.« (Schumpf, 2006) The »dis-solved« city that Taut drew and described in 1920 must have »crystal houses«. Also included are »ritual or religious buildings, built of glass, that glow at night. Everything is loosened up ... The stars in the sky and the stars on earth greet each other.«

The opulence of Baroque architecture and the fantasy world of the Expressionists are not too far apart. A drawing from Bruno Taut's 1920 architectural play *Weltbaumeister* (the world's master builder) may shed light on this. Yet for Taut this lavish architecture, too, is »the shining crystal house – in the evening's red stage lighting«. And in Bruno Taut's built »glass house« (cf. chap. 5.6), the overused metaphor reappears once more: »Here too, as in a crystal, there is no real in-



213. Bruno Taut, »Das Baugebiet vom Monte Generoso aus gesehen«, *Alpine Architektur*, Hagen, 1919.

214. Wenzel August Hablik, *Crystalline Ravine*, 1921, Wenzel-Hablik-Museum, Itzehoe, Germany.

215. Wenzel August Hablik, *Museum in the High Mountains* 1920, Wenzel-Hablik-Museum, Itzehoe, Germany.

216. Wassili Luckhardt, *Crystal on a Globe*, cult building, second version, 1920.

side and outside. We are separated from nature, but we are barely aware of it.« »... with the glass house, an initial apotheosis of the ring and shell principle had been achieved. The way through the shell served as a sort of initiation rite, as a journey upward to the light of the celestial hall, where frosted glass globes soared like constellations.« The innermost zone in the universe of the glass house was left empty – for good reason, as Taut explained later: »The ultimate is always silent and empty ... I never intend to pray that God should surrender himself to me, I want to pray that he should make me empty and pure.« (Taut, 1919)

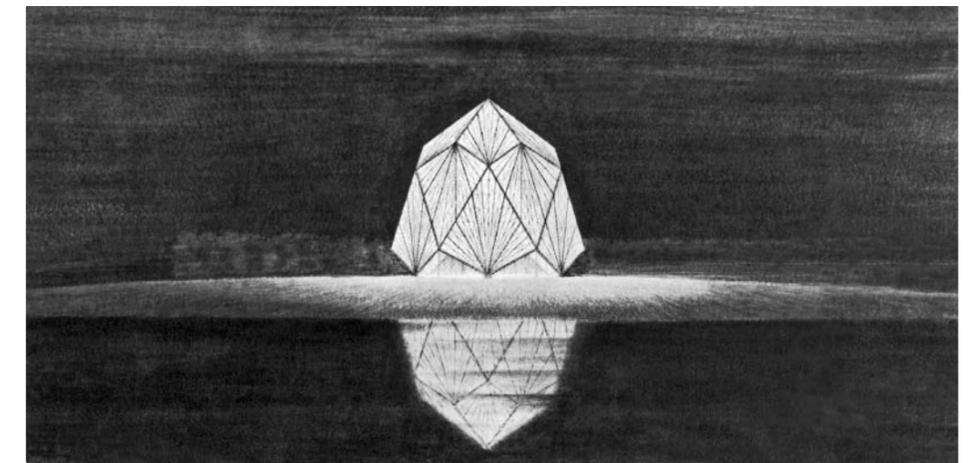
There is also something almost ritualistic about the *Crystal on a Globe* (illus. 216) drawn by **Wassili Luckhardt** ca. 1920. Here too the sacral character of the sketch cannot be overlooked, as is the case with almost all sketches by the Glass Chain, but the artists denied the Christian background of their work, since most of them sympathized with socialism. Thus Luckhardt calls his sketch *Ritual Building*, not wishing to be identified with any religious denomination. Wassili Luckhardt later designs a **Glass Festival Hall**, whose colored facets seem to rise from a cathedral where crystal seems to be ever-present.

**Wenzel August Hablik** (1831–1934) was not a member of the Glass Chain, but in a way he adopted the group's ideas, for instance when he articulated the motif of the crystal. His design for a college of mineralogy (1920) turns out to be an »imaging« building, and the crystal is the ultimate in transparency and purity. The same is true of the **Crystalline Ravine** (illus. 214) and the 1921 exhibit building. Hablik owned a large crystal collection and wanted to replace the word »build« by »crystallize«. (Pehnt, 1973) The **Museum in the High Mountains** (1920), as Hablik depicts it, can only be a glowing, shining crystal (illus. 215). A whole 80 years ago Hablik foresaw that museums would become the new cathedrals: The expressive sacral character is no longer that of a cathedral, but rather of the new place of worship, the museum. We are already familiar with the opening up of church space, the indeterminate, imaginative articulation of space in Renaissance architectural paintings and in late Baroque and Rococo religious architecture.

In painting, too, the idea of the crystal seems to be very popular. To mention only one example: **Paul Klee** (1879–1940) in his 1930 picture **Kristallisation** (illus. 217) makes clear the affinity to architecture: The crystal has become an expressive, dramatic building, though a building characterized by soaring lightness. Admittedly he leaves us in the dark regarding the spatial, three-dimensional shape of the structure; indeed, we begin to wonder whether this is even a compact volume and not a light, floating web, as seems far more likely. And again it is an open, transparent figuration in the broadest sense, for it is impossible to make out the planes, the front and rear of the lines, surfaces, overlappings and connections. Once again, much as in medieval paintings, spatiality is defined in a very different way. While the spaces of the medieval period came before Renaissance spatiality, so to speak, Modern art – and thus Modern architecture – comes after it, as it were. In chapter 6. I shall discuss this topic in more detail.

The term »crystal« continues to be popular to this day when it is a matter of describing, and extolling, transparent, open, high-quality glass architecture. If we search through modern-day reviews and building specifications, we are amazed at the frequent, thoroughly poetic and subjective use of the word »crystal«.

Here are just a few examples. A crystalline reliquary of a very special kind was created by Prada's in-house architects, **Jacques Herzog** (b. 1959) & **Pierre de Meuron** (b. 1950) for the

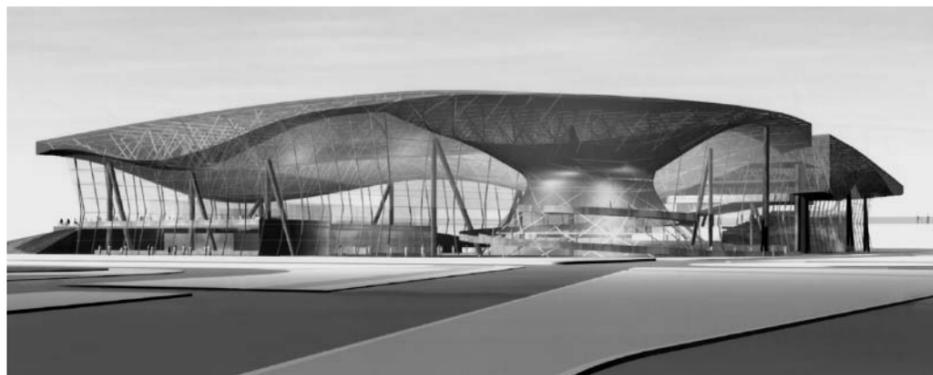


tanced themselves from thousands of years of rectangularity and from the closed cube. The idea of the »cloud« as a spatial construction runs through large sections of Coop Himmelb(l)au's work. However, a cloud is not a space; rather, like the »crystal«, it is a sculptural configuration that cannot be used even mentally. And yet it constantly appears, and not only in the work of the Himmelb(l)au group, as a metaphor for what is light, airy, loose, transparent. The earliest projects of Coop Himmelb(l)au, the pneumatic constructions, were called *Cloud* and *Sky Blue Cloud (Wolke Himmelblau)*. »What was important were not forms or details, but the effect of light and shadow, bright and dark, high and wide, white and vault, vista and air.« (Himmelb(l)au, 1970) As early as 1981, in the **Roter Engel** Bar in Vienna, the typical characteristics of their work become apparent: An occasionally aggressive system of interpenetration, overlapping, interlacing visually dissolves the closed space, where the horizontal and vertical are no longer a matter of course, and simulates a new indeterminacy of space as it were. It was probably Coop Himmelb(l)au who achieved the highest degree of openness in the realm of experimental architecture and of so-called »Deconstructivism«, particularly in the early designs during the 1980s and 1990s. They clearly claim that their work has this openness, and thus their design for the **Open House** for Malibu, California, is so to speak a classic example for »indeterminate« space. The sketches and model were made in 1983. Coop Himmelb(l)au has codified the vocabulary of the Deconstructivists particularly clearly: This simply consists of panels that intersect, overlap, overlay each other, and rods and bars that cross and become knotted. The precise interplay of horizontals and verticals has had its day, the box as a spatial concept has lost its usefulness. As a result space is no longer measurable, it is an interplay of distances, fields of reference, points, lines. It has no volume, for the connection with the infinity of space makes it impossible to give data on its dimensions. Of course, the model for the Open House in Malibu is only the idea of the house; in reality glass elements enclosing the space would be necessary. The design was not implemented. But in a few other, implemented projects, Coop Himmelb(l)au shows that it has successfully managed to »bring over« into the world of reality an amazing number of features from the first totally open sketches. The early formal beginnings are developed further in an exemplary small project: It is an **installation at the Württembergischer Kunstverein** in Stuttgart (1982). The functionless work can demonstrate even more clearly the new *spatial* idiom that has left rational orthogonality far behind. What is surprising, however, is that these seemingly unrealistic stances against functionalism and Post-Modernism have been very adequately implemented.

Coop Himmelb(l)au's first great success is a **loft conversion** for a Viennese law firm (1984 to 1989): From the outside, the conversion looks like a huge bird that has alighted on the roof; in the interior the architects have created one of the most fascinating spaces of the recent architectural scene (illus. 395). It's true that Coop Himmelb(l)au's work in the 1990s can no longer be classed with »Deconstructivism«, but in view of their bold articulation of »open space« they must be mentioned here.

One wing of the **Museum of Art in Groningen** was completed by Himmelb(l)au in 1996, and again we are confronted with the kind of indeterminate spatial situation whose forebears may be Piranesi's Carceri and Schwitters' Merzbau.

The implementation of the **UFA Cinema Center** in Dresden in 1993–98 (illus. 396) is a significant breakthrough to a unique architectonic large-scale form. The principle of a »canted« architecture, which, like »Deconstructivism«, does not follow the dictate of the right angle, or even of gravity, has been consistently and competently implemented. The dialectics of large concrete areas and of an optimal spatial transparency produces all kinds of tensions, and the vistas of the



394. Coop Himmelb(l)au, BMW-Welt, Munich, 2001–07.

395. Coop Himmelb(l)au, Loft conversion for a law firm in Vienna, 1984–89.

396. Coop Himmelb(l)au, UFA Cinema Center (Palace), Dresden, 1993–98.

397. Coop Himmelb(l)au, New Urban Entertainment Center, Guadalajara, Mexico, 1998.



large lobby, especially by artificial light, as well as the views of the urban, by no means attractive surrounding area, show various aspects of »open space«. Once more, the architects also invoke the association with a crystal when they speak of a »hall glazed with diamond-shaped glass«. In the bold design for the project of the **New Urban Entertainment Center** in Guadalajara (1998), which has not been implemented yet, Coop Himmelb(l)au again took up the term »cloud« for a hall building with a large overhang (illus. 397).

Spatial tensions produced by closed and open surfaces, similar to those in the UFA Cinema Center, were further complemented in the **Akron Art Museum** in Ohio (2007) by confrontation with a conventional old building.

Coop Himmelb(l)au have continued to make use of great opportunities to celebrate »open space« in large-scale projects, though always in confrontation with the surface, with the shell, with the volume. The principle of the roof-only building (cf. chap. 9.6) is brilliantly articulated in the **BMW-Welt Munich** (2007), which is made particularly clear in the model. The curved roofs touch the ground substantially at two points (illus. 394).

The **Musée des Confluences** (2009) in Lyon is an imaginative modification of the Munich building (illus. 397). »The museum understands itself not as an exclusive ›Temple of the Muses‹ for the educated elite, but as a public gateway to the knowledge of our time. It stimulates a direct, active use – not only as a place of contemplation, but also as a meeting place in the city. The striking interface situation of the construction site at the eponymous confluence of the Rhône and the Saône inspired the superposition in urban space of two complexly linked architectural units, crystal and cloud. The cloud structure, floating on pillars, contains a spatial sequence of black boxes – admitting no daylight, so as to achieve maximum flexibility for exhibition design. By contrast, the crystal, rising towards the city side, functions as a transparent urban forum; it faces the city and receives visitors. Its clear, readable forms stand for the world in which we move each day. The cloud, by contrast, holds the knowledge of the future. What is known and what is to be explored are understood in the Musée des Confluences as a spatial experimental design to stim-